# TECHNICAL REPORT

## Geochemical Assessment of Waste Rock and Tailings Materials

### Mt Rawdon Gold Mine

**Prepared for: Mt Rawdon Operations Pty Ltd**

MINE WASTE AND WATER MANAGEMENT

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# Glossary of terms and acronyms

| | |
|---|---|
| Acidity | A measurement of the amount of acidity in a water sample generally derived using a titration method to a set pH value (in units of mg/L $CaCO_3$ equivalent). |
| Alkalinity | A measurement of the amount of alkalinity in a water sample generally derived using a titration method to a set pH value (in units of mg/L $CaCO_3$ equivalent). |
| ABA | Acid Base Account. Evaluation of the balance between acid generation and acid neutralisation processes. Determines the maximum potential acidity (MPA) and the inherent acid neutralising capacity (ANC), as defined below. |
| ALS | Australian Laboratory Services. |
| AMD | Acid and metalliferous drainage from mine waste materials characterised by low pH, elevated metal concentrations, high sulfate concentrations and high salinity. |
| ANC | Acid Neutralising Capacity expressed as kg $H_2SO_4$ per tonne of sample. A measure of a sample's maximum potential ability to neutralise acid. |
| ANC:MPA | The ratio of the acid neutralising capacity to the maximum potential acidity of a sample. Used to assess the risk of a sample generating acid conditions. |
| AS | Australian Standards |
| EC | Electrical Conductivity, expressed as µS/cm. |
| Eh | Redox potential. A measure of the tendency of a chemical species to acquire or lose electrons to an electrode. Used to measure oxidising (+ve) or reducing (-ve) conditions in a saturated column. |
| GAI | Geochemical Abundance Index |
| ICP-MS | Inductively Coupled Plasma Mass Spectrometry |
| ICP-AES | Inductively Coupled Plasma Atomic Emission Spectrometry. |
| INAP | International Network on Acid Prevention |
| KLC | Kinetic Leach Column. Leaching setup that generates time-dependent data on the kinetics and rate of acid generation and acid neutralising reactions under laboratory controlled (or onsite conditions) |
| LoR | Limit of Reporting. Laboratory detection limit for the reporting of results for a particular geochemical test. |
| MPA | Maximum Potential Acidity. Calculated by multiplying the total sulfur or sulfide-sulfur (CRS) content of a sample by 30.6 (stoichiometric factor) and expressed as kg $H_2SO_4$ per tonne. |
| NAF | Non-Acid Forming. Geochemical classification criterion for a sample that will not generate acid conditions. |
| NAPP | Net Acid Producing Potential, expressed as kg $H_2SO_4$ per tonne. Calculated by subtracting the ANC from the MPA. |
| NMD | Neutral mine drainage typically caused by exposure of sulfide minerals in mine waste materials to oxygen and water and then neutralisation by gangue minerals. Typically characterised by neutral pH and elevated concentrations of salts, sulfate and metals. |
| Ore | Material that has been mined with sufficient value to warrant processing. |
| PAF | Potentially Acid Forming. Geochemical classification criterion for a sample that has the potential to generate acid conditions. |
| PC Titrator | Potentiometric Compact Titrator. PC Titrators are specially designed for routine applications and simple operation, allowing basic titration analysis from a single device. |

| | |
|---|---|
| pH | A measure of hydrogen ion ($H^+$) concentration. |
| PSD | Particle size distribution. |
| S | Sulfur. |
| SD | Saline Drainage. Water that is elevated in dissolved salts (e.g., $Na^+$, $K^+$, $Ca^{2+}$, $Mg^{2+}$, $Cl^-$, and $SO_4^{2-}$), but may have acidic, neutral, or alkaline pH. |
| $SO_4^{2-}$ | Sulfate. |
| Static test | Procedure for characterising the geochemical nature of a sample at a single point in time. Static tests may include measurements of mineral and chemical composition of a sample and the Acid Base Account. |
| TS | Total sulfur content of a sample generally measured using a 'LECO' analyser expressed as total sulfur%. |
| w:v | Weight to volume ratio. |

# 1 Introduction

## 1.1 Background

Mount Rawdon Operations (MRO) is owned by Evolution Mining and is located in south-east Queensland, approximately 75 km south-west of Bundaberg, and 300 km north-northwest of Brisbane. MRO is an open cut gold mine with facilities for gold recovery by ore processing at a Carbon-in-Leach (CIL) treatment plant, and the tailings is retained in an engineered tailings storage facility (TSF). Mining, processing of ore, and tailings deposition commenced in January 2001 and construction of a waste rock dump in March 2002. The mining operation entered the closure planning phase in 2024.

At the MRO TSF, waste rock classified as Medium and High Potentially Acid Forming (PAF) materials have been used as follows:

- Medium PAF waste rock was placed onto an area in the North Waste Rock Dump (NWRD) along with a larger volume of Non-Acid Forming waste rock. Towards the end of mine life some Medium PAF waste rock was placed in an area at the west of the TSF.
- High PAF waste rock was used to construct a 100 m wide internal groin into the centre of the TSF that formed a circular decant structure to improve dewatering of the TSF. At closure, the High PAF waste rock will be pushed into the tailings. This type of mixing is known as co-disposal and the objective is to ensure that all voids in the waste rock are filled with tailings materials.

RGS was commissioned by MRO to continue a long-term static and kinetic geochemical test program for waste rock types and tailings and waste rock mixtures, that reflect potential long-term field storage situations for these materials at the TSF. It is typical industry practice to undertake static and kinetic geochemical tests at a laboratory scale and then upscale to field trials. Available results for the MRO waste rock field trials have previously been reported (RGS, 2018), although these trials were discontinued in favour of long-term kinetic laboratory tests.

The advantage of kinetic laboratory testing is that (1) reactions can be enhanced as the material is crushed to pass a 10 mm sieve, therefore increasing the surface area of the rock and (2) there is control of the leach testing and application and recovery of water thereby reducing uncertainty in the interpretation of results that can occur in field tests.

## 1.2 Geology and Geochemistry

MRO has completed a number of studies over the years to confirm the geology and geochemical nature of waste rock and tailings materials produced and stored on site as a result of mining and processing ore (RGS, 2011; 2016b; 2018, 2020 and 2021a,b). The geology of the waste rock is variable however waste rock materials are generally classified into three material types on site:

- Non-Acid Forming waste rock (NAF waste rock).
- Medium Potentially Acid Forming waste rock (Medium PAF waste rock); and
- High PAF waste rock.

In contrast, the tailings are generally classified as NAF or Uncertain

The results from ongoing long-term kinetic geochemical studies are included herein to confirm that the predicted classification remains valid in the longer term and that the geochemical nature of the tailings has not changed significantly over time (e.g., if ore was being processed from deeper elevations and/or different locations within the open pit).

It is intended that the KLC data contained herein as well as relevant site information be used in a geochemical modelling program to predict the long term geochemical nature of waste rock and tailings materials and that the result of that modelling program be contained in a separate report.

# 2 Scope of Work

The RGS scope of work was to complete a static and kinetic geochemical (and mineralogical) assessment of representative bulk samples of NAF and PAF waste rock materials and NAF/Uncertain tailings materials from the Project. The RGS Scope of Work was completed using recognised standards and guidelines and in compliance with relevant legislation and regulations This included:

- Continue KLC testing of select waste rock and tailings samples for a further period of 12 months.
- Sub-sample existing KLC test material and subject this to static geochemistry testing and mineralogical testing.
- Investigate the reasons behind the less reactive nature of MRO waste rock and tailings materials compared to predictions/classifications made using classical static geochemical test methods
- Compile the available KLC test data and establish a geochemical database to support the Geochemical Modelling program.
- Provide an opinion on the reasons behind the less reactive nature of MRO waste rock and tailings materials compared to predictions/classifications made using classical static geochemical test methods.
- Link the long-term geochemistry of the waste rock and tailings materials with the current cover designs.
- Provide a stand-alone RGS technical report which will include detailed interpretation of the results of the geochemistry (and mineralogical) program of work.

The outcome of completion of the above scope of work is this stand-alone technical report, which provides geochemical (and mineralogical) information on waste rock and tailings materials; a description of the sampling and geochemical testing methodology; presentation and discussion of the results and findings; and development of conclusions and recommendations.

In addition to the scope of work described above, RGS was commissioned by MRO to undertake a geochemical modelling exercise (using Geochemist Workbench (GWB) and/or PHREEQC) as a separate program of work to assess the long-term geochemical characteristics of the waste rock and tailings materials and provide a separate modelling report.

# 3 Methodology

## 3.1 Material Sampling

The sampling strategy and subsequent geochemical characterisation strategy for waste rock and tailings materials from MRO was guided by Australian (AMIRA, 2002; DEHP, 2013; DME, 1995; and COA, 2016) and international (INAP, 2024; MEND; 2005) technical guidelines for the geochemical assessment of mining wastes. The more recent guidelines favour a risk-based approach to development of a sampling and geochemical testing strategy at a mining operation.

The sampling strategy utilised by RGS at the Project involved working closely with MRO personnel to identify and collect representative bulk samples of NAF and PAF waste rock materials and NAF/Uncertain tailings materials for geochemical testing.

Four bulk samples were collected by MRO personnel and transferred to ALS Environmental Laboratory in Brisbane (ALS Brisbane) for sample preparation and geochemical testing. These samples comprised:

- NAF waste rock from waste material used in the MRO field pad trials (RGS, 2018).
- Medium PAF waste rock from waste material used in the MRO field pad trials (RGS, 2018.
- High PAF waste rock from waste material used in the MRO field pad trials (RGS, 2018); and
- Tailings materials recovered from the discharge line into the TSF.

These samples were subjected to a program of static geochemical, mineralogical and physical tests and then used to set up six large Kinetic Leach Column (KLC) tests as described in **Section 3.2** and previously reported to MRO (RGS, 2020). RGS has operated the six large KLC tests under unsaturated (free draining conditions) analogous to a worst-case scenario at the waste rock dump and TSF, or the surface tailings at the TSF, for eight years. The results of static and KLC test program for these materials are included herein.

Two smaller long-term KLC tests on tailings materials were also included in the KLC test program and were operated to align with relevant technical guidelines (AMIRA, 2002). One of these KLC tests was operated under unsaturated (free draining) conditions and the other under saturated (anoxic) conditions for a period of ten years as previously reported to MRO (RGS, 2021a).

### 3.1.1 Mineralogical specimens sampling

In order to investigate the lower reactivity of the MRO waste rock samples, compared to predictions made using standard static geochemical classification techniques, targeted 20 g sub-samples of waste rock were collected from specific locations in the KLC profile in 2021 and 2023 (**Figure 3-2**). In 2021 the sub-samples were subjected to static geochemcial tests at ALS laboratory. The sub-samples taken in 2023 were sent to ALS for Laser Particle Size Distribution (PSD) and particles less than 5 mm were sent to X-Ray Vision and Blue Minerals Consultancy to be subjected to semi quantitative X-Ray Diffraction (XRD) and Scanning Electron Microscopy (SEM), respectively.

The selection of the specific sub sampling points in the KLC tests was based on obtaining samples to allow comparison of the characteristics of the more exposed materials at the top of KLC tests against material that located in the middle of the KLC tests, that has been less exposed to air, heat and light, and analyse if this exposure has made a difference in the geochemical evolution of the materials.

## 3.2 Geochemical Characterisation

All geochemical test work completed in this project was based on industry recognised procedures for the geochemical characterisation and assessment of mine materials (Parker and Robertson, 1999; AMIRA, 2002; COA, 2016; MEND, 2005 and INAP, 2024). A summary of those parameters included in a static and kinetic geochemical characterisation program for mine waste materials is provided in **Attachment A**.

### 3.2.1 Static Tests

Static geochemical tests provide a 'snapshot' of the characteristics of a sample material at a single point in time. These tests were completed to screen the four bulk waste rock and tailings samples before undertaking more detailed static test and kinetic geochemical tests.

The three bulk waste rock samples (approximately 150 kg each) received by ALS were crushed (to pass 10 mm sieve size), sub-sampled and pulverised before being subjected to a series of static geochemical tests on the pulverised (<75 µm) sample fractions. Similarly, the bulk (60 L) tailings sample was sub-sampled and dried as received at 60 °C, before being subjected to a series of static geochemical tests. The geochemical test program was coordinated by RGS personnel and designed to assess the degree of risk from potential oxidation of sulfides, acid generation, and the presence of (and leaching of) soluble metals/metalloids and salts.

Each solid sample underwent static geochemical testing for:

- pH (1:5 w:v).
- Electrical conductivity (EC) (1:5 w:v).
- Total sulfur content [Leco method].
- Acid Neutralising Capacity (ANC) [AMIRA, 2002]; and
- Chromium Reducible Sulfur (Scr) [AS , AS 4969.7-2008 method].

From the total sulfur and ANC results, Maximum Potential Acidity (MPA) and Net Acid Producing Potential (NAPP) values were calculated.

The three pulverised waste rock samples and single tailings sample were also subjected to whole rock multi-element tests. The samples were tested for:

- Total metals/metalloids (Al, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Hg, Pb, Mn, Mo, Ni, Sb, Se, Th, U and Zn) in solids [HCl and $HNO_3$ acid digest followed by FIMS for Hg, discrete analyser for $SiO_2$ and ICP-MS / -AES for all other elements].
- Total cations (Ca, Mg, Na and K) [HCl and HNO3 acid digest followed by ICP-AES]; and
- PSD [by Hydrometer].

The tailings sample was also subjected to total and weak acid dissociable (WAD) cyanide analysis using a segmented flow analyser.

Additional mineralogical (semi-quantitative XRD) tests were completed on the three bulk waste rock and single bulk tailings sample used in the test program at Levay and Co. Laboratory at the University of South Australia. PSD tests were completed on the waste rock samples used in the KLC described below at Trilab laboratory in Brisbane. A copy of the geochemical results from ALS, mineralogical results from Levay and Co., and PSD results from Trilab for the static test program are provided in **Attachment C**.

### 3.2.2 Kinetic Tests

Following receipt and interpretation of the static geochemical test results, six Kinetic Leach Column (KLC) tests were set up at the RGS in-house laboratory using crushed waste rock samples (passing 10mm sieve size), tailings (as received), and mixtures of PAF waste rock materials and tailings. A schematic of the KLC test set up utilised by RGS is provided in **Figure 3-1**.

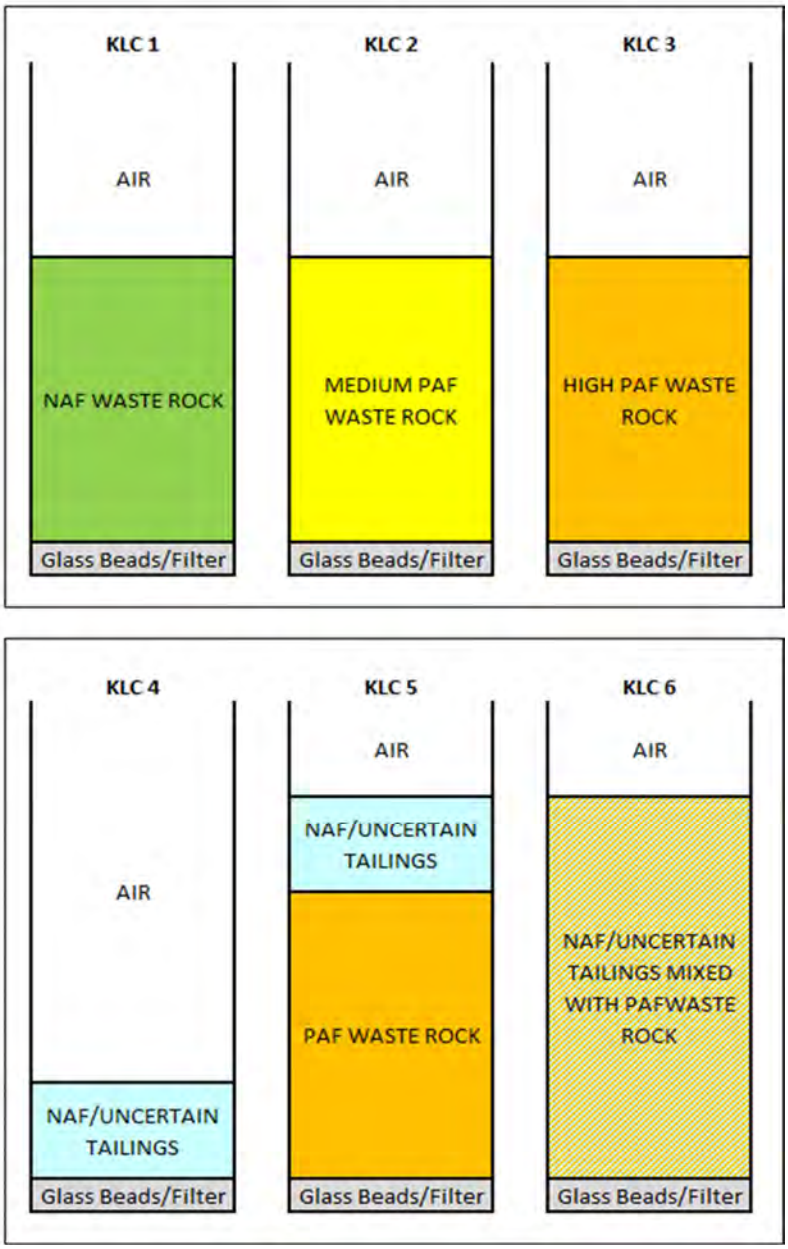


**Figure 3-1: Schematic illustrating the KLC test setup (not to scale)**

The KLC tests utilised large columns (30 L) and represent:

- NAF waste rock – KLC1.
- Medium PAF waste rock – KLC2.
- High PAF waste rock – KLC3.
- Tailings collected from the discharge line into the TSF – KLC4.
- Tailings placed on top of PAF waste rock simulating co-mingling – KLC5; and
- Tailings mixed intimately with PAF waste rock simulating co-disposal – KLC6.

The six large KLC tests for waste rock and tailings materials commenced in August 2016 at the RGS in-house laboratory and were operated under a monthly watering and leaching cycle for three months and then a quarterly watering and leaching cycle until December 2024, including a three-year hiatus from August 2018 to August 2021. Essentially, 19 KLC leach events have occurred over a period of almost seven years and leachate quality results from these events are provided in this report.

The KLC tests were allowed to dry between monthly leaching events to ensure that the waste rock materials were unsaturated and subject to oxidising conditions. This is essentially an assumed 'worst case' scenario for potential sulfide oxidation, acidity generation and metal/metalloid and salt release.

Two smaller long-term KLC tests on tailings materials commenced in December 2014 and were operated to align with relevant technical guidelines (AMIRA, 2002). One of these KLC tests was operated under unsaturated (free draining) conditions and the other under saturated (anoxic) conditions over a total test period of 10 years to November 2024, including a three-year hiatus from August 2018 to August 2021.

After the Interpretation of QXRD and SEM mineralogical analyses, it was determined that there was evidence of passivation of pyrite in the KLC 3 (High PAF waste rock sample) and a decision was made to split the materials in KLC 3 into two columns. One of the two KLC 3 sub-samples continued to be leached according to the previous KLC leaching regime. The second KLC 3 sub-sample (KLC 3AW), was leached with a solution of hydrochloric acid (HCl) (at pH 4.0) to further investigate the apparent pyrite surface passivation. It was decided to use HCl instead of sulfuric acid ($H_2SO_4$) to avoid influencing sulfate concentrations in the collected leachate.

All leachate samples collected from the total of nine KLC tests were sent to ALS Laboratory in Stafford, Queensland for analysis of:

- pH and EC.
- Acidity and alkalinity [Automatic titrator].
- Dissolved metals/metalloids (Al, As, Cd, Cr, Co, Cu, F, Fe, Pb, Mn, Mo, Ni, Sb, Se, Si and Zn) [ICP-AES].
- Dissolved major cations (Ca, Mg, Na and K) [ICP-AES]; and
- Dissolved major anions (Cl, SO4) [ICP-AES].

The KLC leachate test results are tabulated and presented graphically in **Attachment B** and the geochemical results received from ALS Laboratory for the KLC tests are provided in **Attachment C.**

### 3.2.3 Additional Mineralogical Tests

Additional mineralogical tests were completed on samples of waste rock and tailings materials obtained from the six large KLC tests (surface and at depth) and one of the two AMIRA style KLC tests in December 2023 at the same point as the subsamples from 2021 as illustrated in **Figure 3-2**.

The semi-quantitative XRD tests were completed by X-Ray Vision in Australia Capital Territory, and the samples were sent to Blue Minerals Consultancy to be analysed for potential passivation by Scanning Electron Microscopy (SEM). The results from these tests are provided in **Attachment D** and are summarised and discussed further in **Section 4.4**.

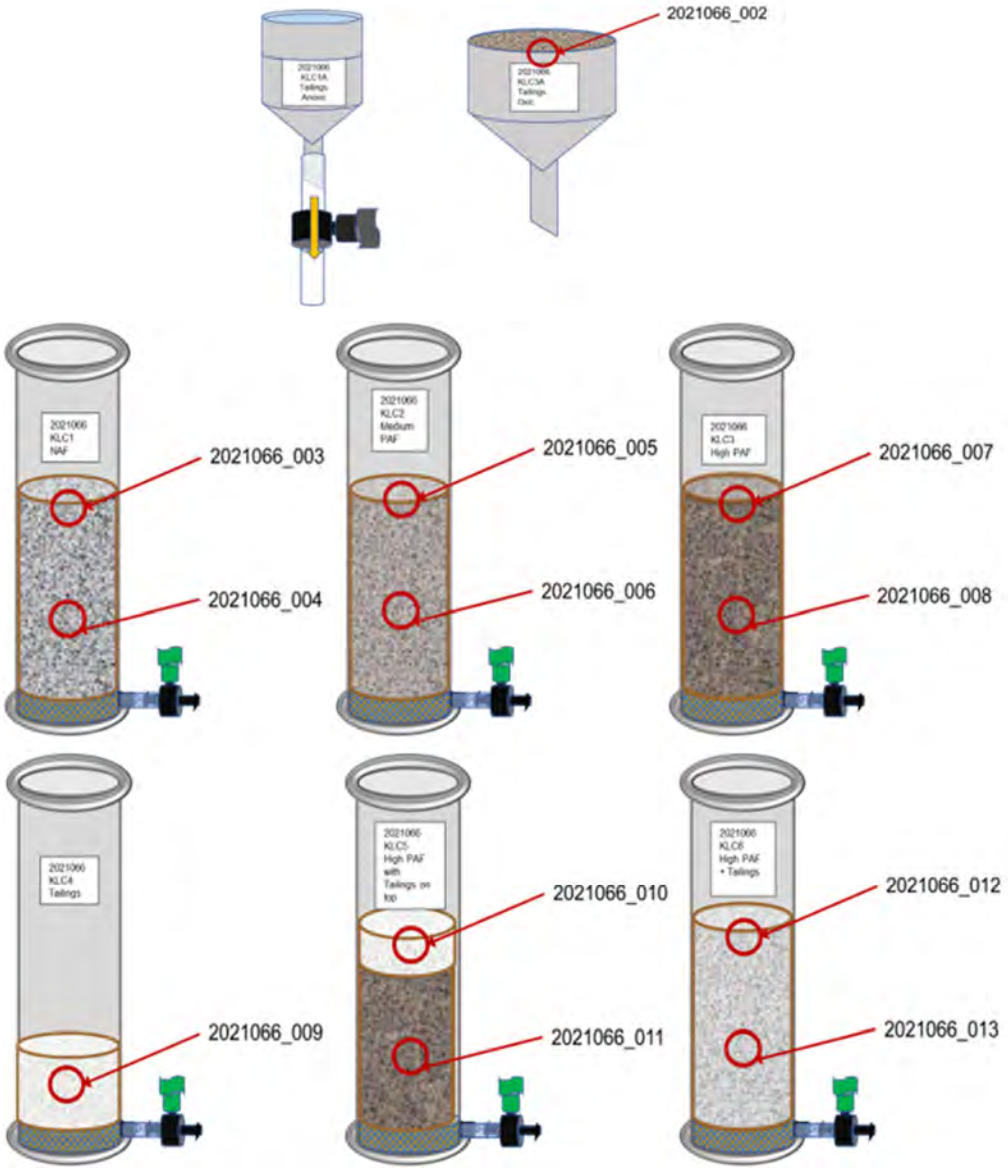


**Figure 3-2: Schematic illustrating the KLC samples taken for mineralogical testing (not to scale)**

# 4 Geochemical Test Results

## 4.1 Acid Base Account Test Data

Acid Base Account (ABA) test results for the sample materials are presented in **Attachment C** and summarised in **Table 4-1**. These results were obtained for the three bulk waste rock samples and single tailings sample used in the large KLC tests; the four composite tailings samples used in the two smaller AMIRA style KLC tests, and the KLC column sub-samples described in **Section 3.2.3**.

### 4.1.1 pH (1:5)

- The pH of the four individual tailings samples collected in 2014 and used as a composite to construct the small AMIRA style KLC tests is slightly alkaline and covers a narrow range from 8.2 to 8.6. The pH of the sub-sample of tailings taken from the oxic KLC test after seven years of exposure to oxidising conditions remains within this range and is slightly alkaline at pH 8.3.
- The bulk waste rock samples used for the large KLC tests in 2016 have alkaline pH values ranging from pH 8.0 to 9.5 although the bulk tailing sample has a more alkaline pH of 10.1. The pH of the NAF waste rock sub-samples from KLC1 taken in August 2021 shows no significant change after five years of exposure to oxidising conditions (pH 9.4 and pH 9.6 for sub-samples taken from the top and middle of KLC1, respectively). The pH values of the moderate (KLC2) and high PAF (KLC3) waste rock sub-samples have slightly lower pH values for the sub-samples taken in the middle of the columns compared to the samples taken from the top but remain slightly alkaline (pH 8.0) after five years of exposure to oxidising conditions.
- The sub-sample of the bulk tailings taken from KLC4 in 2021 has a pH value of 8.2, which is less than the original pH value of 10.1 but remains slightly alkaline after five years of exposure to oxidising conditions.
- The pH of the sub-samples from the mixed waste rock and tailings KLC tests (KLC 5 and KLC 6) are slightly alkaline (pH 8.4 to 8.8) after five years of exposure to oxidising conditions. The pH of the subsamples taken from the top and middle of KLC5 are slightly greater than the pH of sub-samples taken from the top and middle of KLC 6, although the pH difference is marginal.
- The deionised water used by ALS in the tests typically has a pH value of pH 5.0 to 6.5.

### 4.1.2 EC (1:5)

- The EC of four individual tailings samples collected in 2014 and used as a composite to construct the small AMIRA style KLC tests is low to moderate and in the range from 735 to 3,330 µS/cm. The EC of the sub-sample of tailings taken from the oxic KLC test after seven years of exposure to oxidising conditions had reduced to 641 µS/cm.
- The bulk waste rock samples used for the large KLC tests in 2016 have low EC values 51 to 699 µS/cm with values for the medium and high PAF materials showing highest values in the sub-samples taken from the middle of the columns in 2021, after five years of exposure to oxidising conditions.
- The sub-sample of the bulk tailings taken from KLC4 in 2021 has a low EC value of 917 µS/cm, which is greater than the original EC value of 335 µS/cm but remains relatively low after five years of exposure to oxidising conditions.
- The EC of the sub-samples from the mixed waste rock and tailings KLC tests (KLC 5 and KLC 6) show a brackish EC value at the top of the columns after five years of exposure to oxidising conditions which is greater than the sub-samples taken from the middle of the columns, probably reflection greater exposure to oxidising conditions.

## Table 4-1: Acid Base Account Results for MRO Waste Rock and Tailings Samples

| Sample No. | RGS Sample ID | ALS Lab ID | Material Type | Client Sample ID | Material Type | pH[1] | EC[1] | Total S | Scr | Scr/S | ANC[2] | MPA[2] | NAPP[2] | ANC:MPA Ratio | $NAG_{pH}$ | Sample Classification[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | (µS/cm) | (%) | | | (kg $H_2SO_4$/t) | | | | | |
| 1 | MR01 | EB1446978001 | Tailing | Tailings | 2014 Tailings | 8.2 | 2040 | 1.14 | 0.795 | 70% | 47.5 | 24.3 | -23.2 | 2.0 | 9.5 | Non-Acid Forming |
| 2 | MR02 | EB1446978002 | Tailing | Tailings | 2014 Tailings | 8.6 | 3330 | 1.15 | 0.797 | 69% | 43.3 | 24.4 | -18.9 | 1.8 | 8.9 | Non-Acid Forming |
| 3 | MR03 | EB1446978003 | Tailing | Tailings | 2014 Tailings | 8.6 | 1530 | 1.07 | 0.795 | 74% | 28.0 | 24.3 | -3.7 | 1.2 | 9.2 | Uncertain |
| 4 | MR04 | EB1446978004 | Tailing | Tailings | 2014 Tailings | 8.3 | 759 | 1.16 | 0.839 | 72% | 27.5 | 25.7 | -1.8 | 1.1 | 9.1 | Uncertain |
| 5 | 2021066_0002 | EB2124089001 | Tailing | 2021066_KLC3A | 2021 Tailings (Oxic) | 8.3 | 641 | 1.04 | 0.793 | 76% | 38.6 | 24.3 | -14.3 | 1.6 | - | Non-Acid Forming |
| 6 | 1 | EB1619048001 | NAF WR | NAF | 2016 NAF Waste Rock | 9.5 | 104 | 0.54 | 0.355 | 66% | 90.2 | 10.9 | -79.3 | 8.3 | - | Non-Acid Forming |
| 7 | 2021066_0003 | EB2124089002 | NAF WR | 2021066_KLC1 | 2021 NAF Waste Rock | 9.4 | 210 | 0.24 | 0.224 | 93% | 85.6 | 6.9 | -78.7 | 12.5 | - | Non-Acid Forming |
| 8 | 2021066_0004 | EB2124089003 | NAF WR | 2021066_KLC1 | 2021 NAF Waste Rock | 9.6 | 51 | 0.52 | 0.513 | 99% | 78.3 | 15.7 | -62.6 | 5.0 | - | Non-Acid Forming |
| 9 | 2 | EB1619048002 | Medium PAF WR | Medium PAF | 2016 Medium PAF Waste Rock | 9.4 | 120 | 1.49 | 1.340 | 90% | 66.1 | 41.0 | -25.1 | 1.6 | - | Non-Acid Forming |
| 10 | 2021066_0005 | EB2124089004 | Medium PAF WR | 2021066_KLC2 | 2021Medium PAF Waste Rock | 9.4 | 75 | 1.77 | 1.740 | 98% | 52.8 | 53.3 | 0.5 | 1.0 | - | Uncertain |
| 11 | 2021066_0006 | EB2124089005 | Medium PAF WR | 2021066_KLC2 | 2021 Medium PAF Waste Rock | 8.0 | 456 | 1.67 | 1.510 | 90% | 47.0 | 46.2 | -0.8 | 1.0 | - | Uncertain |
| 12 | 3 | EB1619048003 | High PAF WR | High PAF | 2016 High PAF waste rock | 9.0 | 187 | 4.29 | 3.600 | 84% | 37.7 | 110.3 | 72.6 | 0.3 | - | Potentially Acid Forming |
| 13 | 2021066_0007 | EB2124089006 | High PAF WR | 2021066_KLC3 | 2021 High PAF waste rock | 8.8 | 230 | 5.86 | 5.260 | 90% | 34.0 | 161.1 | 127.1 | 0.2 | - | Potentially Acid Forming |
| 14 | 2021066_0008 | EB2124089007 | High PAF WR | 2021066_KLC3 | 2021 High PAF waste rock | 8.0 | 699 | 5.34 | 4.910 | 92% | 36.6 | 150.4 | 113.8 | 0.2 | - | Potentially Acid Forming |
| 15 | 4 | EB1619582001 | Tailing | Tailings | 2016 Tailings | 10.1 | 335 | 1.51 | 1.220 | 81% | 35.4 | 37.4 | 2.0 | 0.9 | - | Uncertain |
| 16 | 2021066_0009 | EB2124089008 | Tailing | 2021066_KLC4 | 2021 Tailings | 8.2 | 917 | 1.66 | 1.300 | 78% | 32.2 | 39.8 | 7.6 | 0.8 | - | Uncertain |
| 17 | 2021066_0010 | EB2124089009 | High PAF WR | 2021066_KLC5 | 2021 Tailings on top of High PAF | 8.6 | 2660 | 2.24 | 0.999 | 45% | 31.0 | 30.6 | -0.4 | 1.0 | - | Uncertain |
| 18 | 2021066_0011 | EB2124089010 | High PAF WR | 2021066_KLC5 | 2021 Tailings on top of High PAF | 8.8 | 197 | 5.17 | 4.300 | 83% | 43.2 | 131.7 | 88.5 | 0.3 | - | Potentially Acid Forming |
| 19 | 2021066_0012 | EB2124089011 | High PAF WR | 2021066_KLC6 | 2021 High PAF + Tailings | 8.5 | 2220 | 6.75 | 4.770 | 71% | 36.5 | 146.1 | 109.6 | 0.2 | - | Potentially Acid Forming |
| 20 | 2021066_0013 | EB2124089012 | High PAF WR | 2021066_KLC6 | 2021 Composite High PAF + Tailings | 8.4 | 1500 | 6.59 | 5.790 | 88% | 34.9 | 177.3 | 142.4 | 0.2 | - | Potentially Acid Forming |

Notes:
1. Current pH, EC, Alkalinity and Acidity provided for 1:5 sample:water extracts
2. Scr = Chromium Reducible Sulfur; MPA = Maximum Potential Acidity; ANC = Acid Neutralising Capacity; NAPP = Net Acid Producing Potential; NAG = Net Acid Generation.
3. Sample classification criteria detail provided in report text. LC = Low Capacity.

The pH and EC tests described in this section were completed on pulverised waste rock samples (≤ 75 µm) or 'as received' tailings material with a large, exposed surface area in contact with the leaching solution, thereby providing a high potential for dissolution and reaction, and represent an assumed 'worst case' scenario. It is also expected that the salinity of leachate from low sulfur NAF waste rock materials will diminish with time as salts are flushed from the rock matrix and a state of equilibrium develops. At that point, the salinity of seepage/runoff should stabilise at a lower asymptotic concentration relative to the weathering/erosion of the materials. In contrast, the salinity of leachate from higher sulfur PAF waste rock materials may increase to some extent if these materials are allowed to oxidise over time.

### 4.1.3 Sulfur, MPA and ANC

- **Total Sulfur**. The total sulfur content for the 2016 bulk waste rock and tailings samples ranges from 0.24 to 4.29 %S and is lowest in the NAF waste rock and highest in the High PAF waste rock. The total sulfur content of the 2014 and 2016 tailings samples ranges from 1.07 to 1.51 %S. All samples have elevated total sulfur content compared to the median crustal abundance (0.1 %) for this element (INAP, 2024). Materials with a total sulfur content less than or equal to 0.1 %S are essentially barren of sulfur, represent background concentrations, and have negligible capacity to generate acidity.
- **Sulfide Sulfur**. The sulfide sulfur content of the 2016 waste rock and 2014 and 2016 tailings samples as measured in the Scr test ranges from 0.224 to 3.6 %S. The 2021 results for both total sulfur and sulfide sulfur show some variability to 2021 probably reflecting some heterogeneity in the sample materials. The results indicate that approximately 80 % of the total sulfur content of the samples is present as sulfide and may have some potential to generate acidity, with the remainder likely to be present as other forms of sulfur such as sulfate, galena and sphalerite which in fresh materials, generally produce negligible acidity.
- **MPA.** Based on the sulfide sulfur content, the maximum potential acidity (MPA) that could be generated by the 2016 waste rock samples and 2014 and 2016 tailings samples ranges from 10.9 kg $H_2SO_4$/t in the NAF waste rock sample to 110.3 kg $H_2SO_4$/t in the High PAF waste rock sample. The subsamples taken in 2021 typically show slightly higher MPA values probably reflecting some heterogeneity in the materials.
- **ANC.** The Acid Neutralising Capacity (ANC) for the 2016 waste rock samples and 2014 and 2016 tailings samples ranges from 27.5 to 90.2 kg $H_2SO_4$/t and is highest in the NAF waste rock sample. The sub-samples taken in 2021 typically show similar ANC values probably reflecting less heterogeneity in occurrence of ANC within the sample materials than found for sulfides.

### 4.1.4 ANC:MPA Ratio and NAPP

- **ANC:MPA ratio**. The ANC:MPA ratio for the 2016 waste rock samples and 2014 and 2016 tailings samples ranges from 0.3 to 8.3 kg $H_2SO_4$/t and is highest and lowest in the in the NAF and High PAF waste rock samples, respectively. Generally, those samples with an ANC:MPA ratio of greater than 2 are considered to have a low to negligible risk of acid generation and a high factor of safety in terms of potential for AMD (INAP, 2024[1]; COA, 2016). The static test results indicate that the NAF waste rock sample has a negligible risk of acid generation and a relatively high factor of safety with respect to potential for AMD. In contrast the high PAF sample may have reduced factor of safety and increased risk of acid generation. The medium PAF waste rock and tailings samples have some uncertainty regarding their potential to generate acidity although the magnitude of any acidity generated is expected to be small.
- **NAPP**. The calculated NAPP value for the 2016 waste rock samples and 2014 and 2016 tailings samples ranges from -79.3 to +72.6 kg $H_2SO_4$/t and is highest and lowest in the in the NAF and High PAF waste rock samples, respectively. **Figure 4-1** shows the NAPP data for all 20 of the individual waste rock and tailings samples and KLC sub-samples tested.

[1] INAP considers that mine materials with an ANC/MPA ratio greater than 2 are likely to be NAF unless significant preferential exposure of sulfides along fracture planes occurs in combination with insufficiently reactive ANC.

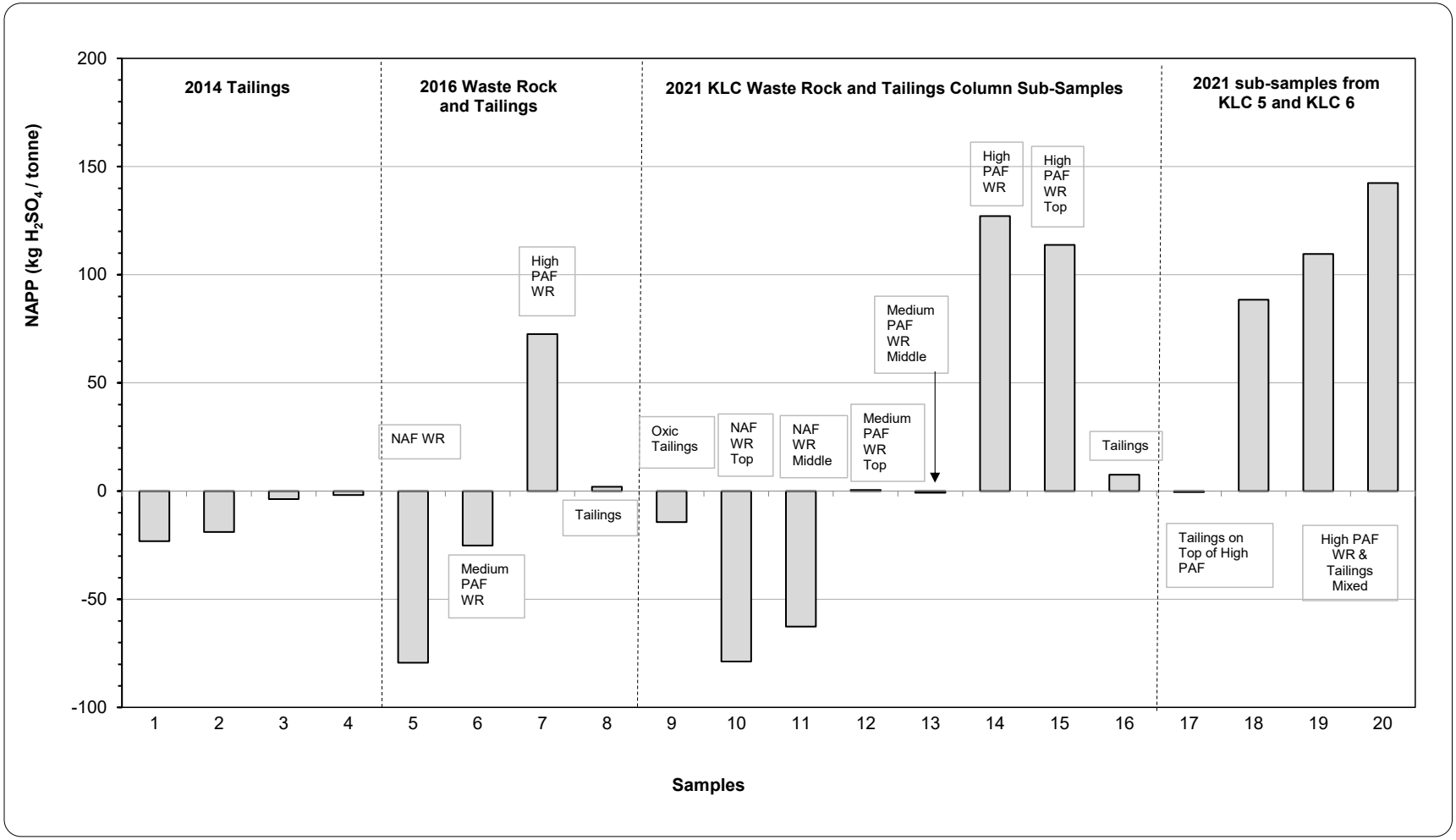


**Figure 4-1:** NAPP values for individual waste rock and tailings samples from 2014 & 2016 and KLC column subsamples taken in 2021

**Table 4-2** provides a summary of the geochemical classification criteria used by RGS to classify the acid forming nature of the four bulk waste rock and tailings samples from 2016 used in the large KLC tests, and the composite tailing samples from 2014 used in the smaller AMIRA style KLC tests; and provides a breakdown of the type of samples in each classification category. Overall, NAF waste rock materials represented by the sample tested have low sulfur content, elevated ANC (from carbonate) and a high factor of safety with respect to potential for AMD. In contrast, High PAF waste rock has elevated sulfur content, lower ANC, and may have some potential to generate AMD after exposure to weathering conditions.

**Table 4-2: Geochemical Classification Criteria for MRO Waste Rock and Tailings Samples**

| Geochemical Classification | Total or Sulfide sulfur (%) | NAPP (kg $H_2SO_4$/t) | Samples |
|---|---|---|---|
| Non-Acid Forming (Barren) | ≤ 0.1 | - | - |
| Non-Acid Forming | > 0.1 | ≤ -10 | NAF waste rock |
| Uncertain[1] | > 0.1 | > -10 & ≤ +10 | Medium PAF waste rock and tailings |
| Potentially Acid Forming | > 0.1 | > 10 | High PAF waste rock |

1. Notes: Samples that fall outside the stated NAF and PAF classifications based on the criteria provided are classified as Uncertain.

Both the Medium PAF waste rock and tailings materials represented by the samples tested generally have some uncertainty associated with their potential to generate AMD and are therefore as bulk materials are classified as Uncertain. In particular, the bulk tailings sample has a finely balanced MPA and ANC values and a NAPP value close to zero. KLC test results described later in this report are required to provide some insight into the actual longer term geochemical nature of these materials.

## 4.2 Multi-Element Concentration in Solids

Multi-element scans were completed on the four bulk waste rock and tailings samples received in 2016, four individual tailings samples received in 2014 and used as a composite sample in the AMIRA style KLC tests, and for the twelve sub-samples taken from the KLC columns in 2021 (i.e., a total of 20 samples). The scans were completed to identify any elements (metals/metalloids) present in these materials at concentrations that may be important with respect to materials handling, storage, final rehabilitation and water quality. RGS has compared the total metal/metalloid concentration the four original samples and the twelve sub-samples with the median crustal abundance for un-mineralised soils (INAP, 2024; and Bowen, 1979). The extent of any enrichment is reported as the Geochemical Abundance Index (GAI), which relates the actual concentration with median crustal abundance on a $\log^{10}$ scale.

The GAI is expressed in integer increments from 0 to 6, where a GAI value of 0 indicates that the element is present at a concentration less than, or similar to, the median crustal abundance; and a GAI value of 6 indicates approximately a 100-fold enrichment above median crustal abundance (**Table 4-3**).

**Table 4-3:** Geochemical Abundance Index Values and Enrichment Factor

| GAI | Enrichment factor | GAI | Enrichment factor |
|---|---|---|---|
| 0 | Less than 3 fold enrichment | 4 | 24 – 48 fold enrichment |
| 1 | 3 – 6 fold enrichment | 5 | 48 – 96 fold enrichment |
| 2 | 6 – 12 fold enrichment | 6 | Greater than 96 fold enrichment |
| 3 | 12 – 24 fold enrichment | | |

As a general rule, a GAI of 3 or greater signifies enrichment that may warrant further examination. This is particularly the case with some environmentally important 'trace' elements, such as As, Cr, Cd, Cu, Pb, Se and Zn, more so than with major rock-forming elements, such as Al, Ca, Fe, Mg and Na.

Elements identified as enriched may not necessarily be a concern for revegetation, drainage water quality or public health, but their significance should still be evaluated. The GAI only provides an indication of metals/metalloids that may be enriched relative to the global median crustal abundance in unmineralised soils, and some points to consider are:

- The median crustal abundance varies between different literature sources, therefore affecting the calculated GAI values.
- If a sample is shown to be enriched relative to the median crustal abundance, there is no direct correlation that that a particular sample will also leach metal/metalloid at elevated concentrations. The mobility of metal/metalloid is dependent on mineralogy, adsorption/desorption and the environment in which it occurs.
- Whilst some element concentrations can be elevated relative to the median crustal abundance, the nature of an ore deposit means the background levels are generally expected to be elevated.
- Similarly, because an element is not enriched does not mean it will never be a concern, because under some conditions (e.g., low pH) the solubility of common environmentally important elements such as Al, Cu, Cd, Fe and Zn increases significantly.

The total metal/metalloid concentrations for the 20 waste rock and tailings samples tested are provided in **Table B1** (**Attachment B**). The relative enrichment of metals/metalloids in the waste rock and tailings samples compared to median crustal abundance (the Geochemical Abundance Index - GAI) is presented in **Table B2** (**Attachment B**).

The GAI results indicate that most of the metals/metalloids measured in the waste rock and tailings samples are not enriched compared to median crustal abundance for soils. The High PAF waste rock samples and the tailings samples can be enriched with arsenic, bismuth, cadmium, silver and zinc compared to median crustal abundance in un-mineralised soils. These results are expected given that the samples are derived from waste rock (and tailings) materials surrounding a mineralised gold ore body.

The enriched silver concentration is most likely an artefact of the very low median value for this metal in un-mineralised soils (0.05 mg/kg), and typical background concentrations in un-mineralised soils can range up to 8 mg/kg (Bowen, 1979).

The results from the 2021 subsamples show the same mineral enrichment as the original samples, however, the sample taken in the middle of the KLC column containing composite mixed High PAF waste rock and Tailings materials was also enriched in lead.

The potential solubility and mobility of these and other metals/metalloids and the potential for effect on water quality was investigated further using long term KLC tests as presented in **Section 4.2**.

## 4.3 KLC Tests

The methodology used to complete the KLC test program has previously been described in **Section 3.2.2**.and the results are presented in this section. The KLC tests were operated to align with relevant mining industry guidelines for such tests (AMIRA, 2002; COA, 2016), albeit the 2016 KLC tests were operated on a larger scale.

The leachate concentrations from the KLC test program over the relevant test period are presented in **Attachment B** alongside livestock drinking water guideline values (ANZG, 2018). These guideline values are provided for context only and are not intended to be interpreted as actual concentrations likely to occur at site water storage or discharge points. It should be noted that the waste rock KLC samples were crushed to pass a 20 mm sieve size, and the tailings samples were used 'as received'. Therefore, both materials have a high surface area for potential geochemical reaction compared to analogous bulk materials in the field situation.

The ratio of sample to water in the KLC test for the MRO waste rock and tailings materials varied from approximately 2:1 to 20:1 (w/v) depending upon the experimental conditions (i.e., concentrated), whereas the ratio of sample to water generally used in tests where results can (arbitrarily) be compared against guideline concentrations to provide relevant context is significantly more dilute at 1:5 (w/v). Whilst arbitrary comparisons against guideline concentrations can be helpful in some situations to provide relevant context, such comparisons cannot be directly extrapolated to the field situation at MRO.

The concentrations trends for major ions and trace metal/metalloids from the waste rock and tailings materials used in the eight KLC tests are presented in **Attachment B,** alongside other useful parameters (such as pH, EC, acidity, alkalinity, net alkalinity, residual sulfur and residual ANC, and selected dissolved metal/ metalloid concentrations.

Tables, **KLC 1** to **KLC 6** (**Attachment B**) provide the KLC test results and relevant graphs for the six bulk KLC tests on waste rock and tailings materials from 2016**. Tables KLC 1A and KLC 3A** provide the KLC test results and relevant graphs for the AMIRA style KLC tests on tailings materials from 2014 under saturated (anoxic) and free draining (oxic) conditions, respectively. Table **KLC 3 (Acid Wash)** provides the information from the duplicate High PAF waste rock sample leached with HCL acid instead of de-ionised water for the four leach events completed during 2024.

The KLC test results obtained to date (i.e., after 23 leach events) indicate that:

- Leachate from the waste rock and tailings samples is likely to be pH neutral to slightly alkaline (in the range pH 6.19 to 9.11) for at least 8 and 10 years of exposure to idealised oxidising/weathering conditions[2].
- The acidity value in leachate from the waste rock and tailings samples is typically very low (≤ 10 mg/L, as $CaCO_3$) for most samples.
- The alkalinity value in leachate from the waste rock and tailings samples is elevated (up to 222 mg/L as $CaCO_3$) and typically has an alkalinity value greater than the acidity.
- The net alkalinity value in leachate from all of the waste rock and tailings samples tested is positive over the entire test period. The PAF waste rock sample has the lowest net alkalinity value, although the value remains positive after eight years of exposure to idealised oxidising/weathering conditions.
- The EC value of KLC leachate from the waste rock samples is generally less than 2,000 µS/cm and is highest in leachate collected from the High PAF waste rock sample after seven years of exposure to idealised oxidising/weathering conditions. The KLC leachate from the tailings samples can also be elevated although the value tends to diminish over time. The elevated salinity level in the leachate from the tailings samples is most likely attributable to salts being flushed from the tailings matrix rather than through significant sulfide oxidation (the leachate pH is neutral; the concentration of some major ions is elevated but follows a similar trend to the EC value and the dissolved iron concentration is typically less than the laboratory LoR (<0.05 mg/L)).
- The concentrations of major ions in leachate from waste rock materials are generally low and dominated by calcium, sodium and sulfate. The concentration of major ions in leachate from the tailings samples are elevated and dominated by calcium, magnesium, potassium, chloride and sulfate, most of which are relatively stable or show a decreasing concentration trend.
- Following the first few flushing event, the sulfate concentration in KLC leachate from most waste rock and tailings samples is generally below the applied livestock drinking water guideline limit (1,000 mg/L) and shows a decreasing concentration trend. The main exceptions are the sulfate concentration for tailings sample (KLC4), which is close to or greater than the applied livestock drinking water guideline (1,000 mg/L) for most of the test period but generally shows a decreasing trend, and KLC6, which has an elevated sulfate concentration in the second half of the test period. The elevated sulfate concentration

[2] It should be noted that the pH of the deionised water used in the KLC tests was typically in the pH range pH 5.02 to 7.07.

appears to be influenced by salts within the tailings. The High PAF Waste Rock sample flushed with HCl (KLC3AW) also shows elevated concentration of sulfate in leachate.

- The KLC waste rock samples retain most of their inherent total sulfur (>98 %) after eight years of exposure to ideal oxidising/weathering conditions, which suggests that the rate of sulfide oxidation is relatively slow for materials represented by these samples. The tailings samples also retain most of their inherent total sulfur (> 93 % and ≈ 80 %) after 8 years and 10 years of exposure to ideal oxidising/weathering conditions, respectively, which suggests that the rate of sulfide oxidation is also slow for materials represented by these tailings samples
- The KLC waste rock samples retain most of their inherent ANC (> 97 %) after 8 years of exposure to ideal oxidising/weathering conditions, which suggests that the rate of depletion of the inherent ANC in these materials is relatively slow, and similar to the sulfide oxidation rate for materials represented by these samples. The tailings samples also retain most of their inherent ANC (≈ 93 % and > 82 %) after 8 years and 10 years of exposure to ideal oxidising/weathering conditions, respectively, which suggests that the rate of depletion of the inherent ANC in these samples is relatively slow for materials represented by these tailings samples.
- The sulfate generation rate results obtained for the KLC tests on waste rock and tailings samples have been used to determine the rate of sulfide oxidation in these materials. Most sulfate salts generated from sulfide reaction involving materials with a relatively low or slow reacting sulfide sulfur concentration are highly soluble, and therefore will be collected in column leachate. The dissolved sulfate (and calcium) concentrations in the KLC leachates are typically less than the solubility limit of gypsum ($CaSO_4$), for example, which indicates that sulfate generation is not controlled by gypsum dissolution in most of the KLC test materials. Therefore, the sulfate concentrations and oxidation rate calculations provide reasonable estimates of these parameters, and the results align well with existing static and dynamic geochemical data derived from a wide range of mine waste materials (AMIRA, 1995). The sulfate generation rate and associated sulfide oxidation rate for the KLC tests are shown in **Table 4-6**.

**Table 4-6: Sulfate Generation and Sulfide Oxidation Rates for Waste Rock and Tailings Samples**

| KLC Sample No. | Sample Description | Sulfate Generation Rate (mg/kg/week) | Oxidation Rate (kg $O_2/m^3/s$) |
|---|---|---|---|
| KLC 1 | NAF Waste Rock | 0.54 | $1.17 \times 10^{-10}$ |
| KLC 2 | Medium PAF Waste Rock | 4.04 | $8.93 \times 10^{-10}$ |
| KLC 3 | High PAF Waste Rock | 10.64 | $2.23 \times 10^{-9}$ |
| KLC 3 AW | High PAF Waste Rock (Acid Washed) | 12.48 | $3.49 \times 10^{-9}$ |
| KLC 4 | Uncertain Tailings | 3.70 | $5.25 \times 10^{-10}$ |
| KLC 5 | High PAF Waste Rock atop Uncertain Tailings | 1.02 | $1.44 \times 10^{-10}$ |
| KLC 6 | High PAF Waste Rock mix Uncertain Tailings | 2.16 | $2.97 \times 10^{-10}$ |
| KLC1A | Tailings (saturated) | 2.03 | $2.64 \times 10^{-10}$ |
| KLC3A | Tailings (oxic) | 1.77 | $2.31 \times 10^{-10}$ |

- The concentration of dissolved sulfate in leachate from the KLC samples is elevated in the tailings samples compared to the NAF and Medium PAF waste rock samples but generally shows a decreasing concentration trend. It is expected that these leachate characteristics result from pore water being flushed from the sample, rather than through any significant sulfide oxidation (the leachate pH is neutral; the concentration of some major ions is elevated but decreases over time and the dissolved iron concentration is typically less than the laboratory LoR (<0.05 mg/L)).

- The sulfate generation rate from the KLC samples ranges from 0.54 to 12.48 mg/kg/week indicating that the rate of sulfide oxidation is low in these materials (equivalent to an oxidation rate ranging from 1.17 x $10^{-10}$ to 3.49 x $10^{-10}$ kg $O_2/m^3/s$). Mining waste materials with an oxidation rate in this range and a moderate ANC level have an increased factor of safety and are likely to generate leachate that is pH neutral and/or has low levels of acidity (AMIRA, 1995; Bennett et al., 2000). Hence, all of the waste rock and tailings samples fall into this category and the KLC results indicate that some of these samples (e.g., the Medium PAF and High PAF Waste Rock Sample KLC3) are geochemically more benign (or certainly much slower to react) than predicted from the static geochemical test results presented in **Table 4-1**.
- The concentrations of trace metals/metalloids in leachate from the waste rock and tailings samples cannot be directly compared against livestock drinking water guideline values, as the ratio of solid to water can be up to two orders of magnitude greater than that whereby any arbitrary comparison could be made for context. A more appropriate way to present the KLC test leachate data for geochemical and water quality modelling purposes would be to calculate release rates (i.e., the load of trace metals/metalloids released from the waste rock and tailings samples in units of mg/kg per flush). This method normalises the data to allow better comparison and provides a conservative approach, as the waste rock samples have been crushed to pass a 10 mm sieve size and therefore had a higher surface area for potential geochemical reaction that would generally be found for waste rock materials in the field at MRO. Similarly, most of the tailings sample/mixtures were allowed to dry between leaching events and this simulates idealised oxidising/weathering conditions for surface tailings at a TSF rather than for bulk tailings materials, which remain relatively saturated and during operations are periodically re-covered with fresh tailings materials over time. Geochemical data release calculations and a geochemical/water quality modelling task are not included in the current scope of work reported herein but will be reported separately.
- KLC leachate results for several environmentally important dissolved metals/metalloids (Al, As, Cd, Co, Cr, Cu, Fe, Mn, Ni, Si and Zn) are presented as graphs in **Attachment B** for the waste rock and tailings samples. The graphed data illustrates that the concentration of metals/metalloids released from waste rock and tailings materials into pore water is typically low and less than applied livestock drinking water guideline values. One minor exception is for high PAF waste rock (KLC3), which has slightly elevated concentrations of dissolved cadmium and manganese in KLC leachate after a three-year KLC testing hiatus (up to August 2021) and a 9-month KLC testing hiatus (up to March 2023). This is most likely attributed to the sample materials being allowed to freely oxidise throughout the hiatus periods. The High PAF waste rock washed with HCL also has elevated dissolved cadmium and manganese values. For tailings, the main exceptions include dissolved cadmium and more sporadically manganese, from tailings samples (KLC1A (saturated) and KLC4). For the mixed waste rock/tailings samples (KLC5 and KLC6), the concentration of cadmium can also be elevated compared to the applied guideline value.

Potential implications of these results with respect to the management of waste rock and tailings materials, and recommendations for further geochemical investigations for these materials are discussed further in **Sections 5** and **6.**

## 4.4 Mineralogical assessment

As described in **Section 3.2.3**, mineralogical tests were completed on samples of waste rock and tailings materials obtained from the six large KLC tests (surface and at depth) and one of the two AMIRA style KLC tests in August 2021. The semi-quantitative XRD tests were completed by Levay & Co laboratory in South Australia and results are provided in **Attachment C** and summarised in this section**.**

The XRD results indicate some heterogeneity in the waste rock samples with respect to calcite and pyrite concentrations however the calcite concentration is generally lower in the high PAF waste rock compared to the NAF waste rock. Similarly, there is a general increase in pyrite content going from NAF to high PAF waste rock. The calcite and pyrite content of the tailings is more consistent and generally well balanced.

For the high PAF waste rock sample, after eight years of exposure to idealised oxidising conditions, most of the calcite and pyrite is retained in the column materials and the KLC leachate remains pH neutral and contains low levels of acidity and excess alkalinity. This could be due to a number of factors such as pyrite being in a highly crystalline form that is not finely disseminated and less reactive than predicted, pyrite being held within

the waste rock sample matrix, and/or passivation of pyrite on exposed surfaces by calcite, acid neutralisation products or other sample matrix constituents.

The mineralogical test work completed by X-Ray Vision using XRD and Levay and Co. using a Scanning Electron Microscope (SEM) in 2023 was used to further investigate the cause of the lower than predicted reactivity of the waste rock and tailings materials. For the waste rock and tailings samples described in **Section 3.2.3**, there is strong evidence for passivation of pyrite surfaces by silicon and aluminium rather than calcite or other oxidation and/or neutralisation reaction products. This is evident from the results of HCL washing of the High PAF Waste Rock samples (KLC 3AW) which showed negligible change in collected KLC leachate characteristics from acid washing. Several pyrite surfaces are relatively fresh and do not appear to have been exposed to oxidation/weathering over a period of eight years of idealised oxidising conditions due to interaction/covering and passivation with silicon and aluminium species. The source of these elements could be the chlorite or feldspar which are present in the waste rock and tailings materials. In all cases there is sufficient calcite (and possibly Ca- feldspar) present to maintain near neutral pH at the decreased rates of reaction of surface passivated pyrite. This is verified with 8 to 10 years of testing of MRO waste rock and tailings materials under idealises oxidising/weathering conditions.

The complete set of mineralogical test results for the original samples, and the samples taken from the columns in 2021 and 2023 are presented in **Attachment D**.

# 5 Discussion

## 5.1 AMD Potential and Management

The results of the static geochemical (ABA) tests on waste rock and tailings samples presented in **Section 4.1** confirm the likely geochemical nature of these materials at the field trials and at the TSF. In particular, the NAF waste rock sample has low sulfur content, elevated ANC and a high factor of safety with respect to potential for AMD (including neutral mine drainage (NMD) and/or saline drainage (SD)). In contrast, the Medium and High PAF samples have elevated sulfur content, moderate ANC, and have a reduced factor of safety with respect to potential to generate AMD. However, the static and kinetic geochemical results in this report and previous geochemical results on waste rock and tailings materials (EGi, 1996; RGS, 2011, 2016a,b, 2020, and 2021a,b) indicate that an extended period of exposure time to oxidising/weathering conditions (lag period) of several decades would be required before acidic conditions could potentially ever become apparent. The current rate of sulfide oxidation and neutralisation reactions in crushed waste rock and tailings samples is well balanced, residual sulfur and ANC values are similar; and these materials continue to generate pH neutral leachate with excess alkalinity even after 8 and 10 years of exposure to idealised oxidising conditions, respectively.

The tailings samples also have elevated sulfur content and a moderate ANC value, the magnitudes of which are well balanced. Whilst there is some uncertainty regarding the potential for tailings materials to generate acid at some point in the future, current geochemical data provided herein suggests that tailings materials remain pH neutral after exposure to idealised oxidising/weathering conditions for at least ten years and rates of sulfide oxidation and ANC depletion remain low and well balanced. Similarly, mineralogical test work results provide strong evidence for passivation of pyrite surfaces by silicon and aluminium. The source of these elements could be the chlorite or feldspar which are present in the waste rock and tailings materials. In all cases there is sufficient calcite (and possibly Ca- feldspar) present to maintain neutral pH at the decreased rates of reaction of surface passivated pyrite.

The KLC tests now appear to have reached a steady state in terms of reaction kinetics after and therefore there is some confidence in predicting that even under fully oxidising/weathering conditions the waste rock and tailing materials will not generate acid conditions in the longer term. This outcome is even more likely as the High PAF waste rock materials are contained within the TSF and will be covered with NAF waste rock, borrow and soil materials as part of rehabilitation activities for the final landform developed as part of closure planning. Similarly medium PAF waste rock materials are encapsulated within NAF waste rock materials at the North Waste Rock Dump and will be covered and rehabilitated as part of final closure planning.

The KLC tests results indicate that if High PAF waste rock and tailings materials are left unmanaged, there is some potential for cadmium, manganese and sulfate to be contained in pore water and potentially results in Neutral Mine Drainage (NMD). Notwithstanding the isolation of these materials as part of planned rehabilitation activities is likely to reduce this potential hazard and consequently reduce the risk of leachate and potential downstream impacts to an acceptable level. This conclusion could be further evaluated by geochemical modelling utilising the results of the KLC test program on waste rock and tailings materials described herein.

RGS has already measured the particle size distribution of the waste rock and tailings materials included in the KLC test program (**Attachment C**) and therefore a specific surface area could be calculated for these materials. This could then be extrapolated to the field waste rock and tailings storage situation, and for waste rock, the actual particle size distribution and specific surface area could be calculated from waste rock photographs. This information could then be used along with the KLC test data as an input into the current geochemical and potential future water quality modelling programs at MRO.

Overall, the current conservative management strategy for waste rock and tailings materials at MRO of placing High and Medium PAF waste rock in the TSF or encapsulating the Medium PAF waste rock at the North Waste Rock Dump appears sound. Most waste rock will be covered/mixed with tailings materials well within the expected lag period of at least one if not one several decades and therefore AMD generation from waste rock materials at the TSF or NWRD is not expected. However, given the finely balanced geochemical nature of MRO tailings materials, as a contingency measure it is recommended that addition of finely ground agricultural limestone (< 4 mm) to the PAF waste rock and tailings surface should be considered as part of the final closure

strategy for the TSF, as described in the 2016 Closure, Decommissioning and Rehabilitation Plan for the TSF (RGS, 2016a). The plan provided a conceptual cover design and rehabilitation strategy that is suitable for mine closure, and which meets the Queensland Government's rehabilitation objectives of being safe stable, sustainable and non-polluting.

## 5.2 Multi-element Composition and Enrichment

The multi-element concentrations of metal/metalloids in waste rock and tailings materials are presented in **Section 4.2**, along with a comparison with median crustal abundance values for soils. The results indicate that most of the metals/metalloids measured in the waste rock and tailings samples are not enriched compared to median crustal abundance for soils. The PAF waste rock sample is enriched in cadmium and silver and the tailings sample is enriched with arsenic, cadmium, silver and zinc compared to median crustal abundance. These results are expected given that the samples are derived from waste rock materials surrounding a mineralised gold ore body.

The enriched silver concentration is most likely an artefact of the very low median value for this metal in soils (0.05 mg/kg), although the typical concentration soils can range up to 8 mg/kg (Bowen, 1979).

## 5.3 Water Quality

Kinetic geochemical and mineralogical test results indicate that initial and medium term (at least 10 years) surface run-off and seepage from waste rock and tailings materials is likely to be pH neutral to slightly alkaline and have a relatively low salinity value, although the salinity of water in contact with High PAF waste rock or tailings materials may increase as major ions are released from these materials over time.

The concentrations of major ions in leachate from waste rock materials are relatively low and dominated by calcium, sodium and sulfate. For uncovered PAF waste rock materials, the concentration of sulfate in surface runoff and seepage would be expected increase over time with continued exposure to oxidising/weathering conditions however this has generally not occurred for a period of eight years under idealised oxidising conditions. The concentrations of major ions in leachate from the tailings samples are elevated and dominated by calcium, magnesium, potassium, chloride and sulfate, most of which after the first few flushes show a relatively steady or decreasing concentration trend.

Most trace metals/metalloids tested in leachate from NAF and PAF waste rock and Uncertain tailings materials are sparingly soluble under KLC leachate test pH conditions and typically less than applied livestock drinking water guideline values (ANZG, 2018). Exceptions may include high PAF waste rock and tailings which can sporadically have elevated concentrations of dissolved cadmium and manganese (and sulfate) in KLC leachate, which if left unmanaged in the field situation could result in NMD.

On the basis of these results, and given the waste rock, tailings and rehabilitation and water management strategy employed at MRO, it is expected that the risk of significant impact on the quality of surface water and groundwater from waste rock and tailings contact water at MRO should be relatively low (although it is recommended that the water quality monitoring program for the WRD and TSF facilities continue to confirm this finding).

# 6 Conclusions and Recommendations

## 6.1 Conclusions

RGS has completed a long term kinetic geochemical and mineralogical assessment program for representative waste rock and tailings samples from MRO. The main findings of the geochemical assessment are:

- The KLC and mineralogical test results indicate that some of the MRO samples (e.g., High and Medium PAF waste rock) are geochemically more benign (or certainly much slower to react) than expected from the initial static geochemical test results.
- There is strong evidence for passivation of pyrite surfaces by silicon and aluminium rather than calcite or other potential oxidation and/or neutralisation products. This is evident from the results of HCL washing of the High PAF Waste Rock samples (KLC 3AW) which showed negligible change in collected KLC leachate characteristics from acid washing.
- NAF waste rock materials have negligible sulfur content, elevated ANC and a high factor of safety with respect to potential for AMD (including NMD and SD). In contrast, High PAF waste rock materials have elevated sulfur content, moderate ANC, and may have a reduced factor of safety with respect to potential for AMD, if exposed to long term oxidising/weathering conditions (i.e., greater than eight years). Tailings materials have well balanced acid generating and acid neutralising capacities and continue to generate pH neutral conditions even after extended (10 years) exposure to idealised oxidising/weathering conditions. The concentrations of existing major ions leached into contact water from the High PAF waste rock and tailings matrix, including sulfate, are likely to be elevated.
- Initial surface runoff and seepage from NAF and PAF waste rock materials (and ongoing surface runoff and seepage from NAF waste rock materials) is likely to be pH neutral to slightly alkaline and have a low level of salinity. Initial and ongoing surface runoff and seepage from NAF waste rock materials is likely to contain excess alkalinity.
- KLC test data indicates the lag period preceding acid generation from PAF waste rock materials exposed to idealised oxidising/weathering conditions represented by the samples tested is likely to be greater than eight years.
- Metal/metalloid enrichment in waste rock and tailings materials compared to median crustal abundance in unmineralised soils is likely to be limited to cadmium and silver in some PAF waste rock materials and arsenic, cadmium, silver and zinc in some tailings materials. These results are expected given that the samples are derived from waste rock (and processed ore) materials surrounding a mineralised gold ore body.
- Most metals/metalloids are sparingly soluble at the neutral to slightly alkaline pH of contact water with waste rock and tailings materials at MRO. Some exceptions may include dissolved cadmium and manganese concentrations in leachate from High PAF waste rock and tailings materials over time.
- High PAF waste rock and tailings materials may have the potential to generate elevated concentrations of dissolved cadmium and manganese (and sulfate) in KLC leachate in contact water, which if left unmanaged in the field situation could result in NMD.
- Encapsulation of High PAF waste rock at the TSF and Medium PAF waste rock at the TSF and/or North Waste Rock Dump, within 10 years as part of rehabilitation activities is likely to reduce the risk of AMD or NMD and maintain the overall quality of surface runoff and seepage from the TSF and North Waste Rock Dump.
- Given the current management strategy employed by MRO for waste rock and tailings materials, the potential for AMD from these materials is relatively low. The static and kinetic geochemical information and mineralogical test data obtained to date suggests that existing management and rehabilitation strategy at MRO are likely to meet the long-term site rehabilitation objectives.

## 6.2 Recommendations

As a result of the static and kinetic geochemical and mineralogical assessment work completed on waste rock and tailings materials at MRO, a number of additional recommendations are provided for waste rock and tailings materials. It is recommended that MRO considers:

- Continuation of the current KLC test program for a further 12 months.
- Addition of crushed limestone to High PAF waste rock materials if stored for more than 10 years in an uncovered state (i.e., exposed to oxidising/weathering conditions) and tailings materials, prior to placement of the cover system described in the Closure, Decommissioning and Rehabilitation Plan for the TSF (RGS, 2016a) or equivalent cover system.
- Geochemical and water quality modelling for waste rock and tailings materials using KLC test leachate release rate data (i.e., the trace metals/metalloids and major ions released from the waste rock and tailings samples in units of mg/kg per flush). This method normalises the data to allow better comparison and provides a conservative approach, as the waste rock samples have been crushed to pass a 10 mm sieve size and therefore had a higher surface area for potential geochemical reaction that would generally be found for waste rock materials in the field at MRO. Similarly, the tailings samples are allowed to dry between leaching events, and this simulates idealised oxidising/weathering conditions for surface tailings at a TSF rather than for bulk tailings materials, which remain relatively saturated and are during operations were periodically re-covered with fresh tailings materials over time. RGS has already measured the particle size distribution of the waste rock materials included in the KLC test and therefore a specific surface area could be calculated for these materials. This could then be extrapolated to the field waste rock storage situation where the particle size distribution and specific surface area for waste rock could be calculated from waste rock photographs.
- Continuing to implement the existing surface water and groundwater monitoring programs as defined in the current Environmental Authority for the site.

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# 8 Limitations

RGS has prepared this technical report in accordance with the generally accepted practices and standards of the consulting profession for the use of MRO and only those third parties who have been authorised in writing by RGS to rely on the report. No other warranty is made as to the professional advice in this report. It is prepared in accordance with the scope of work and for the purpose outlined in **Section 2.0**.

The methodology adopted and information sources used by RGS are outlined in this report. RGS has made no independent verification of this information beyond the agreed scope of works and assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to RGS was false.

This report was prepared in January 2025 and is based on the information and samples provided by MRO prior to the time of preparation. RGS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not provide legal advice which, can only be given by qualified legal practitioners.

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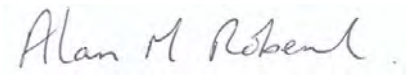
If you have any questions regarding the information presented in this report, please contact the undersigned on (+617) 3344 1222 or (+61) 431 620 623.

Yours sincerely,

**RGS ENVIRONMENTAL CONSULTANTS PTY LTD**



Dr. Alan Robertson
Principal Geochemist/Director

# 9 Attachments

## 9.1 Attachment A: Geochemical Assessment of Mining Waste Materials

# Geochemical Assessment of Mining Waste Materials

## Acid generation and prediction

Acid generation is caused by the exposure of sulfide minerals, most commonly pyrite ($FeS_2$), to atmospheric oxygen and water. Sulfur assay results are used to calculate the maximum amount of acid that could be generated by a material based on either direct measurement of the pyritic S content, or assuming that all sulfur not present as sulfate occurs as pyrite. Pyrite reacts under oxidising conditions to generate acid according to the following overall reaction:

$$FeS_2 + 15/4\ O_2 + 7/2\ H_2O \rightarrow Fe(OH)_3 + 2\ H_2SO_4$$

According to this reaction, the maximum potential acidity (MPA) of a sample containing 1%S as pyrite would be 30.6 kg $H_2SO_4$/t. The chemical components of the acid generation process consist of the above sulfide oxidation reaction and acid neutralization, which is mainly provided by inherent carbonates and to a lesser extent silicate materials. The amount and rate of acid generation is determined by the interaction and overall balance of the acid generation and neutralisation components.

### *Net Acid Producing Potential*

The net acid producing potential (NAPP) is used as an indicator of materials that may be of concern with respect to acid generation. The NAPP calculation represents the balance between the maximum potential acidity (MPA) of a sample, which is derived from the sulfide sulfur content, and the acid neutralising capacity (ANC) of the material, which is determined experimentally. By convention, the NAPP result is expressed in units of kg $H_2SO_4$/t sample. If the capacity of the solids to neutralise acid (ANC) exceeds their capacity to generate acid (MPA), then the NAPP of the material is negative. Conversely, if the MPA exceeds the ANC, the NAPP of the material is positive. A NAPP assessment involves a series of analytical tests that include:

### *Determination of pH and EC*

pH and EC measured on 1:5 w/w water extract. This gives an indication of the inherent acidity and salinity of the mining waste material when initially exposed in an emplacement area.

### *Total sulfur content and Maximum Potential Acidity (MPA)*

Total sulfur content is determined by the Leco high temperature combustion method. The total sulfur content is then used to calculate the MPA which is based on the assumption that the entire sulfur content is present as reactive pyrite. Direct determination of the pyritic sulfur content can provide a more accurate estimate of the MPA.

### *Acid neutralising capacity (ANC)*

The ANC is determined by addition of acid to a known weight of sample, then titration with NaOH to determine the amount of residual acid. The ANC measures the capacity of a sample to react with and neutralise acid. The ANC can be further evaluated by slow acid titration to a set end-point in the Acid Buffering Characteristic Curve (ABCC) test through calculation of the amount of acid consumed and evaluation of the resultant titration curve.

## Assessment of element enrichment and solubility

In mineralised areas it is common to find a suite of enriched elements that have resulted from natural geological processes. Multi-element scans are carried out to identify any elements that are present in a material (or readily leachable from a material) at concentrations that may be of environmental concern with respect to surface water quality, revegetation and public health. The samples are generally analysed for the following elements:

| | |
|---|---|
| Major elements | Al, Ca, Fe, K, Mg, Na and S. |
| Minor elements | As, B, Cd, Co, Cr, Cu, F, Hg, Mn, Mo, Ni, Pb, Sb, Se and Zn. |

The concentration of these elements in samples can be directly compared with the median concentration in un-mineralised soils to determine the Geochemical Abundance Index (GAI) and level of significance. Water extracts are used to determine the immediate element solubilities under the existing sample pH conditions of the sample. The following tests are normally carried out:

### *Multi-element composition of solids.*

Multi-element composition of solid samples determined using a combination of ICP-mass spectroscopy (ICP-MS), ICP-optical emission spectroscopy (OES), and atomic absorption spectrometry (AAS).

### *Multi-element composition of water extracts (1:5 sample:deionised water).*

Multi-element composition of 1:5 (solid:water) water extracts from solid samples determined using a combination of ICP-mass spectroscopy (ICP-MS), ICP-optical emission spectroscopy (OES), and atomic absorption spectrometry (AAS).

Under some conditions (eg. low pH) the solubility and mobility of common environmentally important elements can increase significantly. If element mobility under initial pH conditions is deemed likely and/or subsequent low pH conditions may occur, kinetic leach column test work may be completed on representative samples.

## Kinetic leach column tests

Kinetic leach column (KLC) tests can be used to provide information on the reaction kinetics of mine waste materials. The major objectives of kinetics tests are to:

- Provide time-dependent data on the kinetics and rate of acid generation and acid neutralising reactions under laboratory controlled (or onsite conditions).
- Investigate metal release and drainage/seepage quality; and
- Assess treatment options such as addition of alkaline materials.

The KLC tests simulate the weathering process that leads to acid and base generation and reaction under laboratory controlled or site conditions. The kinetic tests allow an assessment of the acid forming characteristics and indicate the rate of acid generation, over what period it will occur, and what management controls may be required.

In KLC tests, water is added to a sample and the mixture allowed to leach products and by-products of acid producing and consuming reactions. Samples of leachate are then collected and analysed. Intermittent water application is applied to simulate rainfall and heat lamps are used to simulate sunshine. These tests provide real-time information and may have to continue for months or years. Monitoring includes trends in pH, sulfate, acidity or alkalinity, and metals, for example. The pH of the collected leachate simulates the acid drainage process, acidity or alkalinity levels indicate the rate of acid production and acid neutralisation, and sulfate production can be related to the rate of sulfide oxidation. Metal concentration data provides an assessment of metal solubility and leaching behaviour.

**Figure 3-1** shows the kinetic leach column set up used by RGS adapted from *AMIRA, 2002*. The columns are allowed to dry between water additions to ensure adequate oxygen ingress into the sample material.

Sample materials is accurately weighed and used in the leach columns and depending on the physical nature of the material and particle size can be used on an as-received basis (*i.e.* no crushing as with process residues) or crushed to pass nominal 10 mm particle size (as with waste rock). The sample in the column is initially leached with deionised water and the initial leachate from the columns collected and analysed. Subsequent column leaching is carried out on a monthly or quarterly basis and again collected and analysed. The leaching rate can be varied to better simulate expected site conditions or satisfy test program data requirements. The column must be exposed to drying conditions in between watering events. The residual water content and air void content in the column can be determined by comparing the wet and dry column weights.

## 9.2 Attachment B: Static Multi-Element and KLC Test Results

## Table B2: Multi-Element Results for Waste Rock and Tailings from the MRO Project

| | RGS Sample Number → | MR01 | MR02 | MR03 | MR04 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| | ALS Laboratory ID → | EB1447772001 | EB1447772002 | EB1447772003 | EB1447772004 | EB1621104001 | EB1621104002 | EB1621104003 | EB1621104004 |
| | Sample type → | Tailings | Tailings | Tailings | Tailings | NAF WR | Medium PAF Waste Rock | High PAF Waste Rock | Uncertain Tailings |
| Parameters | Limit of Reporting | | | | | | | | |
| **Major Cations** | All units mg/kg | All units mg/kg | | | | | | | |
| Calcium (Ca) | 50 | 20,800 | 19,600 | 13,000 | 12,000 | 33,500 | 27,300 | 17,600 | 14,000 |
| Magnesium (Mg) | 50 | 6,190 | 6,140 | 3,000 | 3,020 | 16,000 | 11,000 | 6,660 | 5,720 |
| Potassium (K) | 50 | 2,630 | 2,760 | 1,120 | 1,820 | 1,440 | 1,410 | 2,050 | 2,490 |
| Sodium (Na) | 50 | 910 | 1,880 | 250 | 1,240 | 810 | 380 | 120 | 590 |
| Aluminium (Al) | 50 | 11,600 | 10,700 | 4,970 | 5,410 | 22,700 | 12,200 | 8,000 | 11,300 |
| Iron (Fe) | 50 | 25,300 | 25,700 | 16,900 | 17,200 | 39,200 | 24,200 | 39,700 | 28,500 |
| **Minor and Trace Elements** | All units mg/kg | All units mg/kg | | | | | | | |
| Antimony (Sb) | 0.05 | *<5* | *<5* | *<5* | *<5* | 0.60 | 3.50 | 1.30 | 0.50 |
| Arsenic (As) | 0.1 | 77 | 95 | 84 | 69 | 7.5 | 25.5 | 25.9 | 134.0 |
| Barium (Ba) | 10 | - | - | - | - | 28.9 | 39.8 | 19.7 | 68.5 |
| Beryllium (Be) | 0.05 | - | - | - | - | 0.60 | 0.60 | 0.40 | 0.50 |
| Bismuth (Bi) | 0.01 | - | - | - | - | - | - | - | - |
| Boron (B) | 50 | *<50* | *<50* | *<50* | *<50* | *<50* | *<50* | *<50* | *<50* |
| Cadmium (Cd) | 0.1 | 8 | 9 | 4 | 4 | *<0.1* | 0.20 | 4.00 | 8.60 |
| Chromium (Cr) | 1 | 38.0 | 18.0 | 16.0 | 61.0 | 35.1 | 82.5 | 30 | 25.8 |
| Cobalt (Co) | 0.1 | 8.0 | 7.0 | 6.0 | 6.0 | 15.4 | 9.0 | 9.8 | 6.9 |
| Copper (Cu) | 0.2 | 262 | 253 | 665 | 335 | 8.8 | 26.9 | 140.0 | 358.0 |
| Lead (Pb) | 0.2 | 65 | 72 | 64 | 62 | 4.0 | 8.3 | 160.0 | 52.6 |
| Lithium (Li) | 0.1 | - | - | - | - | 50.3 | 30.8 | 17.8 | 10.6 |
| Manganese (Mn) | 5 | 1,300 | 1,300 | 1,120 | 1,090 | 2,260 | 1,940 | 1,950 | 1,180 |
| Mercury (Hg) | 0.1 | - | - | - | - | *<0.1* | *<0.1* | *<0.1* | *<0.1* |
| Molybdenum (Mo) | 0.05 | *<2* | *<2* | *<2* | *<2* | 0.60 | 1.90 | 1.00 | 1.90 |
| Nickel (Ni) | 0.2 | 6 | 5 | 9 | 8 | 10.4 | 28.6 | 12.1 | 12.2 |
| Selenium (Se) | 1 | *<5* | *<5* | *<5* | *<5* | *<1* | *<1* | *<1* | *<1* |
| Silver (Ag) | 0.01 | - | - | - | - | *<0.1* | 0.20 | 2.50 | 1.30 |
| Strontium (Sr) | 0.2 | - | - | - | - | 109.0 | 70.0 | 43.1 | 68.4 |
| Thallium (Tl) | 0.02 | - | - | - | - | - | - | - | - |
| Thorium (Th) | 0.2 | - | - | - | - | 1.4 | 2.4 | 1.7 | 4.2 |
| Tin (Sn) | 0.1 | - | - | - | - | 1.2 | 0.9 | 0.6 | 0.7 |
| Uranium (U) | 0.1 | - | - | - | - | 0.10 | 0.40 | 0.20 | 0.60 |
| Vanadium (V) | 1 | - | - | - | - | 72 | 25 | 11 | 17 |
| Zinc (Zn) | 2 | 1,440 | 1,740 | 843 | 750 | 141 | 126 | 748 | 1,490 |

Notes: < indicates less than the laboratory limit of reporting.

## Table B2: Multi-Element Results for Waste Rock and Tailings from the MRO Project

| | RGS Sample Number → | 2021066_0002 | 2021066_0003 | 2021066_0004 | 2021066_0005 | 2021066_0006 | 2021066_0007 |
|---|---|---|---|---|---|---|---|
| | ALS Laboratory ID → | EB2124089001 | EB2124089002 | EB2124089003 | EB2124089004 | EB2124089005 | EB2124089006 |
| | Sample type → | Tailings<br>Oxic | NAF WR | NAF WR | Moderate PAF | Moderate PAF | High PAF |
| Parameters | Limit of Reporting | 2021066_KLC3A | 2021066_KLC1 | 2021066_KLC1 | 2021066_KLC2 | 2021066_KLC2 | 2021066_KLC3 |
| **Major Cations** | All units mg/kg | All units mg/kg | | | | | |
| Calcium (Ca) | 50 | 12,800 | 25,200 | 16,100 | 17,700 | 8,610 | 9,160 |
| Magnesium (Mg) | 50 | 3,160 | 5,250 | 2,670 | 2,830 | 950 | 2,240 |
| Potassium (K) | 50 | 1,790 | 250 | 130 | 350 | 70 | 370 |
| Sodium (Na) | 50 | 220 | 260 | 60 | 60 | *<50* | 90 |
| Aluminium (Al) | 50 | 6,120 | 7,460 | 4,010 | 3,360 | 990 | 2,650 |
| Iron (Fe) | 50 | 20,000 | 16,100 | 8,070 | 18,500 | 3,980 | 48,600 |
| **Minor and Trace Elements** | All units mg/kg | All units mg/kg | | | | | |
| Antimony (Sb) | 0.05 | 0.7 | 0.1 | 0.2 | 0.3 | 0.1 | 0.4 |
| Arsenic (As) | 0.1 | 74.2 | 3.8 | 3.5 | 20.5 | 4.8 | 51.8 |
| Barium (Ba) | 10 | 43.1 | 6.2 | 3.8 | 5 | 1 | 3.6 |
| Beryllium (Be) | 0.05 | 0.4 | 0.3 | 0.2 | 0.2 | 0.1 | 0.2 |
| Bismuth (Bi) | 0.01 | 13.2 | 0.2 | 0.1 | 1.2 | 0.5 | 9.6 |
| Boron (B) | 50 | *<50* | *<50* | *<50* | *<50* | *<50* | *<50* |
| Cadmium (Cd) | 0.1 | 5.2 | *<0.1* | *<0.1* | 0.2 | *<0.1* | 7.3 |
| Chromium (Cr) | 1 | 9.3 | 3.2 | 1.6 | 5.4 | 1.4 | 2.3 |
| Cobalt (Co) | 0.1 | 5.1 | 6.4 | 3.6 | 7 | 1.2 | 11.3 |
| Copper (Cu) | 0.2 | 256 | 5.3 | 22.1 | 2.8 | 0.4 | 80.4 |
| Lead (Pb) | 0.2 | 53 | 3.3 | 3.4 | 22.8 | 12.9 | 116 |
| Lithium (Li) | 0.1 | 10.1 | 15.2 | 8.8 | 8.2 | 2.8 | 5.9 |
| Manganese (Mn) | 5 | 915 | 852 | 689 | 705 | 392 | 731 |
| Mercury (Hg) | 0.1 | *<0.1* | *<0.1* | *<0.1* | *<0.1* | *<0.1* | *<0.1* |
| Molybdenum (Mo) | 0.05 | 1.4 | 1.2 | 0.4 | 1 | 1.3 | 0.5 |
| Nickel (Ni) | 0.2 | 5.4 | 4.4 | 2.7 | 8.7 | 2.4 | 8.2 |
| Selenium (Se) | 1 | *<1* | *<1* | *<1* | *<1* | *<1* | *<1* |
| Silver (Ag) | 0.01 | 1.8 | 0.1 | *<0.1* | 0.3 | 0.2 | 2.6 |
| Strontium (Sr) | 0.2 | 64.6 | 63.4 | 34 | 56.4 | 33.4 | 33.5 |
| Thallium (Tl) | 0.02 | *<0.1* | *<0.1* | *<0.1* | *<0.1* | *<0.1* | *<0.1* |
| Thorium (Th) | 0.2 | 3 | 0.7 | 0.5 | 1.2 | 0.6 | 0.9 |
| Tin (Sn) | 0.1 | 0.2 | *<0.1* | *<0.1* | *<0.1* | *<0.1* | 0.1 |
| Uranium (U) | 0.1 | 0.5 | *<0.1* | *<0.1* | 0.2 | 0.2 | *<0.1* |
| Vanadium (V) | 1 | 8 | 19 | 10 | 4 | *<1* | 3 |
| Zinc (Zn) | 2 | 940 | 45 | 36 | 48 | 18 | 1,190 |

Notes: < indicates less than the laboratory limit of reporting.

## Table B2: Multi-Element Results for Waste Rock and Tailings from the MRO Project

| | RGS Sample Number → | 2021066_0008 | 2021066_0009 | 2021066_0010 | 2021066_0011 | 2021066_0012 | 2021066_0013 |
|---|---|---|---|---|---|---|---|
| | ALS Laboratory ID → | EB2124089007 | EB2124089008 | EB2124089009 | EB2124089010 | EB2124089011 | EB2124089012 |
| | Sample type → | High PAF | Tailings | Tailings on top of High PAF Waste Rock | Tailings on top of High PAF Waste Rock | Composite High PAF Waste Rock + Tailings | Composite High PAF Waste Rock + Tailings |
| Parameters | Limit of Reporting | 2021066_KLC3 | 2021066_KLC4 | 2021066_KLC5 | 2021066_KLC5 | 2021066_KLC6 | 2021066_KLC6 |
| **Major Cations** | All units mg/kg | All units mg/kg | | | | | |
| Calcium (Ca) | 50 | 11,100 | 11,100 | 16,000 | 17,000 | 7,840 | 16,700 |
| Magnesium (Mg) | 50 | 2,310 | 3,220 | 3,460 | 3,050 | 1,180 | 2,920 |
| Potassium (K) | 50 | 240 | 750 | 1,030 | 280 | 850 | 690 |
| Sodium (Na) | 50 | *<50* | 70 | 660 | *<50* | 590 | 180 |
| Aluminium (Al) | 50 | 2,620 | 4,770 | 4,950 | 3,370 | 1,280 | 4,020 |
| Iron (Fe) | 50 | 85,800 | 24,000 | 24,700 | 42,000 | 41,600 | 40,300 |
| **Minor and Trace Elements** | All units mg/kg | All units mg/kg | | | | | |
| Antimony (Sb) | 0.05 | 0.8 | 0.4 | 0.4 | 1.3 | 0.8 | 2.1 |
| Arsenic (As) | 0.1 | 65.7 | 124 | 119 | 44.3 | 52.2 | 290 |
| Barium (Ba) | 10 | 2.3 | 13.9 | 14.4 | 3.7 | 3.4 | 32.1 |
| Beryllium (Be) | 0.05 | 0.2 | 0.3 | 0.3 | 0.2 | 0.2 | 0.7 |
| Bismuth (Bi) | 0.01 | 17.5 | 17.8 | 18.7 | 17.1 | 17.9 | 62.4 |
| Boron (B) | 50 | *<50* | *<50* | *<50* | *<50* | *<50* | *<50* |
| Cadmium (Cd) | 0.1 | 2.7 | 7.8 | 7.5 | 8 | 2.1 | 124 |
| Chromium (Cr) | 1 | 2.4 | 11.3 | 11.8 | 4.5 | 1.9 | 24.9 |
| Cobalt (Co) | 0.1 | 12.7 | 5.9 | 5.7 | 12.7 | 8 | 27.1 |
| Copper (Cu) | 0.2 | 95.7 | 298 | 278 | 124 | 136 | 1040 |
| Lead (Pb) | 0.2 | 200 | 41.7 | 42.3 | 186 | 231 | 631 |
| Lithium (Li) | 0.1 | 5.5 | 6.4 | 6.4 | 8 | 4 | 17.7 |
| Manganese (Mn) | 5 | 831 | 855 | 855 | 1,650 | 522 | 3,260 |
| Mercury (Hg) | 0.1 | *<0.1* | *<0.1* | *<0.1* | *<0.1* | *<0.1* | *<0.1* |
| Molybdenum (Mo) | 0.05 | 0.8 | 1.6 | 2 | 0.8 | 2.2 | 4.9 |
| Nickel (Ni) | 0.2 | 9.6 | 9.2 | 9 | 11.1 | 7.3 | 29.1 |
| Selenium (Se) | 1 | *<1* | *<1* | *<1* | *<1* | *<1* | 1 |
| Silver (Ag) | 0.01 | 5 | 1.3 | 1.2 | 4.9 | 4.4 | 10.6 |
| Strontium (Sr) | 0.2 | 38.5 | 54 | 74.8 | 71.2 | 83.5 | 195 |
| Thallium (Tl) | 0.02 | *<0.1* | *<0.1* | *<0.1* | *<0.1* | *<0.1* | *<0.1* |
| Thorium (Th) | 0.2 | 1.1 | 2.6 | 2.8 | 1.3 | 1.4 | 6.1 |
| Tin (Sn) | 0.1 | *<0.1* | *<0.1* | 0.1 | 0.2 | 0.2 | 0.8 |
| Uranium (U) | 0.1 | *<0.1* | 0.4 | 0.4 | 0.1 | 0.1 | 0.8 |
| Vanadium (V) | 1 | 3 | 6 | 5 | 6 | 2 | 16 |
| Zinc (Zn) | 2 | 452 | 1,260 | 1,190 | 1,360 | 312 | 8,840 |

Notes: < indicates less than the laboratory limit of reporting.

## Table B3: Geochemical Abundance Index Results for Waste Rock and Tailings from the MRO Project

| | RGS Sample Number → | | MR01 | MR02 | MR03 | MR04 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| | ALS Laboratory ID → | | EB1447772001 | EB1447772002 | EB1447772003 | EB1447772004 | EB1621104001 | EB1621104002 | EB1621104003 | EB1621104004 |
| | Sample type → | | Tailings | Tailings | Tailings | Tailings | NAF WR | Medium PAF Waste Rock | High PAF Waste Rock | Uncertain Tailings |
| Parameters | Limit of Reporting | Median Crustal Abundance[1] | | | | | | | | |
| **Major Cations** | All units mg/kg | | Geochemical Abundance Index | | | | | | | |
| Calcium (Ca) | 50 | 15,000 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Magnesium (Mg) | 50 | 5,000 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Potassium (K) | 50 | 14,000 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Sodium (Na) | 50 | 5,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aluminium (Al) | 50 | 71,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Iron (Fe) | 50 | 40,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Minor and Trace Elements** | All units mg/kg | | | | | | | | | |
| Antimony (Sb) | 0.05 | 1 | ---- | ---- | ---- | ---- | 0 | 1 | 0 | 0 |
| Arsenic (As) | 0.1 | 6 | 3 | 3 | 3 | 3 | 0 | 2 | 2 | 4 |
| Barium (Ba) | 10 | 500 | ---- | ---- | ---- | ---- | 0 | 0 | 0 | 0 |
| Beryllium (Be) | 0.1 | 6 | ---- | ---- | ---- | ---- | 0 | 0 | 0 | 0 |
| Bismuth (Bi) | 0.01 | 0.2 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Boron (B) | 50 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cadmium (Cd) | 0.1 | 0.35 | 4 | 4 | 3 | 3 | 0 | 0 | 3 | 4 |
| Chromium (Cr) | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Cobalt (Co) | 0.1 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Copper (Cu) | 0.2 | 30 | 3 | 2 | 4 | 3 | 0 | 0 | 2 | 3 |
| Lead (Pb) | 0.2 | 35 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Lithium (Li) | 0.1 | 25 | ---- | ---- | ---- | ---- | 0 | 0 | 0 | 0 |
| Manganese (Mn) | 5 | 1,000 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Mercury (Hg) | 0.1 | 0.06 | ---- | ---- | ---- | ---- | 0 | 0 | 0 | 0 |
| Molybdenum (Mo) | 0.1 | 2 | ---- | ---- | ---- | ---- | 0 | 0 | 0 | 0 |
| Nickel (Ni) | 0.2 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Selenium (Se) | 1 | 0.4 | ---- | ---- | ---- | ---- | 0 | 0 | 0 | 0 |
| Silver (Ag) | 0.0 | 0.057 | ---- | ---- | ---- | ---- | ---- | 1 | 5 | 4 |
| Strontium (Sr) | 0.2 | 250 | ---- | ---- | ---- | ---- | 0 | 0 | 0 | 0 |
| Thallium (Tl) | 0.0 | 0.2 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Thorium (Th) | 0.2 | 9 | ---- | ---- | ---- | ---- | 0 | 0 | 0 | 0 |
| Tin (Sn) | 0.1 | 4 | ---- | ---- | ---- | ---- | 0 | 0 | 0 | 0 |
| Uranium (U) | 0.1 | 2 | ---- | ---- | ---- | ---- | 0 | 0 | 0 | 0 |
| Vanadium (V) | 1 | 90 | ---- | ---- | ---- | ---- | 0 | 0 | 0 | 0 |
| Zinc (Zn) | 2 | 90 | 3 | 4 | 3 | 2 | 0 | 0 | 2 | 3 |

Notes: GAI's greater than or equal to 3 are highlighted.

1. Median Crustal Abundance values sourced from Bowen 1979.

## Table B3: Geochemical Abundance Index Results for Waste Rock and Tailings from the MRO Project

| | RGS Sample Number → | | 2021066_0002 | 2021066_0003 | 2021066_0004 | 2021066_0005 | 2021066_0006 | 2021066_0007 |
|---|---|---|---|---|---|---|---|---|
| | ALS Laboratory ID → | | EB2124089001 | EB2124089002 | EB2124089003 | EB2124089004 | EB2124089005 | EB2124089006 |
| | Sample type → | | Tailings (Oxic) | NAF WR | NAF WR | Moderate PAF | Moderate PAF | High PAF |
| Parameters | Limit of Reporting | Median Crustal Abundance[1] | 2021066_KLC3A | 2021066_KLC1 | 2021066_KLC1 | 2021066_KLC2 | 2021066_KLC2 | 2021066_KLC3 |
| **Major Cations** | All units mg/kg | | Geochemical Abundance Index | | | | | |
| Calcium (Ca) | 50 | 15,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Magnesium (Mg) | 50 | 5,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Potassium (K) | 50 | 14,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sodium (Na) | 50 | 5,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aluminium (Al) | 50 | 71,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Iron (Fe) | 50 | 40,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Minor and Trace Elements** | All units mg/kg | | ---- | ---- | ---- | ---- | ---- | ---- |
| Antimony (Sb) | 0.05 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Arsenic (As) | 0.1 | 6 | 3 | 0 | 0 | 1 | 0 | 3 |
| Barium (Ba) | 10 | 500 | 0 | 0 | 0 | 0 | 0 | 0 |
| Beryllium (Be) | 0.1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bismuth (Bi) | 0.01 | 0.2 | 5 | 0 | 0 | 2 | 1 | 5 |
| Boron (B) | 50 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cadmium (Cd) | 0.1 | 0.35 | 3 | 0 | 0 | 0 | 0 | 4 |
| Chromium (Cr) | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Cobalt (Co) | 0.1 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| Copper (Cu) | 0.2 | 30 | 3 | 0 | 0 | 0 | 0 | 1 |
| Lead (Pb) | 0.2 | 35 | 0 | 0 | 0 | 0 | 0 | 1 |
| Lithium (Li) | 0.1 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| Manganese (Mn) | 5 | 1,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mercury (Hg) | 0.1 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 |
| Molybdenum (Mo) | 0.1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nickel (Ni) | 0.2 | 50 | 0 | 0 | 0 | 0 | 0 | 0 |
| Selenium (Se) | 1 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Silver (Ag) | 0.0 | 0.057 | 4 | 0 | 0 | 2 | 1 | 5 |
| Strontium (Sr) | 0.2 | 250 | 0 | 0 | 0 | 0 | 0 | 0 |
| Thallium (Tl) | 0.0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Thorium (Th) | 0.2 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tin (Sn) | 0.1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Uranium (U) | 0.1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vanadium (V) | 1 | 90 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zinc (Zn) | 2 | 90 | 3 | 0 | 0 | 0 | 0 | 3 |

Notes: GAI's greater than or equal to 3 are highlighted.

1. Median Crustal Abundance values sourced from Bowen 1979.

## Table B3: Geochemical Abundance Index Results for Waste Rock and Tailings from the MRO Project

| | RGS Sample Number → | | 2021066_0008 | 2021066_0009 | 2021066_0010 | 2021066_0011 | 2021066_0012 | 2021066_0013 |
|---|---|---|---|---|---|---|---|---|
| | ALS Laboratory ID → | | EB2124089007 | EB2124089008 | EB2124089009 | EB2124089010 | EB2124089011 | EB2124089012 |
| | Sample type → | | High PAF | Tailings | Tailings on top of High PAF Waste Rock | Tailings on top of High PAF Waste Rock | Composite High PAF Waste Rock + Tailings | Composite High PAF Waste Rock + Tailings |
| Parameters | Limit of Reporting | Median Crustal Abundance[1] | 2021066_KLC3 | 2021066_KLC4 | 2021066_KLC5 | 2021066_KLC5 | 2021066_KLC6 | 2021066_KLC6 |
| **Major Cations** | All units mg/kg | | Geochemical Abundance Index | | | | | |
| Calcium (Ca) | 50 | 15,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Magnesium (Mg) | 50 | 5,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Potassium (K) | 50 | 14,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sodium (Na) | 50 | 5,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aluminium (Al) | 50 | 71,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Iron (Fe) | 50 | 40,000 | 1 | 0 | 0 | 0 | 0 | 0 |
| **Minor and Trace Elements** | All units mg/kg | | ---- | ---- | ---- | ---- | ---- | ---- |
| Antimony (Sb) | 0.05 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Arsenic (As) | 0.1 | 6 | 3 | 4 | 4 | 2 | 3 | 5 |
| Barium (Ba) | 10 | 500 | 0 | 0 | 0 | 0 | 0 | 0 |
| Beryllium (Be) | 0.1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bismuth (Bi) | 0.01 | 0.2 | 6 | 6 | 6 | 6 | 6 | 6 |
| Boron (B) | 50 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cadmium (Cd) | 0.1 | 0.35 | 2 | 4 | 4 | 4 | 2 | 6 |
| Chromium (Cr) | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Cobalt (Co) | 0.1 | 8 | 0 | 0 | 0 | 0 | 0 | 1 |
| Copper (Cu) | 0.2 | 30 | 1 | 3 | 3 | 1 | 2 | 5 |
| Lead (Pb) | 0.2 | 35 | 2 | 0 | 0 | 2 | 2 | 4 |
| Lithium (Li) | 0.1 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| Manganese (Mn) | 5 | 1,000 | 0 | 0 | 0 | 0 | 0 | 1 |
| Mercury (Hg) | 0.1 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 |
| Molybdenum (Mo) | 0.1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 |
| Nickel (Ni) | 0.2 | 50 | 0 | 0 | 0 | 0 | 0 | 0 |
| Selenium (Se) | 1 | 0.4 | 0 | 0 | 0 | 0 | 0 | 1 |
| Silver (Ag) | 0.0 | 0.057 | 6 | 4 | 4 | 6 | 6 | 6 |
| Strontium (Sr) | 0.2 | 250 | 0 | 0 | 0 | 0 | 0 | 0 |
| Thallium (Tl) | 0.0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Thorium (Th) | 0.2 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tin (Sn) | 0.1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Uranium (U) | 0.1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vanadium (V) | 1 | 90 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zinc (Zn) | 2 | 90 | 2 | 3 | 3 | 3 | 1 | 6 |

Notes: GAI's greater than or equal to 3 are highlighted.

1. Median Crustal Abundance values sourced from Bowen 1979.

# KLC1A: Tailings (saturated)

| | | | | | |
|---|---|---|---|---|---|
| Weight (kg) | 1.61 | Total S (%) | 1.13 | ANC | 36.58 |
| pH (1:5) | 8.39 | Scr (%) | 0.81 | NAPP | -11.87 |
| EC (µS/cm) | 1915.00 | MPA | 24.71 | ANC:MPA | 1.48 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | 04-Dec-14 | 03-Mar-15 | 04-Jun-15 | 03-Sep-15 | 03-Dec-15 | 02-Jun-16 | 02-Dec-16 | 22-Aug-17 | 20-Feb-18 | 28-Aug-18 | 18-Dec-18 | 24-Aug-21 | 25-Nov-21 | 22-Feb-22 | 24-May-22 | 23-Aug-22 | 24-Nov-22 | 28-Feb-23 | 23-May-23 | 01-Mar-24 | 29-May-24 | 28-Aug-24 | 28-Nov-24 |
| Number of Weeks | | 0 | 13 | 26 | 39 | 52 | 78 | 104 | 142 | 168 | 195 | 211 | 351 | 364 | 377 | 390 | 403 | 416 | 430 | 442 | 482 | 495 | 508 | 521 |
| Leach Number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| ALS Laboratory Number | | EB1447785 | EB1513989 | EB1520149 | EB1528976 | EB1536536 | EB1615076 | EB1628822 | EB1717132 | EB1804711 | EB1820822 | EB1830124 | EB2123896007 | EB2134162007 | EB2204864007 | EB2214553007 | EB2224653007 | EB2235214007 | EB2305995007 | EB2315518007 | EB2407152008 | EB2418286008 | EB2429597008 | EB2441569008 |
| Volume On (L) | | 3.0 | 1.5 | 1.5 | 1.5 | 1.5 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.0 | 2.2 | 2.0 | 1.0 | 1.0 | 1.0 | 2.0 | 2.0 | 1.0 |
| Volume Off (L) | | 1.058 | 0.875 | 0.860 | 0.780 | 0.496 | 0.929 | 0.740 | 0.946 | 0.746 | 0.946 | 0.942 | 0.858 | 0.907 | 0.958 | 1.060 | 1.260 | 1.300 | 0.570 | 0.758 | 0.509 | 1.112 | 0.330 | 0.444 |
| Cum. Volume (L) | | 1.06 | 1.93 | 2.79 | 3.57 | 4.07 | 5.00 | 5.74 | 6.68 | 7.43 | 8.38 | 9.32 | 10.18 | 11.08 | 12.04 | 13.10 | 14.36 | 15.66 | 16.23 | 16.99 | 17.50 | 18.61 | 18.94 | 19.38 |
| Number of Pore Volumes through the Samples | WQ Guidelines | 0.9 | 1.7 | 2.4 | 3.1 | 3.5 | 4.3 | 5.0 | 5.8 | 6.5 | 7.3 | 8.1 | 8.8 | 9.6 | 10.5 | 11.4 | 12.5 | 13.6 | 14.1 | 14.8 | 15.2 | 16.2 | 16.5 | 16.9 |
| pH (RGS Measurement) | - | 6.51 | 6.92 | 7.25 | 7.15 | 7.24 | 7.72 | 7.49 | 7.30 | 6.80 | 7.50 | 7.50 | 7.05 | 7.62 | 7.15 | 7.21 | 7.21 | 7.37 | 7.61 | 7.46 | 6.93 | 7.35 | 7.80 | 7.63 |
| pH (ALS Measurement) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.97 | 5.79 | 7.63 | 7.87 | 8.01 | 7.83 | 7.95 | 8.07 | 8.09 | 7.44 | 7.93 | 7.92 |
| pH (deionised water used in test) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.07 | 5.79 | 6.05 | 5.83 | 6.05 | 5.38 | 6.18 | 5.77 | 5.58 | 6.45 | 5.73 | 5.66 |
| EC (RGS Measurement) (µS/cm) | 3,580^ | 8,160 | 2,780 | 2,410 | 2,430 | 1,657 | 1,329 | 1,013 | 1,045 | 569 | 669 | 680 | 990 | 890 | 779 | 519 | 390 | 315 | 332 | 294 | 421 | 286 | 265 | 276 |
| EC (ALS Measurement) (µS/cm) | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1,050 | 886 | 874 | 548 | 422 | 298 | 343 | 326 | 406 | 328 | 299 | 298 |
| Acidity (mg/L as $CaCO_3$)* | - | 22.0 | 15.0 | 8.0 | 10.0 | 12.0 | 4.0 | <1 | 7.0 | 6.0 | 1.0 | 1.0 | 6.0 | 7.0 | 4.0 | 2 | 3 | 7 | 2 | 3 | 2 | 2 | 3 | 2.0 |
| Hydroxide Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 111 | 117 | 109 | 90 | 91 | 106 | 97 | 94 | 115 | 77 | 105 | 102 |
| Total Alkalinity (mg/L as $CaCO_3$)* | - | 244 | 112 | 114 | 115 | 88 | 94 | 92 | 101 | 121 | 97 | 90 | 111 | 117 | 109 | 90 | 91 | 106 | 97 | 94 | 115 | 77 | 105 | 102 |
| Net Alkalinity | - | 222 | 97 | 106 | 105 | 76 | 90 | 92 | 94 | 115 | 96 | 89 | 105 | 110 | 105 | 88 | 88 | 99 | 95 | 91 | 113 | 75 | 102 | 100 |
| **Major Ions (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Calcium | Ca | 1 | 1000 | 534 | 529 | 506 | 510 | 332 | 248 | 178 | 155 | 115 | 150 | 140 | 246 | 189 | 184 | 113 | 74 | 63 | 75 | 56 | 71 | 68 | 54 | 62 |
| Potassium | K | 1 | - | 370 | 86 | 52 | 42 | 36 | 31 | 22 | 17 | 12 | 10 | 9 | 11 | 10 | 9 | 6 | 4 | 4 | 4 | 3 | 4 | 3 | 3 | 3 |
| Magnesium | Mg | 1 | - | 73 | 24 | 13 | 11 | 8 | 7 | 4 | 4 | 2 | 3 | 3 | 4 | 3 | 3 | 2 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Sodium | Na | 1 | - | 1360 | 149 | 76 | 61 | 48 | 37 | 21 | 15 | 7 | 6 | 7 | 9 | 6 | 6 | 3 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 3 |
| Chloride | Cl | 1 | - | 576 | 45 | 24 | 15 | 14 | 11 | 9 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 |
| Fluoride | F | 0.1 | 2 | 0.5 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sulfate | $SO_4$ | 1 | 1,000 | 2,970 | 1,530 | 1,570 | 1,380 | 852 | 662 | 476 | 389 | 172 | 274 | 260 | 516 | 395 | 362 | 173 | 104 | 62 | 77 | 72 | 113 | 85 | 46 | 52 |
| **Trace metals/ metalloids (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Aluminium | Al | 0.01 | 5 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.001 | <0.001 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Arsenic | As | 0.001 | 0.5 | 0.002 | 0.002 | 0.001 | 0.001 | 0.004 | 0.002 | 0.002 | 0.002 | 0.004 | 0.001 | 0.001 | 0.002 | 0.001 | 0.002 | 0.002 | 0.001 | 0.001 | 0.001 | <0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Boron | B | 0.05 | 5 | 0.12 | 0.13 | 0.11 | 0.1 | 0.09 | <0.05 | 0.07 | 0.08 | <0.05 | 0.1 | 0.05 | 0.18 | 0.18 | 0.22 | 0.11 | 0.06 | 0.06 | 0.06 | 0.08 | 0.08 | 0.08 | <0.05 | <0.05 |
| Barium | Ba | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.021 | 0.019 | 0.02 | 0.016 | 0.02 | 0.027 | 0.042 | 0.032 | 0.041 | 0.029 | 0.033 | 0.030 |
| Beryllium | Be | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Bismuth | Bi | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | Cd | 0.0001 | 0.01 | 0.0729 | 0.0282 | 0.035 | 0.0305 | 0.0175 | 0.0066 | 0.0031 | 0.0067 | 0.0045 | 0.0062 | 0.00525 | 0.0118 | 0.0128 | 0.0105 | 0.0071 | 0.0063 | 0.0078 | 0.0102 | 0.0056 | 0.0073 | 0.0031 | 0.0042 | 0.0036 |
| Cerium | Ce | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Caesium | Cs | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cobalt | Co | 0.001 | 1 | 0.01 | 0.001 | <0.001 | <0.001 | 0.003 | 0.004 | 0.002 | 0.002 | 0.002 | 0.002 | 0.001 | 0.002 | 0.002 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 |
| Chromium | Cr | 0.001 | 1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | Cu | 0.001 | 1 | 0.035 | 0.01 | 0.01 | 0.009 | 0.015 | 0.004 | 0.003 | 0.003 | 0.005 | 0.008 | 0.007 | 0.011 | 0.016 | 0.015 | 0.015 | 0.011 | 0.012 | 0.014 | 0.01 | 0.01 | 0.008 | 0.006 | 0.005 |
| Dysprosium | Dy | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | Er | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Europium | Eu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gadolinium | Gd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | Ga | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Hafnium | Hf | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Holmium | Ho | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | In | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lanthanum | La | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lithium | Li | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.015 | 0.015 | 0.015 | 0.01 | 0.005 | 0.004 | 0.005 | 0.004 | 0.004 | 0.004 | 0.003 | 0.003 |
| Lutetium | Lu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Iron | Fe | 0.05 | 1* | <0.05 | <0.05 | <0.05 | <0.05 | 0.34 | 0.13 | 0.06 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Mercury | Hg | 0.0001 | 0.002 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Manganese | Mn | 0.001 | 2* | 2.28 | 2.17 | 0.805 | 0.306 | 2.34 | 2.56 | 1.18 | 0.701 | 0.625 | 0.463 | 0.422 | 0.433 | 0.178 | 0.124 | 0.059 | 0.03 | 0.019 | 0.009 | 0.004 | 0.004 | 0.003 | 0.004 | 0.005 |
| Molybdenum | Mo | 0.001 | 0.15 | 0.143 | 0.071 | 0.035 | 0.018 | 0.028 | 0.034 | 0.031 | 0.029 | 0.035 | 0.021 | 0.02 | 0.016 | 0.014 | 0.015 | 0.014 | 0.015 | 0.015 | 0.016 | 0.012 | 0.017 | 0.018 | 0.021 | 0.016 |
| Neodymium | Nd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | Ni | 0.001 | 1 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 |
| Praseodymium | Pr | 0.001 | - | | | | | | | | | | | | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | Pb | 0.001 | 0.1 | 0.01 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony | Sb | 0.001 | - | 0.003 | 0.003 | 0.002 | 0.002 | 0.002 | <0.001 | <0.001 | 0.001 | <0.001 | 0.001 | 0.001 | 0.002 | 0.002 | 0.001 | 0.002 | 0.001 | 0.002 | 0.002 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 |
| Rubidium | Rb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.009 | 0.008 | 0.008 | 0.005 | 0.004 | 0.003 | 0.004 | 0.002 | 0.004 | 0.003 | 0.003 | 0.002 |
| Samarium | Sm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | Se | 0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Silver | Ag | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | Sr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1.80 | 1.39 | 1.32 | 0.802 | 0.624 | 0.434 | 0.574 | 0.484 | 0.663 | 0.52 | 0.464 | 0.441 |
| Tellurium | Te | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Terbium | Tb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | Tl | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | Sn | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 | <0.001 |
| Thulium | Tm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | Ti | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium | Th | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | U | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.002 | 0.002 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Vanadium | V | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | Yb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silicon | Si | - | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Zinc | Zn | 0.005 | 20 | 2.610 | 3.470 | 4.230 | 3.890 | 1.920 | 1.020 | 0.537 | 0.390 | 0.285 | 1.020 | 0.981 | 1.070 | 1.29 | 0.982 | 0.62 | 0.53 | 0.499 | 0.562 | 0.329 | 0.428 | 0.187 | 0.207 | 0.205 |
| Zirconium | Zr | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Ionic Balance** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Anions | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 9.74 | 5.4 | 3.98 | 3.41 | 3.54 | 3.38 | 4.65 | 3.34 | 3.06 | 3.12 |
| Total Cations | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 9.92 | 6.09 | 3.96 | 3.38 | 3.93 | 2.91 | 3.73 | 3.56 | 2.86 | 3.21 |
| Ionic Balance | % | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.9 | 5.98 | 0.24 | 0.48 | 5.23 | 7.35 | 11 | 3.2 | 3.34 | 1.47 |
| **Calculations**** | **Elements** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $SO_4$ Release Rate | $SO_4$ | | | 1954 | 832 | 840 | 669 | 263 | 382 | 219 | 229 | 80 | 161 | 152 | 275 | 223 | 216 | 114 | 81 | 50 | 27 | 34 | 36 | 59 | 9 | 14 |
| Cumulative $SO_4$ Release | Cum $SO_4$ | | | 1954 | 2786 | 3626 | 4295 | 4558 | 4940 | 5159 | 5388 | 5468 | 5629 | 5781 | 6056 | 6279 | 6495 | 6609 | 6690 | 6740 | 6768 | 6802 | 6837 | 6896 | 6906 | 6920 |
| Ca Release Rate | Ca | | | 351.3 | 287.8 | 270.6 | 247.3 | 102.4 | 143.3 | 81.9 | 91.2 | 53.3 | 88.2 | 82.0 | 131.2 | 106.6 | 109.6 | 74.5 | 58.0 | 50.9 | 26.6 | 26.4 | 22.5 | 47.0 | 11.1 | 17.1 |
| Cumulative Ca Release | Cum Ca | | | 351.3 | 639.1 | 909.7 | 1157.0 | 1259.4 | 1402.6 | 1484.5 | 1575.7 | 1629.1 | 1717.3 | 1799.3 | 1930.5 | 2037.1 | 2146.7 | 2221.2 | 2279.2 | 2330.1 | 2356.7 | 2383.1 | 2405.5 | 2452.5 | 2463.6 | 2480.7 |
| Mg Release Rate | Mg | | | 48.0 | 13.1 | 7.0 | 5.3 | 2.5 | 4.0 | 1.8 | 2.4 | 0.9 | 1.8 | 1.8 | 2.1 | 1.7 | 1.8 | 1.3 | 0.8 | 0.4 | 0.2 | 0.2 | 0.2 | 0.3 | 0.1 | 0.1 |
| Cumulative Mg Release | Cum Mg | | | 48.0 | 61.1 | 68.0 | 73.4 | 75.8 | 79.9 | 81.7 | 84.1 | 85.0 | 86.8 | 88.5 | 90.7 | 92.3 | 94.1 | 95.4 | 96.2 | 96.6 | 96.8 | 97.1 | 97.2 | 97.6 | 97.7 | 97.8 |
| Residual ANC (%) | Res. ANC | | | 97.1 | 95.1 | 93.2 | 91.5 | 90.7 | 89.7 | 89.2 | 88.5 | 88.2 | 87.6 | 87.0 | 86.1 | 85.4 | 84.6 | 84.1 | 83.7 | 83.3 | 83.2 | 83.0 | 82.8 | 82.5 | 82.4 | 82.3 |
| Residual Sulfur (%) | Res. S | | | 94.2 | 91.8 | 89.3 | 87.3 | 86.5 | 85.4 | 84.8 | 84.1 | 83.9 | 83.4 | 82.9 | 82.1 | 81.5 | 80.8 | 80.5 | 80.2 | 80.1 | 80.0 | 79.9 | 79.8 | 79.6 | 79.6 | 79.6 |
| $SO_4$/(Ca+Mg) molar ratio | $SO_4$/(Ca+Mg) | | | 1.9 | 1.1 | 1.2 | 1.1 | 1.0 | 1.1 | 1.1 | 1.0 | 0.6 | 0.7 | 0.7 | 0.9 | 0.8 | 0.8 | 0.6 | 0.6 | 0.4 | 0.4 | 0.5 | 0.7 | 0.5 | 0.4 | 0.3 |

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines 1. Recommended guideline limits for Livestock Drinking Water.

< indicates less than the laboratory limit of reporting. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm * Acidity and alkalinity data calculated in mg $CaCO_3$/L. Shaded cells exceed applied guideline values. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm. ^ calculated based on total dissolved solids (TDS) conversion rate of 0.67 % of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water. ** $SO_4$, Ca and Mg release rates calculated in mg/kg/flush. Residual ANC assumes that all leached Mg and Ca is due to dissolution of calcite or dolomite. Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity. MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential.

# KLC3A: Tailings (Oxic)

| | | | | | |
|---|---|---|---|---|---|
| Weight (kg) | 1.75 | Total S (%) | 1.13 | ANC | 36.58 |
| pH (1:5) | 8.39 | Scr (%) | 0.81 | NAPP | -11.87 |
| EC (µS/cm) | 1915.00 | MPA | 24.71 | ANC:MPA | 1.48 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | 04-Dec-14 | 03-Mar-15 | 04-Jun-15 | 03-Sep-15 | 03-Dec-15 | 02-Jun-16 | 02-Dec-16 | 22-Aug-17 | 20-Feb-18 | 28-Aug-18 | 18-Dec-18 | 25-Aug-21 | 25-Nov-21 | 22-Feb-22 | 24-May-22 | 23-Aug-22 | 24-Nov-22 | 28-Feb-23 | 23-May-23 | 01-Mar-24 | 29-May-24 | 28-Aug-24 | 28-Nov-24 |
| Number of Weeks | | 0 | 13 | 26 | 39 | 52 | 78 | 104 | 142 | 168 | 195 | 211 | 351 | 364 | 377 | 390 | 403 | 416 | 430 | 442 | 482 | 495 | 508 | 521 |
| Leach Number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| ALS Laboratory Number | | EB1447785 | EB1513989 | EB1520149 | EB1528976 | EB1536536 | EB1615076 | EB1628822 | EB1717132 | EB1804711 | EB1820822 | EB1830124 | EB2123896 | EB2134162 | EB2204864 | EB2214553 | EB2224653 | EB2235214 | EB2305995 | EB2315518 | EB2407152009 | EB2418286009 | EB2429597009 | EB2441569009 |
| Volume On (L) | | 1.0 | 1.2 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Volume Off (L) | | 0.771 | 0.714 | 0.514 | 0.483 | 0.512 | 0.505 | 0.514 | 0.606 | 0.514 | 0.511 | 0.580 | 0.533 | 0.495 | 0.503 | 0.564 | 0.542 | 0.593 | 0.574 | 0.591 | 0.495 | 0.634 | 0.611 | 0.593 |
| Cum. Volume (L) | | 0.77 | 1.49 | 2.00 | 2.48 | 2.99 | 3.50 | 4.01 | 4.62 | 5.13 | 5.64 | 6.22 | 6.76 | 7.25 | 7.76 | 8.32 | 8.86 | 9.45 | 10.03 | 10.62 | 11.11 | 11.75 | 12.36 | 12.95 |
| Number of Pore Volumes through the Samples | WQ Guidelines | 0.7 | 1.3 | 1.7 | 2.2 | 2.6 | 3.0 | 3.5 | 4.0 | 4.5 | 4.9 | 5.4 | 5.9 | 6.3 | 6.7 | 7.2 | 7.7 | 8.2 | 8.7 | 9.2 | 9.7 | 10.2 | 10.7 | 11.3 |
| pH (RGS Measurement) | - | 7.10 | 7.42 | 7.56 | 7.66 | 7.67 | 7.77 | 7.49 | 7.60 | 6.90 | 7.60 | 7.52 | 7.17 | 7.74 | 7.22 | 7.53 | 7.56 | 7.66 | 7.68 | 7.80 | 7.52 | 7.60 | 7.96 | 7.68 |
| pH (ALS Measurement) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.79 | 7.77 | 7.02 | 7.45 | 7.84 | 7.66 | 7.78 | 7.87 | 8.20 | 7.51 | 7.75 | 7.70 |
| pH (deionised water used in test) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.07 | 5.79 | 6.05 | 5.83 | 6.05 | 5.38 | 5.57 | 5.77 | 5.58 | 6.45 | 5.73 | 5.66 |
| EC (RGS Measurement) (µS/cm) | 3,580^ | 7,560 | 5,530 | 3,520 | 2,410 | 2,007 | 1,631 | 1,526 | 1,500 | 1,369 | 1,311 | 1,220 | 1,043 | 1,032 | 754 | 713 | 621 | 555 | 445 | 388 | 458 | 288 | 255 | 231 |
| EC (ALS Measurement) (µS/cm) | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1,080 | 1,000 | 858 | 722 | 637 | 535 | 455 | 413 | 469 | 337 | 287 | 270 |
| Acidity (mg/L as $CaCO_3$)* | - | 5 | 9 | 3 | 2 | 6 | 2 | 2 | 2 | 3 | 2 | 1 | 3 | 7 | 4 | 2 | 2 | 6 | 2 | 2 | 2 | 2 | 2 | 7 |
| Hydroxide Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 69 | 59 | 54 | 48 | 56 | 69 | 65 | 73 | 107 | 69 | 66 | 65 |
| Total Alkalinity (mg/L as $CaCO_3$)* | - | 28 | 68 | 34 | 39 | 37 | 56 | 35 | 54 | 48 | 44 | 40 | 69 | 59 | 54 | 48 | 56 | 69 | 65 | 73 | 107 | 69 | 66 | 65 |
| Net Alkalinity | - | 23 | 59 | 31 | 37 | 31 | 54 | 33 | 52 | 45 | 42 | 39 | 66 | 52 | 50 | 46 | 54 | 63 | 63 | 71 | 105 | 67 | 64 | 58 |

| Major Ions (mg/L) | Elements | LoR | Livestock Drinking Water[1] | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calcium | Ca | 1 | 1000 | 499 | 493 | 395 | 367 | 318 | 311 | 295 | 316 | 295 | 282 | 262 | 240 | 214 | 169 | 151 | 109 | 113 | 89 | 68 | 79 | 69 | 46 | 51 |
| Potassium | K | 1 | - | 409 | 223 | 128 | 93 | 74 | 56 | 53 | 42 | 36 | 28 | 25 | 30 | 25 | 20 | 17 | 12 | 12 | 11 | 8 | 10 | 8 | 7 | 6 |
| Magnesium | Mg | 1 | - | 74 | 34 | 26 | 22 | 16 | 16 | 11 | 13 | 9 | 9 | 8 | 6 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | <1 | <1 |
| Sodium | Na | 1 | - | 1580 | 744 | 382 | 165 | 60 | 30 | 13 | 9 | 7 | 7 | 7 | 7 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Chloride | Cl | 1 | - | 701 | 307 | 124 | 31 | 8 | 6 | 4 | 3 | 1 | 1 | 1 | 2 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 2 | <1 | <1 |
| Fluoride | F | 0.1 | 2 | 0.6 | 0.6 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sulfate | $SO_4$ | 1 | 1,000 | 3,590 | 2,790 | 1,970 | 1,330 | 1,120 | 911 | 886 | 750 | 730 | 668 | 600 | 529 | 500 | 367 | 287 | 223 | 198 | 139 | 109 | 104 | 76 | 56 | 53 |

| Trace metals/ metalloids (mg/L) | Elements | LoR | Livestock Drinking Water[1] | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminium | Al | 0.01 | 5 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 0.02 |
| Arsenic | As | 0.001 | 0.5 | 0.003 | 0.003 | 0.002 | 0.001 | 0.002 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.001 | 0.002 | 0.002 | 0.003 | 0.002 |
| Boron | B | 0.05 | 5 | 0.08 | 0.11 | 0.09 | 0.06 | 0.1 | <0.05 | 0.07 | 0.08 | 0.1 | 0.1 | 0.1 | 0.1 | 0.14 | 0.14 | 0.13 | 0.1 | 0.16 | 0.08 | 0.1 | 0.12 | 0.1 | 0.08 | 0.12 |
| Barium | Ba | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.014 | 0.018 | 0.014 | 0.017 | 0.016 | 0.02 | 0.02 | 0.017 | 0.025 | 0.018 | 0.016 | 0.018 |
| Beryllium | Be | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Bismuth | Bi | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | Cd | 0.0001 | 0.01 | 0.0099 | 0.009 | 0.0088 | 0.0086 | 0.0072 | 0.0078 | 0.0072 | 0.0094 | 0.0072 | 0.0069 | 0.0059 | 0.0073 | 0.0048 | 0.0032 | 0.0026 | 0.0022 | 0.002 | 0.0014 | 0.0012 | 0.0017 | 0.001 | 0.0007 | 0.0006 |
| Cerium | Ce | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Caesium | Cs | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.001 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cobalt | Co | 0.001 | 1 | 0.011 | 0.006 | 0.005 | 0.002 | 0.002 | 0.002 | 0.001 | <0.001 | 0.002 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Chromium | Cr | 0.001 | 1 | <0.001 | <0.001 | <0.001 | 0.002 | 0.002 | 0.002 | 0.005 | 0.002 | 0.002 | <0.001 | <0.001 | 0.002 | 0.002 | 0.002 | 0.002 | <0.001 | <0.001 | 0.002 | <0.001 | 0.002 | 0.002 | 0.002 | 0.002 |
| Copper | Cu | 0.001 | 1 | 0.01 | 0.022 | 0.016 | 0.012 | 0.012 | 0.019 | 0.016 | 0.022 | 0.018 | 0.015 | 0.012 | 0.048 | 0.014 | 0.013 | 0.012 | 0.01 | 0.01 | 0.01 | 0.008 | 0.014 | 0.01 | 0.008 | 0.007 |
| Dysprosium | Dy | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | Er | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Europium | Eu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gadolinium | Gd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | Ga | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Hafnium | Hf | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Holmium | Ho | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | In | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lanthanum | La | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lithium | Li | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.037 | 0.036 | 0.029 | 0.027 | 0.018 | 0.016 | 0.017 | 0.012 | 0.014 | 0.009 | 0.008 | 0.009 |
| Lutetium | Lu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Iron | Fe | 0.05 | 1* | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.06 | <0.05 | 0.08 | <0.05 |
| Mercury | Hg | 0.0001 | 0.002 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Manganese | Mn | 0.001 | 2* | 0.046 | 0.03 | 0.052 | 0.031 | 0.026 | 0.033 | 0.038 | 0.046 | 0.042 | 0.028 | 0.022 | 0.06 | 0.039 | 0.026 | 0.02 | 0.017 | 0.013 | 0.011 | 0.011 | 0.013 | 0.01 | 0.007 | 0.0006 |
| Molybdenum | Mo | 0.001 | 0.15 | 0.18 | 0.109 | 0.081 | 0.038 | 0.046 | 0.031 | 0.038 | 0.027 | 0.042 | 0.026 | 0.023 | 0.024 | 0.036 | 0.032 | 0.038 | 0.025 | 0.027 | 0.028 | 0.021 | 0.023 | 0.026 | 0.027 | 0.027 |
| Neodymium | Nd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | Ni | 0.001 | 1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Praseodymium | Pr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | Pb | 0.001 | 0.1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony | Sb | 0.001 | - | 0.003 | 0.004 | 0.003 | 0.004 | 0.003 | 0.002 | 0.003 | 0.002 | 0.002 | 0.002 | 0.001 | 0.003 | 0.003 | 0.002 | 0.003 | 0.001 | 0.002 | 0.002 | 0.003 | 0.002 | 0.002 | 0.002 | 0.002 |
| Rubidium | Rb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.020 | 0.019 | 0.013 | 0.01 | 0.007 | 0.006 | 0.007 | 0.005 | 0.007 | 0.004 | 0.004 | 0.004 |
| Samarium | Sm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | Se | 0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Silver | Ag | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | Sr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1.23 | 1.17 | 0.929 | 0.751 | 0.68 | 0.564 | 0.537 | 0.476 | 0.588 | 0.416 | 0.353 | 0.31 |
| Tellurium | Te | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Terbium | Tb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | Tl | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | Sn | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thulium | Tm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | Ti | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium | Th | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | U | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Vanadium | V | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | Yb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silicon | Si | - | - | 2.85 | 3.04 | 6.4 | 5.9 | 7.5 | 6 | 7.9 | 6.6 | 8.4 | 8.4 | 8.3 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | ---- | ---- | ---- | ---- |
| Zinc | Zn | 0.005 | 20 | 0.215 | 0.166 | 0.273 | 0.307 | 0.208 | 0.267 | 0.194 | 0.338 | 0.183 | 0.242 | 0.232 | 0.285 | 0.136 | 0.108 | 0.066 | 0.087 | 0.063 | 0.049 | 0.049 | 0.069 | 0.046 | 0.029 | 0.026 |
| Zirconium | Zr | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Ionic Balance | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Anions | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 8.7 | 6.9 | 5.8 | 5.5 | 4.2 | 3.7 | 4.3 | 3.0 | 2.5 | 2.4 |
| Total Cations | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 9.4 | 8.4 | 6.0 | 6.2 | 5.0 | 3.8 | 4.4 | 3.8 | 2.6 | 2.8 |
| Ionic Balance | % | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 3.8 | 9.2 | 2.0 | 6.0 | 8.5 | 0.5 | 0.4 | 11.7 | | |

| Calculations** | Elements | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $SO_4$ Release Rate | $SO_4$ | | 1585 | 1141 | 580 | 368 | 328 | 263 | 261 | 260 | 215 | 196 | 199 | 161 | 142 | 106 | 93 | 69 | 67 | 46 | 37 | 29 | 28 | 20 | 18 |
| Cumulative $SO_4$ Release | Cum $SO_4$ | | 1585 | 2726 | 3306 | 3674 | 4002 | 4266 | 4527 | 4787 | 5002 | 5198 | 5397 | 5558 | 5700 | 5806 | 5899 | 5968 | 6035 | 6081 | 6118 | 6147 | 6175 | 6194 | 6212 |
| Ca Release Rate | Ca | | 220.3 | 201.6 | 116.3 | 101.5 | 93.3 | 90.0 | 86.8 | 109.7 | 86.8 | 82.5 | 87.0 | 73.3 | 60.7 | 48.7 | 48.8 | 33.8 | 38.4 | 29.3 | 23.0 | 22.4 | 25.1 | 16.1 | 17.3 |
| Cumulative Ca Release | Cum Ca | | 220.3 | 422.0 | 538.2 | 639.8 | 733.0 | 823.0 | 909.8 | 1019.5 | 1106.3 | 1188.9 | 1275.9 | 1349.2 | 1409.8 | 1458.5 | 1507.3 | 1541.1 | 1579.5 | 1608.8 | 1631.8 | 1654.2 | 1679.2 | 1695.3 | 1712.7 |
| Mg Release Rate | Mg | | 32.7 | 13.9 | 7.7 | 6.1 | 4.7 | 4.6 | 3.2 | 4.5 | 2.6 | 2.6 | 2.7 | 1.8 | 1.4 | 1.2 | 1.0 | 0.6 | 0.7 | 0.7 | 0.3 | 0.3 | 0.4 | 0.2 | 0.2 |
| Cumulative Mg Release | Cum Mg | | 32.7 | 46.6 | 54.2 | 60.3 | 65.0 | 69.6 | 72.9 | 77.4 | 80.0 | 82.7 | 85.3 | 87.2 | 88.6 | 89.7 | 90.7 | 91.3 | 92.0 | 92.7 | 93.0 | 93.3 | 93.6 | 93.8 | 94.0 |
| Residual ANC (%) | Res. ANC | | 98.2 | 96.7 | 95.8 | 95.1 | 94.4 | 93.7 | 93.1 | 92.3 | 91.7 | 91.1 | 90.5 | 90.0 | 89.6 | 89.3 | 88.9 | 88.7 | 88.4 | 88.2 | 88.1 | 87.9 | 87.7 | 87.6 | 87.5 |
| Residual Sulfur (%) | Res. S | | 95.3 | 91.9 | 90.2 | 89.1 | 88.2 | 87.4 | 86.6 | 85.9 | 85.2 | 84.6 | 84.1 | 83.6 | 83.2 | 82.9 | 82.6 | 82.4 | 82.2 | 82.0 | 81.9 | 81.8 | 81.8 | 81.7 | 81.7 |
| $SO_4$/(Ca+Mg) molar ratio | $SO_4$/(Ca+Mg) | | 2.4 | 2.1 | 1.9 | 1.4 | 1.4 | 1.1 | 1.2 | 0.9 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.7 | 0.6 | 0.7 | 0.5 | 0.4 | 0.5 | 0.4 |

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines 1. Recommended guideline limits for Livestock Drinking Water.

< indicates less than the laboratory limit of reporting. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm * Acidity and alkalinity data calculated in mg CaCO3/L. Shaded cells exceed applied guideline values. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm. ^ calculated based on total dissolved solids (TDS) conversion rate of 0.67 % of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water. ** SO4, Ca and Mg release rates calculated in mg/kg/flush. Residual ANC assumes that all leached Mg and Ca is due to dissolution of calcite or dolomite. Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity. MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential.

# KLC 1: NAF Waste Rock

| | | | | | |
|---|---|---|---|---|---|
| Weight (kg) | 14.00 | Total S (%) | 0.54 | ANC | 90.20 |
| pH (1:5) | 9.50 | Scr (%) | 0.355 | NAPP | -79.33 |
| EC (µS/cm) | 94 | MPA | 10.87 | ANC:MPA | 8.30 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | 29-Aug-16 | 27-Sep-16 | 31-Oct-16 | 28-Nov-16 | 28-Feb-17 | 29-May-17 | 29-Aug-17 | 28-Nov-17 | 28-Mar-18 | 29-May-18 | 28-Aug-18 | 25-Aug-21 | 25-Nov-21 | 22-Feb-22 | 24-May-22 | 23-Aug-22 | 24-Nov-22 | 28-Feb-23 | 23-May-23 | 01-Mar-24 | 29-May-24 | 28-Aug-24 | 28-Nov-24 |
| Number of Weeks | | 0 | 4 | 9 | 13 | 26 | 39 | 52 | 65 | 82 | 91 | 104 | 260 | 273 | 286 | 299 | 312 | 325 | 339 | 351 | 392 | 404 | 417 | 426 |
| Leach Number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| ALS Laboratory Number | | EB1621323 | EB1623451 | EB1626138 | EB1628241 | EB1703876 | EB1711556 | EB1718207 | EB1725119 | EB1808038 | EB1813063 | EB1820820 | EB2123896 | EB2134162 | EB2204864 | EB2214553 | EB2224653 | EB2235214 | EB2305995 | EB2315518 | EB2407152001 | EB2418286001 | EB2429597001 | EB2441569001 |
| Volume On (L) | | 1.5 | 1.5 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| Volume Off (L) | | 0.781 | 1.131 | 0.97 | 0.992 | 0.675 | 0.694 | 0.721 | 0.676 | 0.649 | 0.831 | 0.695 | 0.772 | 0.84 | 0.833 | 1.005 | 0.941 | 0.903 | 0.818 | 0.844 | 0.835 | 0.825 | 0.752 | 1.085 |
| Cum. Volume (L) | | 0.781 | 1.912 | 2.882 | 3.874 | 4.549 | 5.243 | 5.964 | 6.640 | 7.289 | 8.120 | 8.815 | 9.587 | 10.427 | 11.260 | 12.265 | 13.206 | 14.109 | 14.927 | 15.771 | 16.606 | 17.431 | 18.183 | 19.268 |
| Number of Pore Volumes through the Samples | WQ Guidelines | 0.7 | 1.7 | 2.5 | 3.4 | 4.0 | 4.6 | 5.2 | 5.8 | 6.3 | 7.1 | 7.7 | 8.3 | 9.1 | 9.8 | 10.7 | 11.5 | 12.3 | 13.0 | 13.7 | 14.4 | 15.2 | 15.8 | 16.8 |
| pH (RGS Measurement) | - | 7.91 | 8.39 | 7.84 | 8.00 | 8.50 | 8.13 | 8.42 | 6.93 | 8.27 | 6.80 | 8.18 | 7.93 | 8.35 | 6.40 | 8.34 | 7.69 | 8.37 | 7.64 | 7.77 | 6.91 | 7.57 | 7.39 | 7.37 |
| pH (ALS Measurement) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.69 | 7.41 | 7.01 | 7.57 | 7.70 | 7.27 | 7.28 | 7.68 | 7.98 | 7.93 | 7.92 | 7.47 |
| pH (deionised water used in test) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.07 | 5.79 | 6.05 | 5.83 | 6.05 | 5.38 | 6.18 | 5.77 | 5.58 | 6.45 | 5.73 | 5.66 |
| EC (RGS Measurement) (µS/cm) | 3,580^ | 282 | 298 | 375 | 421 | 396 | 383 | 323 | 258 | 305 | 268 | 328 | 365 | 219 | 282 | 151 | 170 | 150 | 176 | 142 | 422 | 232 | 436 | 325 |
| EC (ALS Measurement) (µS/cm) | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 348 | 226 | 331 | 160 | 177 | 146 | 180 | 160 | 415 | 256 | 485 | 334 |
| Acidity (mg/L as $CaCO_3$)* | - | <1 | <1 | 10 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | <1 | 5 | 6 | 4 | 2 | <1 | 3 | 1 | 3 | 4 | 4 | 3 | 4 |
| Hydroxide Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 35 | 26 | 22 | 22 | 21 | 26 | 21 | 24 | 48 | 40 | 38 | 36 |
| Total Alkalinity (mg/L as $CaCO_3$)* | - | 65 | 43 | 34 | 34 | 26 | 42 | 33 | 32 | 35 | 31 | 45 | 35 | 26 | 22 | 22 | 21 | 26 | 21 | 24 | 48 | 40 | 38 | 36 |
| Net Alkalinity | - | 65 | 43 | 24 | 32 | 25 | 41 | 31 | 31 | 33 | 30 | 45 | 30 | 20 | 18 | 20 | 21 | 23 | 20 | 21 | 44 | 36 | 35 | 32 |
| **Major Ions (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Calcium | Ca | 1 | 1000 | 14 | 20 | 30 | 36 | 35 | 20 | 24 | 23 | 19 | 24 | 33 | 40 | 26 | 38 | 105 | 87 | 15 | 21 | 14 | 46 | 32 | 55 | 42 |
| Potassium | K | 1 | - | 6 | 3 | 3 | 3 | 3 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 3 | 2 | 2 | 2 |
| Magnesium | Mg | 1 | - | 4 | 6 | 8 | 10 | 10 | 5 | 15 | 5 | 4 | 7 | 8 | 7 | 4 | 6 | 4 | 4 | 2 | 4 | 2 | 8 | 6 | 10 | 7 |
| Sodium | Na | 1 | - | 40 | 32 | 34 | 33 | 30 | 18 | 1 | 19 | 21 | 19 | 19 | 29 | 10 | 16 | 9 | 12 | 8 | 11 | 9 | 21 | 17 | 19 | 17 |
| Chloride | Cl | 1 | - | 7 | 4 | 3 | 2 | <1 | <1 | <1 | 1 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 2 | 1 |
| Fluoride | F | 0.1 | 2 | 0.6 | 0.4 | 0.4 | 0.4 | 0.4 | 0.6 | 0.3 | 0.3 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.4 | 0.4 | 0.4 | 0.4 |
| Sulfate | $SO_4$ | 1 | 1,000 | 74 | 110 | 144 | 167 | 152 | 140 | 81 | 93 | 80 | 100 | 119 | 134 | 76 | 122 | 47 | 56 | 43 | 62 | 46 | 177 | 93 | 181 | 117 |
| **Trace metals/ metalloids (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Aluminium | Al | 0.01 | 5 | 0.01 | 0.06 | 0.04 | 0.06 | 0.02 | <0.01 | <0.01 | 0.04 | 0.06 | 0.02 | 0.01 | 0.04 | 0.02 | 0.02 | 0.04 | 0.04 | 0.04 | 0.06 | 0.1 | <0.01 | 0.01 | <0.01 | 0.01 |
| Arsenic | As | 0.001 | 0.5 | 0.002 | 0.002 | 0.002 | 0.003 | 0.002 | 0.002 | <0.001 | 0.002 | 0.002 | 0.002 | 0.003 | <0.001 | <0.001 | 0.001 | <0.001 | 0.001 | 0.001 | 0.001 | <0.001 | 0.002 | 0.003 | 0.003 | 0.003 |
| Boron | B | 0.05 | 5 | 0.07 | 0.19 | 0.21 | 0.35 | 0.44 | 0.31 | 0.12 | 0.39 | 0.58 | 0.45 | 0.29 | 0.35 | 0.26 | 0.26 | 0.2 | 0.27 | 0.21 | 0.34 | 0.24 | 0.66 | 0.63 | 0.56 | 0.65 |
| Barium | Ba | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.006 | 0.004 | 0.007 | 0.002 | 0.003 | 0.003 | 0.005 | 0.004 | 0.018 | 0.007 | 0.014 | 0.008 |
| Beryllium | Be | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Bismuth | Bi | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | Cd | 0.0001 | 0.01 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Cerium | Ce | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Caesium | Cs | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 |
| Cobalt | Co | 0.001 | 1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Chromium | Cr | 0.001 | 1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | Cu | 0.001 | 1 | 0.009 | 0.001 | 0.001 | 0.007 | 0.002 | 0.001 | <0.001 | 0.004 | 0.001 | 0.002 | <0.001 | 0.003 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dysprosium | Dy | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | Er | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Europium | Eu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gadolinium | Gd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | Ga | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Hafnium | Hf | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Holmium | Ho | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | In | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lanthanum | La | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lithium | Li | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.032 | 0.025 | 0.033 | 0.02 | 0.016 | 0.015 | 0.024 | 0.017 | 0.046 | 0.034 | 0.046 | 0.037 |
| Lutetium | Lu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Iron | Fe | 0.05 | 1* | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Mercury | Hg | 0.0001 | 0.002 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Manganese | Mn | 0.001 | 2* | 0.02 | 0.026 | 0.04 | 0.024 | 0.019 | 0.005 | 0.014 | 0.033 | 0.025 | 0.019 | 0.018 | 0.016 | 0.02 | 0.022 | 0.018 | 0.018 | 0.017 | 0.02 | 0.025 | <0.001 | 0.002 | <0.001 | 0.007 |
| Molybdenum | Mo | 0.001 | 0.15 | 0.011 | 0.010 | 0.010 | 0.010 | 0.012 | 0.007 | 0.003 | 0.011 | 0.007 | 0.014 | 0.017 | 0.005 | 0.004 | 0.009 | 0.004 | 0.006 | 0.004 | 0.007 | 0.004 | 0.012 | 0.009 | 0.017 | 0.014 |
| Neodymium | Nd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | Ni | 0.001 | 1 | 0.035 | 0.001 | <0.001 | <0.001 | 0.005 | 0.005 | <0.001 | 0.002 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 |
| Praseodymium | Pr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | Pb | 0.001 | 0.1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony | Sb | 0.001 | - | 0.029 | 0.167 | 0.079 | 0.106 | 0.05 | 0.05 | 0.013 | 0.04 | 0.05 | 0.064 | 0.032 | 0.025 | 0.032 | 0.036 | 0.04 | 0.046 | 0.04 | 0.046 | 0.051 | 0.187 | 0.127 | 0.108 | 0.147 |
| Rubidium | Rb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.003 | 0.001 | 0.002 | 0.001 | <0.001 | 0.001 | 0.001 | 0.001 | 0.003 | 0.002 | 0.003 | 0.002 |
| Samarium | Sm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | Se | 0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Silver | Ag | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | Sr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.353 | 0.196 | 0.317 | 0.121 | 0.14 | 0.104 | 0.152 | 0.115 | 0.411 | 0.241 | 0.518 | 0.301 |
| Tellurium | Te | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Terbium | Tb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | Tl | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | Sn | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thulium | Tm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | Ti | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium | Th | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | U | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Vanadium | V | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | Yb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silicon | Si | - | - | 7.7 | 11.1 | 10.3 | 8.2 | 6.3 | 12.0 | 4.0 | 13.2 | 14.0 | 5.8 | 6.1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Zinc | Zn | 0.005 | 20 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.01 | 0.01 |
| Zirconium | Zr | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Ionic Balance** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Anions | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 2.98 | 1.42 | 1.58 | 1.41 | 1.71 | 1.44 | 4.64 | 2.76 | 4.58 | 3.18 |
| Total Cations | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 3.14 | 1.49 | 1.7 | 1.29 | 1.91 | 1.28 | 3.94 | 2.88 | 4.44 | 3.46 |
| Ionic Balance | % | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 8.15 | ---- | 1.54 | 4.2 |
| **Calculations**** | **Elements** | | | | | | | | | | | | | | | | | | | | | | | | | |
| $SO_4$ Release Rate | $SO_4$ | | | 4 | 9 | 10 | 12 | 7 | 7 | 4 | 4 | 4 | 6 | 6 | 7 | 5 | 7 | 3 | 4 | 3 | 4 | 3 | 11 | 5 | 10 | 9 |
| Cumulative $SO_4$ Release | Cum $SO_4$ | | | 4 | 13 | 23 | 35 | 42 | 49 | 53 | 58 | 61 | 67 | 73 | 81 | 85 | 93 | 96 | 100 | 102 | 106 | 109 | 119 | 125 | 135 | 144 |
| Ca Release Rate | Ca | | | 0.8 | 1.6 | 2.1 | 2.6 | 1.7 | 1.0 | 1.2 | 1.1 | 0.9 | 1.4 | 1.6 | 2.2 | 1.6 | 2.3 | 7.5 | 5.8 | 1.0 | 1.2 | 0.8 | 2.7 | 1.9 | 3.0 | 3.3 |
| Cumulative Ca Release | Cum Ca | | | 0.8 | 2.4 | 4.5 | 7.0 | 8.7 | 9.7 | 10.9 | 12.1 | 12.9 | 14.4 | 16.0 | 18.2 | 19.8 | 22.0 | 29.6 | 35.4 | 36.4 | 37.6 | 38.4 | 41.2 | 43.1 | 46.0 | 49.3 |
| Mg Release Rate | Mg | | | 0.2 | 0.5 | 0.6 | 0.7 | 0.5 | 0.2 | 0.8 | 0.2 | 0.2 | 0.4 | 0.4 | 0.4 | 0.2 | 0.4 | 0.3 | 0.3 | 0.1 | 0.2 | 0.1 | 0.5 | 0.4 | 0.5 | 0.5 |
| Cumulative Mg Release | Cum Mg | | | 0.2 | 0.7 | 1.3 | 2.0 | 2.5 | 2.7 | 3.5 | 3.7 | 3.9 | 4.3 | 4.7 | 5.1 | 5.3 | 5.7 | 6.0 | 6.3 | 6.4 | 6.6 | 6.7 | 7.2 | 7.6 | 8.1 | 8.6 |
| Residual ANC (%) | Res. ANC | | | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.8 | 99.8 | 99.8 |
| Residual Sulfur (%) | Res. S | | | 100.0 | 99.9 | 99.9 | 99.8 | 99.7 | 99.7 | 99.7 | 99.6 | 99.6 | 99.6 | 99.5 | 99.5 | 99.5 | 99.4 | 99.4 | 99.4 | 99.4 | 99.3 | 99.3 | 99.3 | 99.2 | 99.2 | 99.1 |
| $SO_4$/(Ca+Mg) molar ratio | $SO_4$/(Ca+Mg) | | | 1.5 | 1.5 | 1.4 | 1.3 | 1.2 | 2.1 | 0.7 | 1.2 | 1.3 | 1.2 | 1.1 | 1.1 | 1.0 | 1.1 | 0.2 | 0.2 | 1.0 | 0.9 | 1.1 | 1.2 | 0.9 | 1.1 | 0.9 |

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines 1. Recommended guideline limits for Livestock Drinking Water.

< indicates less than the laboratory limit of reporting. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm * Acidity and alkalinity data calculated in mg CaCO3/L. Shaded cells exceed applied guideline values. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm. ^ calculated based on total dissolved solids (TDS) conversion rate of 0.67 % of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water. ** SO4, Ca and Mg release rates calculated in mg/kg/flush. Residual ANC assumes that all leached Mg and Ca is due to dissolution of calcite or dolomite. Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity. MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential.

# KLC 2: Medium PAF Waste Rock

| | | | | | |
|---|---|---|---|---|---|
| Weight (kg) | 14.00 | Total S (%) | 1.49 | ANC | 66.10 |
| pH (1:5) | 9.40 | Scr (%) | 1.34 | NAPP | -25.06 |
| EC (µS/cm) | 120.00 | MPA | 41.04 | ANC:MPA | 1.61 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | | | 29-Aug-16 | 27-Sep-16 | 31-Oct-16 | 28-Nov-16 | 28-Feb-17 | 29-May-17 | 29-Aug-17 | 28-Nov-17 | 28-Mar-18 | 29-May-18 | 30-Aug-18 | 25-Aug-21 | 25-Nov-21 | 22-Feb-22 | 24-May-22 | 23-Aug-22 | 24-Nov-22 | 28-Feb-23 | 23-May-23 | 01-Mar-24 | 29-May-24 | 28-Aug-24 | 28-Nov-24 |
| Number of Weeks | | | | 0 | 4 | 9 | 13 | 26 | 39 | 52 | 65 | 82 | 91 | 104 | 260 | 273 | 286 | 299 | 312 | 325 | 339 | 351 | 392 | 404 | 417 | 426 |
| Leach Number | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| ALS Laboratory Number | | | | EB1621323 | EB1623451 | EB1626138 | EB1628241 | EB1703876 | EB1711556 | EB1718207 | EB1725119 | EB1808038 | EB1813063 | EB1820820 | EB2123896 | EB2134162 | EB2204864 | EB2214553 | EB2224653 | EB2235214 | EB2305995 | EB2315518 | EB2407152002 | EB2418286002 | EB2429597002 | EB2441569002 |
| Volume On (L) | | | | 1.5 | 1.5 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| Volume Off (L) | | | | 0.775 | 1.244 | 0.985 | 1.021 | 0.934 | 0.436 | 0.855 | 0.975 | 1.012 | 1.025 | 1.027 | 0.819 | 1.016 | 0.987 | 1.193 | 1.082 | 1.085 | 1.042 | 1.029 | 0.943 | 0.819 | 1.008 | 1.087 |
| Cum. Volume (L) | | | | 0.775 | 2.019 | 3.004 | 4.025 | 4.959 | 5.395 | 6.250 | 7.225 | 8.237 | 9.262 | 10.289 | 11.108 | 12.124 | 13.111 | 14.304 | 15.386 | 16.471 | 17.513 | 18.542 | 19.49 | 20.30 | 21.31 | 22.40 |
| Number of Pore Volumes through the Samples | | WQ Guidelines | | 0.7 | 1.8 | 2.6 | 3.5 | 4.3 | 4.7 | 5.4 | 6.3 | 7.2 | 8.1 | 8.9 | 9.7 | 10.5 | 11.4 | 12.4 | 13.4 | 14.3 | 15.2 | 16.1 | 16.9 | 17.7 | 18.5 | 19.5 |
| pH (RGS Measurement) | | - | | 7.81 | 7.76 | 7.53 | 7.44 | 7.86 | 7.75 | 7.83 | 7.03 | 7.76 | 6.74 | 7.92 | 7.43 | 7.86 | 6.31 | 7.90 | 7.20 | 7.76 | 7.29 | 7.48 | 6.70 | 7.55 | 7.27 | 7.58 |
| pH (ALS Measurement) | | - | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.46 | 7.24 | 6.50 | 6.62 | 7.27 | 6.96 | 6.86 | 7.24 | 7.47 | 6.92 | 7.28 | 7.31 |
| pH (deionised water used in test) | | - | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.07 | 5.79 | 6.05 | 5.83 | 6.05 | 5.38 | 5.57 | 5.77 | 5.58 | 6.45 | 5.73 | 5.66 |
| EC (RGS Measurement) (µS/cm) | | 3,580^ | | 692 | 769 | 778 | 1,019 | 1,006 | 1,410 | 660 | 808 | 778 | 560 | 664 | 598 | 550 | 396 | 539 | 514 | 548 | 466 | 464 | 1,638 | 1,040 | 1,664 | 1,642 |
| EC (ALS Measurement) (µS/cm) | | | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 590 | 574 | 457 | 553 | 535 | 545 | 481 | 483 | 1,670 | 1,390 | 1,770 | 1,600 |
| Acidity (mg/L as $CaCO_3$)* | | - | | 2 | 2 | 14 | 2 | 2 | 1 | 3 | 3 | 3 | 2 | 2 | 4 | 4 | 4 | 2 | 2 | 6 | 2 | 2 | 4.0 | 5.0 | 4.0 | 4.0 |
| Hydroxide Alkalinity (mg/L as $CaCO_3$)* | | - | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity (mg/L as $CaCO_3$)* | | - | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity (mg/L as $CaCO_3$)* | | - | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 22 | 15 | 13 | 10 | 9 | 18 | 10 | 12 | 47 | 29 | 30 | 28 |
| Total Alkalinity (mg/L as $CaCO_3$)* | | - | | 45 | 28 | 32 | 26 | 21 | 29 | 26 | 22 | 21 | 16 | 42 | 22 | 15 | 13 | 10 | 9 | 18 | 10 | 12 | 47 | 29 | 30 | 28 |
| Net Alkalinity | | - | | 43 | 26 | 18 | 24 | 19 | 28 | 23 | 19 | 18 | 14 | 40 | 18 | 11 | 9 | 8 | 7 | 12 | 8 | 10 | 43 | 24 | 26 | 24 |
| **Major Ions (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | | | |
| Calcium | Ca | 1 | 1000 | 92 | 111 | 136 | 182 | 192 | 196 | 133 | 150 | 143 | 102 | 122 | 110 | 104 | 76 | 105 | 87 | 99 | 88 | 80 | 372 | 256 | 421 | 387 |
| Potassium | K | 1 | - | 19 | 11 | 7 | 8 | 7 | 6 | 8 | 4 | 4 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 5 | 4 | 4 | 4 |
| Magnesium | Mg | 1 | - | 14 | 17 | 15 | 18 | 16 | 15 | 11 | 10 | 8 | 6 | 7 | 5 | 5 | 3 | 4 | 4 | 4 | 3 | 3 | 8 | 8 | 10 | 10 |
| Sodium | Na | 1 | - | 28 | 24 | 19 | 18 | 23 | 17 | 4 | 16 | 18 | 11 | 12 | 21 | 9 | 8 | 9 | 12 | 8 | 8 | 8 | 14 | 11 | 11 | 12 |
| Chloride | Cl | 1 | - | 8 | 4 | 2 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Fluoride | F | 0.1 | 2 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.6 | 0.3 | 0.4 | 0.4 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.4 | 0.4 | 0.4 | 0.4 |
| Sulfate | $SO_4$ | 1 | 1,000 | 316 | 389 | 419 | 559 | 547 | 832 | 323 | 405 | 406 | 273 | 332 | 289 | 270 | 197 | 252 | 231 | 262 | 224 | 220 | 1,000 | 817 | 975 | 928 |
| **Trace metals/ metalloids (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminium | Al | 0.01 | 5 | <0.01 | 0.02 | 0.02 | <0.01 | 0.01 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | 0.04 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Arsenic | As | 0.001 | 0.5 | 0.004 | 0.008 | 0.01 | 0.015 | 0.021 | 0.018 | 0.006 | 0.017 | 0.016 | 0.011 | 0.013 | <0.001 | 0.005 | 0.005 | 0.006 | 0.006 | 0.006 | 0.007 | 0.005 | 0.011 | 0.01 | 0.01 | 0.012 |
| Boron | B | 0.05 | 5 | <0.05 | 0.12 | 0.15 | 0.3 | 0.81 | 0.5 | 0.18 | 0.7 | 0.85 | 0.46 | 0.54 | 0.35 | 0.39 | 0.39 | 0.43 | 0.44 | 0.39 | 0.4 | 0.39 | 0.64 | 0.54 | 0.59 | 0.58 |
| Barium | Ba | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.004 | 0.004 | 0.003 | 0.004 | 0.004 | 0.004 | 0.004 | 0.003 | 0.012 | 0.007 | 0.01 | 0.09 |
| Beryllium | Be | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Bismuth | Bi | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | Cd | 0.0001 | 0.01 | 0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0002 | <0.0001 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0008 | 0.0002 | 0.0003 | 0.0003 |
| Cerium | Ce | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Caesium | Cs | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 | 0.001 | 0.001 | 0.001 |
| Cobalt | Co | 0.001 | 1 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.003 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Chromium | Cr | 0.001 | 1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | Cu | 0.001 | 1 | 0.006 | 0.001 | 0.001 | 0.001 | 0.005 | 0.002 | <0.001 | 0.003 | 0.001 | 0.001 | <0.001 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dysprosium | Dy | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | Er | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Europium | Eu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gadolinium | Gd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | Ga | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Hafnium | Hf | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Holmium | Ho | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | In | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lanthanum | La | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lithium | Li | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.029 | 0.031 | 0.026 | 0.037 | 0.023 | 0.024 | 0.028 | 0.024 | 0.064 | 0.036 | 0.053 | 0.048 |
| Lutetium | Lu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Iron | Fe | 0.05 | 1* | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Mercury | Hg | 0.0001 | 0.002 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Manganese | Mn | 0.001 | 2* | 0.238 | 0.487 | 0.179 | 0.069 | 0.014 | 0.002 | 0.012 | 0.024 | 0.016 | 0.021 | 0.022 | 0.214 | 0.035 | 0.022 | 0.021 | 0.019 | 0.014 | 0.018 | 0.02 | 0.129 | <0.001 | <0.001 | 0.002 |
| Molybdenum | Mo | 0.001 | 0.15 | 0.029 | 0.026 | 0.025 | 0.041 | 0.053 | 0.038 | 0.013 | 0.035 | 0.031 | 0.021 | 0.025 | 0.004 | 0.008 | 0.008 | 0.011 | 0.01 | 0.011 | 0.011 | 0.01 | 0.024 | 0.022 | 0.023 | 0.025 |
| Neodymium | Nd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | Ni | 0.001 | 1 | 0.06 | 0.003 | 0.002 | 0.002 | 0.001 | 0.002 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | 0.005 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.005 | 0.005 | <0.001 | <0.001 |
| Praseodymium | Pr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | Pb | 0.001 | 0.1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony | Sb | 0.001 | - | 0.018 | 0.101 | 0.046 | 0.063 | 0.099 | 0.062 | 0.018 | 0.092 | 0.094 | 0.07 | 0.077 | 0.024 | 0.03 | 0.033 | 0.044 | 0.054 | 0.054 | 0.041 | 0.053 | 0.119 | 0.083 | 0.069 | 0.118 |
| Rubidium | Rb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.004 | 0.003 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.002 | 0.008 | 0.004 | 0.005 | 0.004 |
| Samarium | Sm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | Se | 0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Silver | Ag | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | Sr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.278 | 0.26 | 0.193 | 0.246 | 0.227 | 0.211 | 0.204 | 0.202 | 0.923 | 0.599 | 0.94 | 0.801 |
| Tellurium | Te | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Terbium | Tb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | Tl | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | Sn | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thulium | Tm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | Ti | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium | Th | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | U | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.004 | 0.002 | 0.003 | 0.002 |
| Vanadium | V | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | Yb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silicon | Si | - | - | 6.8 | 11 | 11.4 | 9.8 | 7.88 | 9.97 | 4.98 | 18.9 | 17.7 | 5.61 | 7.25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Zinc | Zn | 0.005 | 20 | <0.005 | 0.005 | 0.007 | 0.015 | 0.017 | 0.034 | 0.01 | 0.019 | 0.015 | 0.016 | 0.026 | 0.013 | 0.007 | <0.005 | <0.005 | 0.01 | 0.009 | 0.005 | 0.01 | 0.09 | 0.023 | 0.052 | 0.048 |
| Zirconium | Zr | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Ionic Balance** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Anions | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 4.36 | 5.45 | 4.99 | 5.81 | 4.86 | 4.82 | 21.8 | 17.6 | 20.9 | 21 |
| Total Cations | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 4.44 | 6.01 | 5.24 | 5.67 | 5.04 | 4.64 | 20 | 14 | 22.4 | 22.8 |
| Ionic Balance | % | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.88 | 4.93 | 2.48 | 1.27 | 1.75 | 1.93 | 4.32 | 11.3 | 3.49 | 4.21 |
| **Calculations**** | **Elements** | | | | | | | | | | | | | | | | | | | | | | | | | |
| $SO_4$ Release Rate | $SO_4$ | | | 17 | 35 | 29 | 41 | 36 | 26 | 20 | 28 | 29 | 20 | 24 | 17 | 20 | 14 | 21 | 18 | 20 | 17 | 16 | 67 | 48 | 70 | 72 |
| Cumulative $SO_4$ Release | Cum $SO_4$ | | | 17 | 52 | 82 | 122 | 159 | 185 | 204 | 233 | 262 | 282 | 306 | 323 | 343 | 357 | 378 | 396 | 416 | 433 | 449 | 517 | 564 | 635 | 707 |
| Ca Release Rate | Ca | | | 5.1 | 9.9 | 9.6 | 13.3 | 12.8 | 6.1 | 8.1 | 10.4 | 10.3 | 7.5 | 8.9 | 6.4 | 7.5 | 5.4 | 8.9 | 6.7 | 7.7 | 6.5 | 5.9 | 25.1 | 15.0 | 30.3 | 30.0 |
| Cumulative Ca Release | Cum Ca | | | 5.1 | 15.0 | 24.5 | 37.8 | 50.6 | 56.7 | 64.8 | 75.3 | 85.6 | 93.1 | 102.0 | 108.5 | 116.0 | 121.4 | 130.3 | 137.0 | 144.7 | 151.3 | 157.1 | 182.2 | 197.2 | 227.5 | 257.5 |
| Mg Release Rate | Mg | | | 0.8 | 1.5 | 1.1 | 1.3 | 1.1 | 0.5 | 0.7 | 0.7 | 0.6 | 0.4 | 0.5 | 0.3 | 0.4 | 0.2 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.5 | 0.5 | 0.7 | 0.8 |
| Cumulative Mg Release | Cum Mg | | | 0.8 | 2.3 | 3.3 | 4.7 | 5.7 | 6.2 | 6.9 | 7.6 | 8.1 | 8.6 | 9.1 | 9.4 | 9.7 | 10.0 | 10.3 | 10.6 | 10.9 | 11.1 | 11.4 | 11.9 | 12.4 | 13.1 | 13.9 |
| Residual ANC (%) | Res. ANC | | | 100.0 | 99.9 | 99.9 | 99.8 | 99.8 | 99.8 | 99.7 | 99.7 | 99.6 | 99.6 | 99.6 | 99.5 | 99.5 | 99.5 | 99.5 | 99.4 | 99.4 | 99.4 | 99.3 | 99.3 | 99.2 | 99.1 | 99.0 |
| Residual Sulfur (%) | Res. S | | | 100.0 | 99.9 | 99.8 | 99.7 | 99.6 | 99.6 | 99.5 | 99.5 | 99.4 | 99.4 | 99.3 | 99.3 | 99.2 | 99.2 | 99.2 | 99.1 | 99.1 | 99.0 | 99.0 | 98.8 | 98.7 | 98.6 | 98.4 |
| $SO_4$/(Ca+Mg) molar ratio | $SO_4$/(Ca+Mg) | | | 1.1 | 1.2 | 1.1 | 1.1 | 1.0 | 1.6 | 0.9 | 1.0 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 1.3 | 0.9 | 1.0 |

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines 1. Recommended guideline limits for Livestock Drinking Water.

< indicates less than the laboratory limit of reporting. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm * Acidity and alkalinity data calculated in mg CaCO3/L. Shaded cells exceed applied guideline values. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm. ^ calculated based on total dissolved solids (TDS) conversion rate of 0.67 % of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water. ** SO4, Ca and Mg release rates calculated in mg/kg/flush. Residual ANC assumes that all leached Mg and Ca is due to dissolution of calcite or dolomite. Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity. MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential.

# KLC 3: High PAF Waste Rock

| | | | | | |
|---|---|---|---|---|---|
| Weight (kg) | 14.00 | Total S (%) | 4.29 | ANC | 37.70 |
| pH (1:5) | 9.00 | Scr (%) | 3.60 | NAPP | 72.55 |
| EC (µS/cm) | 187.00 | MPA | 110.25 | ANC:MPA | 0.34 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | 29-Aug-16 | 27-Sep-16 | 31-Oct-16 | 28-Nov-16 | 28-Feb-17 | 29-May-17 | 29-Aug-17 | 28-Nov-17 | 28-Mar-18 | 29-May-18 | 28-Aug-18 | 25-Aug-21 | 25-Nov-21 | 22-Feb-22 | 24-May-22 | 23-Aug-22 | 24-Nov-22 | 28-Feb-23 | 23-May-23 | 01-Mar-24 | 29-May-24 | 28-Aug-24 | 28-Nov-24 |
| Number of Weeks | | 0 | 4 | 9 | 13 | 26 | 39 | 52 | 65 | 82 | 91 | 104 | 260 | 273 | 286 | 299 | 312 | 325 | 339 | 351 | 392 | 404 | 417 | 426 |
| Leach Number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| ALS Laboratory Number | | EB1621323 | EB1623451 | EB1626138 | EB1628241 | EB1703876 | EB1711556 | EB1718207 | EB1725119 | EB1808038 | EB1813063 | EB1820820 | EB2123896 | EB2134162 | EB2204864 | EB2214553 | EB2224653 | EB2235214 | EB2305995 | EB2315518 | EB2407152003 | EB2418286003 | EB2429597003 | EB2441569003 |
| Volume On (L) | | 1.5 | 1.5 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| Volume Off (L) | | 0.801 | 1.001 | 1.013 | 1.030 | 0.854 | 0.946 | 0.927 | 0.080 | 0.771 | 0.910 | 0.908 | 0.878 | 1.078 | 0.931 | 1.000 | 0.954 | 0.988 | 0.992 | 0.913 | 1.013 | 0.788 | 0.849 | 0.967 |
| Cum. Volume (L) | | 0.80 | 1.80 | 2.82 | 3.85 | 4.70 | 5.65 | 6.57 | 6.65 | 7.42 | 8.33 | 9.24 | 10.12 | 11.20 | 12.13 | 13.13 | 14.08 | 15.07 | 16.06 | 16.98 | 17.99 | 18.78 | 19.63 | 20.59 |
| Number of Pore Volumes through the Samples | WQ Guidelines | 0.7 | 1.6 | 2.4 | 3.3 | 4.1 | 4.9 | 5.7 | 5.8 | 6.5 | 7.2 | 8.0 | 8.8 | 9.7 | 10.5 | 11.4 | 12.2 | 13.1 | 14.0 | 14.8 | 15.6 | 16.3 | 17.1 | 17.9 |
| pH (RGS Measurement) | - | 7.8 | 7.79 | 7.59 | 7.61 | 8.1 | 7.54 | 7.64 | 7.04 | 7.89 | 6.9 | 7.61 | 6.74 | 7.5 | 6.19 | 7.06 | 6.57 | 6.97 | 6.34 | 6.63 | 6.51 | 6.93 | 7.00 | 6.86 |
| pH (ALS Measurement) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.14 | 7.06 | 6.37 | 6.44 | 6.83 | 6.51 | 6.48 | 6.77 | 7.04 | 7.01 | 7.19 | 7.11 |
| pH (deionised water used in test) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.07 | 5.79 | 6.05 | 5.30 | 6.05 | 5.38 | 5.57 | 5.77 | 5.58 | 6.45 | 5.73 | 5.66 |
| EC (RGS Measurement) (µS/cm) | 3,580^ | 584 | 299 | 486 | 455 | 512 | 703 | 281 | 294 | 304 | 398 | 466 | 876 | 489 | 336 | 353 | 318 | 508 | 543 | 519 | 2,280 | 1,918 | 1,998 | 1,774 |
| EC (ALS Measurement) (µS/cm) | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 907 | 506 | 380 | 375 | 344 | 506 | 579 | 545 | 2,500 | 2,380 | 2,160 | 1,750 |
| Acidity (mg/L as $CaCO_3$)* | - | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 9 | 4 | 4 | 2 | 2 | 6 | 4 | 3 | 10 | 10 | 7 | 8 |
| Hydroxide Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 14 | 10 | 8 | 6 | 4 | 8 | 5 | 5 | 71 | 48 | 33 | 32 |
| Total Alkalinity (mg/L as $CaCO_3$)* | - | 43 | 27 | 30 | 22 | 20 | 46 | 15 | 16 | 13 | 16 | 15 | 14 | 10 | 8 | 6 | 4 | 8 | 5 | 5 | 71 | 48 | 33 | 32 |
| Net Alkalinity | - | 42 | 26 | 24 | 20 | 18 | 45 | 13 | 14 | 11 | 14 | 13 | 5 | 6 | 4 | 4 | 2 | 2 | 1 | 2 | 61 | 38 | 26 | 24 |
| **Major Ions (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Calcium | Ca | 1 | 1000 | 69 | 38 | 66 | 62 | 82 | 62 | 46 | 43 | 42 | 55 | 68 | 171 | 91 | 63 | 66 | 51 | 84 | 99 | 79 | 516 | 536 | 532 | 428 |
| Potassium | K | 1 | - | 16 | 2 | 4 | 3 | 4 | 2 | 4 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | <1 | 1 | 2 | 2 | 7 | 5 | 3 | 3 |
| Magnesium | Mg | 1 | - | 14 | 6 | 12 | 11 | 11 | 8 | 5 | 4 | 4 | 6 | 8 | 14 | 6 | 4 | 4 | 4 | 7 | 9 | 7 | 37 | 29 | 16 | 14 |
| Sodium | Na | 1 | - | 25 | 12 | 17 | 12 | 11 | 6 | 2 | 6 | 7 | 9 | 8 | 25 | 6 | 5 | 5 | 4 | 6 | 8 | 6 | 16 | 9 | 4 | 5 |
| Chloride | Cl | 1 | - | 9 | 2 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 |
| Fluoride | F | 0.1 | 2 | 0.4 | 0.2 | 0.3 | 0.3 | 0.3 | 0.4 | 0.1 | 0.2 | 0.1 | <0.1 | 0.2 | 0.1 | 0.1 | <0.1 | <0.1 | <0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.3 | 0.3 | 0.3 |
| Sulfate | $SO_4$ | 1 | 1,000 | 267 | 128 | 220 | 186 | 228 | 338 | 116 | 120 | 124 | 170 | 202 | 510 | 235 | 162 | 160 | 140 | 244 | 290 | 261 | 1,590 | 1,390 | 1,220 | 976 |
| **Trace metals/ metalloids (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Aluminium | Al | 0.01 | 5 | 0.01 | 0.05 | 0.01 | 0.01 | 0.01 | <0.01 | <0.01 | 0.02 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Arsenic | As | 0.001 | 0.5 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | B | 0.05 | 5 | <0.05 | 0.2 | 0.16 | 0.16 | 0.27 | 0.16 | 0.07 | 0.2 | 0.24 | 0.34 | 0.3 | 0.45 | 0.26 | 0.21 | 0.2 | 0.13 | 0.22 | 0.33 | 0.25 | 0.4 | 0.34 | 0.23 | 0.25 |
| Barium | Ba | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.008 | 0.004 | 0.003 | 0.003 | 0.002 | 0.005 | 0.005 | 0.003 | 0.022 | 0.014 | 0.01 | 0.009 |
| Beryllium | Be | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Bismuth | Bi | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | Cd | 0.0001 | 0.01 | 0.0004 | 0.0001 | 0.0007 | 0.0009 | 0.0012 | 0.001 | 0.0006 | 0.0009 | 0.001 | 0.0015 | 0.0024 | 0.0438 | 0.0064 | 0.0039 | 0.0044 | 0.0034 | 0.0057 | 0.0127 | 0.0082 | 0.108 | 0.0966 | 0.0585 | 0.0657 |
| Cerium | Ce | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.040 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.003 | 0.002 | 0.009 | 0.014 | 0.009 | 0.009 |
| Caesium | Cs | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | 0.006 | 0.003 | 0.002 | 0.002 |
| Cobalt | Co | 0.001 | 1 | 0.004 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.029 | 0.002 | 0.001 | <0.001 | <0.001 | <0.001 | 0.002 | 0.001 | 0.006 | 0.008 | 0.002 | 0.003 |
| Chromium | Cr | 0.001 | 1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | Cu | 0.001 | 1 | 0.025 | 0.004 | 0.002 | 0.002 | 0.004 | 0.002 | 0.005 | 0.003 | 0.002 | 0.002 | 0.004 | 0.199 | 0.002 | 0.007 | 0.009 | 0.008 | 0.007 | 0.032 | 0.02 | 0.021 | 0.025 | 0.017 | 0.020 |
| Dysprosium | Dy | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | Er | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Europium | Eu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gadolinium | Gd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 |
| Gallium | Ga | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Hafnium | Hf | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Holmium | Ho | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | In | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lanthanum | La | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.019 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | 0.003 | 0.002 | 0.014 | 0.023 | 0.013 | 0.014 |
| Lithium | Li | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.033 | 0.028 | 0.02 | 0.022 | 0.013 | 0.02 | 0.03 | 0.022 | 0.083 | 0.045 | 0.026 | 0.024 |
| Lutetium | Lu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Iron | Fe | 0.05 | 1* | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Mercury | Hg | 0.0001 | 0.002 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Manganese | Mn | 0.001 | 2* | 0.396 | 0.143 | 0.262 | 0.165 | 0.093 | 0.024 | 0.055 | 0.087 | 0.113 | 0.059 | 0.071 | 3.04 | 0.532 | 0.191 | 0.147 | 0.09 | 0.129 | 0.319 | 0.171 | 4.58 | 4.12 | 1.40 | 1.76 |
| Molybdenum | Mo | 0.001 | 0.15 | 0.004 | 0.002 | 0.004 | 0.005 | 0.011 | 0.004 | 0.001 | 0.003 | 0.001 | 0.002 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 0.001 | <0.001 | <0.001 |
| Neodymium | Nd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.016 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 0.001 | 0.005 | 0.08 | 0.005 | 0.006 |
| Nickel | Ni | 0.001 | 1 | 0.025 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.02 | 0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 0.002 | 0.001 | 0.018 | 0.016 | 0.007 | 0.008 |
| Praseodymium | Pr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.004 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 0.002 | 0.001 | 0.002 |
| Lead | Pb | 0.001 | 0.1 | 0.002 | 0.002 | 0.004 | 0.005 | 0.002 | 0.001 | <0.001 | 0.002 | 0.001 | 0.001 | <0.001 | 0.028 | 0.003 | 0.002 | 0.004 | 0.004 | 0.003 | 0.006 | 0.004 | 0.015 | 0.017 | 0.011 | 0.013 |
| Antimony | Sb | 0.001 | - | 0.011 | 0.051 | 0.075 | 0.045 | 0.053 | 0.027 | 0.013 | 0.032 | 0.032 | 0.071 | 0.052 | 0.017 | 0.02 | 0.02 | 0.022 | 0.021 | 0.024 | 0.03 | 0.033 | 0.033 | 0.018 | 0.011 | 0.012 |
| Rubidium | Rb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.004 | 0.002 | 0.002 | 0.001 | 0.001 | 0.002 | 0.002 | 0.002 | 0.014 | 0.007 | 0.004 | 0.004 |
| Samarium | Sm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | Se | 0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Silver | Ag | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | Sr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.701 | 0.308 | 0.217 | 0.203 | 0.184 | 0.248 | 0.336 | 0.286 | 2.25 | 1.73 | 1.45 | 1.09 |
| Tellurium | Te | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Terbium | Tb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | Tl | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | Sn | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thulium | Tm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | Ti | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium | Th | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | U | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Vanadium | V | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | Yb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silicon | Si | - | - | 4.4 | 6 | 12.6 | 8.8 | 5.12 | 6.5 | 2.39 | 7 | 6.4 | 5.03 | 4.57 | 0.005 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | - | - | - | - |
| Zinc | Zn | 0.005 | 20 | 0.007 | <0.005 | 0.016 | 0.024 | 0.036 | 0.041 | 0.027 | 0.03 | 0.026 | 0.067 | 0.127 | 3.89 | 0.254 | 0.225 | 0.01 | 0.218 | 0.29 | 0.721 | 0.468 | 4.63 | 4.49 | 2.53 | 3.16 |
| Zirconium | Zr | 0.005 | - | | | | | | | | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Ionic Balance** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Anions | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 3.53 | 3.45 | 2.99 | 5.24 | 6.14 | 5.53 | 34.6 | 29.9 | 26.1 | 2.4 |
| Total Cations | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 3.72 | 3.86 | 3.05 | 5.05 | 6.08 | 4.83 | 29.7 | 29.6 | 28.1 | 2.78 |
| Ionic Balance | % | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 2.53 | 5.66 | ---- | 1.8 | 0.47 | 6.79 | 7.64 | 0.41 | 3.79 | ---- |
| **Calculations**** | **Elements** | | | | | | | | | | | | | | | | | | | | | | | | | |
| $SO_4$ Release Rate | $SO_4$ | | | 15 | 9 | 16 | 14 | 14 | 23 | 8 | 1 | 7 | 11 | 13 | 32 | 18 | 11 | 11 | 10 | 17 | 21 | 17 | 268 | 183 | 173 | 157 |
| Cumulative $SO_4$ Release | Cum $SO_4$ | | | 15 | 24 | 40 | 54 | 68 | 91 | 98 | 99 | 106 | 117 | 130 | 162 | 180 | 191 | 202 | 212 | 229 | 250 | 267 | 535 | 718 | 890 | 1048 |
| Ca Release Rate | Ca | | | 3.9 | 2.7 | 4.8 | 4.6 | 5.0 | 4.2 | 3.0 | 0.2 | 2.3 | 3.6 | 4.4 | 10.7 | 7.0 | 4.2 | 4.7 | 3.5 | 5.9 | 7.0 | 5.2 | 87.1 | 70.4 | 75.3 | 69.0 |
| Cumulative Ca Release | Cum Ca | | | 3.9 | 6.7 | 11.4 | 16.0 | 21.0 | 25.2 | 28.2 | 28.5 | 30.8 | 34.4 | 38.8 | 49.5 | 56.5 | 60.7 | 65.4 | 68.9 | 74.8 | 81.8 | 87.0 | 174.1 | 244.5 | 319.8 | 388.8 |
| Mg Release Rate | Mg | | | 0.8 | 0.4 | 0.9 | 0.8 | 0.7 | 0.5 | 0.3 | 0.0 | 0.2 | 0.4 | 0.5 | 0.9 | 0.5 | 0.3 | 0.3 | 0.3 | 0.5 | 0.6 | 0.5 | 6.2 | 3.8 | 2.3 | 2.3 |
| Cumulative Mg Release | Cum Mg | | | 0.8 | 1.2 | 2.1 | 2.9 | 3.6 | 4.1 | 4.5 | 4.5 | 4.7 | 5.1 | 5.6 | 6.5 | 6.9 | 7.2 | 7.5 | 7.8 | 8.3 | 8.9 | 9.4 | 15.6 | 19.4 | 21.7 | 23.9 |
| Residual ANC (%) | Res. ANC | | | 100.0 | 99.9 | 99.9 | 99.9 | 99.8 | 99.8 | 99.8 | 99.8 | 99.7 | 99.7 | 99.7 | 99.6 | 99.6 | 99.5 | 99.5 | 99.5 | 99.4 | 99.4 | 99.3 | 98.7 | 98.2 | 97.7 | 97.2 |
| Residual Sulfur (%) | Res. S | | | 100.0 | 100.0 | 100.0 | 100.0 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.8 | 99.8 | 99.8 | 99.8 | 99.8 | 99.6 | 99.4 | 99.3 | 99.2 |
| $SO_4$/(Ca+Mg) molar ratio | $SO_4$/(Ca+Mg) | | | 1.2 | 1.1 | 1.1 | 1.0 | 1.0 | 1.9 | 0.9 | 1.0 | 1.1 | 1.1 | 1.0 | 1.1 | 1.0 | 1.0 | 0.9 | 1.0 | 1.1 | 1.1 | 1.2 | 1.1 | 1.0 | 0.9 | 0.9 |

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines 1. Recommended guideline limits for Livestock Drinking Water.

< indicates less than the laboratory limit of reporting. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm * Acidity and alkalinity data calculated in mg CaCO3/L. Shaded cells exceed applied guideline values. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm. ^ calculated based on total dissolved solids (TDS) conversion rate of 0.67 % of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water. ** SO4, Ca and Mg release rates calculated in mg/kg/flush. Residual ANC assumes that all leached Mg and Ca is due to dissolution of calcite or dolomite. Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity. MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential.

# KLC 4: Uncertain Tailings

| | | | | | |
|---|---|---|---|---|---|
| Weight (kg) | 7.00 | Total S (%) | 1.51 | ANC | 35.40 |
| pH (1:5) | 10.10 | Scr (%) | 1.22 | NAPP | 1.96 |
| EC (µS/cm) | 335.00 | MPA | 37.36 | ANC:MPA | 0.95 |

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | 29-Aug-16 | 27-Sep-16 | 31-Oct-16 | 28-Nov-16 | 03-Mar-17 | 29-May-17 | 29-Aug-17 | 01-Dec-17 | 10-Apr-18 | 01-Jun-18 | 30-Aug-18 | 26-Aug-21 | 25-Nov-21 | 22-Feb-22 | 24-May-22 | 23-Aug-22 | 24-Nov-22 | 28-Feb-23 | 23-May-23 | 01-Mar-24 | 29-May-24 | 28-Aug-24 | 28-Nov-24 |
| Number of Weeks | | 0 | 4 | 9 | 13 | 27 | 39 | 52 | 66 | 84 | 92 | 104 | 260 | 273 | 286 | 299 | 312 | 325 | 339 | 351 | 392 | 404 | 417 | 426 |
| Leach Number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| ALS Laboratory Number | | EB1621323 | EB1623451 | EB1626138 | EB1628241 | EB1704234 | EB1711556 | EB1718207 | EB1725503 | EB1808901 | EB1813420 | EB1821049 | EB2123896 | EB2134162 | EB2204864 | EB2214553 | EB2224653 | EB2235214 | EB2305995 | EB2315518 | EB2407152005 | EB2418286005 | EB2429597005 | EB2441569005 |
| Volume On (L) | | 1.0 | 1.2 | 1.6 | 1.0 | 2.4 | 2.5 | 2.2 | 2.2 | 1.2 | 2.2 | 2.2 | 1.9 | 2.4 | 1.9 | 1.9 | 1.4 | 2.0 | 1.9 | 2.0 | 1.9 | 1.4 | 1.9 | 1.9 |
| Volume Off (L) | | 0.723 | 0.842 | 0.572 | 0.351 | 1.003 | 0.987 | 0.920 | 0.808 | 0.383 | 0.970 | 0.986 | 0.598 | 0.987 | 0.688 | 0.643 | 0.943 | 0.391 | 0.713 | 0.681 | 0.536 | 0.181 | 0.359 | 0.264 |
| Cum. Volume (L) | | 0.72 | 1.57 | 2.14 | 2.49 | 3.49 | 4.48 | 5.40 | 6.21 | 6.59 | 7.56 | 8.55 | 9.14 | 10.13 | 10.82 | 11.46 | 12.40 | 12.80 | 13.51 | 14.19 | 14.73 | 14.91 | 15.27 | 15.53 |
| Number of Pore Volumes through the Samples | WQ Guidelines | 0.6 | 1.4 | 1.9 | 2.2 | 3.0 | 3.9 | 4.7 | 5.4 | 5.7 | 6.6 | 7.4 | 8.0 | 8.8 | 9.4 | 10.0 | 10.8 | 11.1 | 11.7 | 12.3 | 12.8 | 13.0 | 13.3 | 13.5 |
| pH (RGS Measurement) | - | 9.11 | 7.95 | 8.09 | 7.62 | 7.00 | 7.55 | 7.33 | 7.14 | 6.55 | 6.68 | 7.32 | 7.16 | 7.48 | 6.51 | 7.61 | 7.16 | 7.53 | 7.22 | 7.35 | 7.15 | 7.33 | 7.60 | 7.59 |
| pH (ALS Measurement) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.67 | 7.64 | 7.03 | 7.23 | 7.72 | 7.53 | 7.46 | 7.75 | 7.66 | 7.28 | 7.40 | 7.49 |
| pH (deionised water used in test) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 5.79 | 6.05 | 5.83 | 6.05 | 5.38 | 5.57 | 5.77 | 5.58 | 6.45 | 5.73 | 5.66 |
| EC (RGS Measurement) (µS/cm) | 3,580^ | 517 | 1,272 | 507 | 4,460 | 4,970 | 3,500 | 2,790 | 2,725 | 2,640 | 2,239 | 2,085 | 1,704 | 2,196 | 1,877 | 1,741 | 1,466 | 1,836 | 1,488 | 1,445 | 1,604 | 1,486 | 1,869 | 1,773 |
| EC (ALS Measurement) (µS/cm) | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1,950 | 2,050 | 2,080 | 1,750 | 1,500 | 1,340 | 1,630 | 1,500 | 1,680 | 1,700 | 2,020 | 1,700 |
| Acidity (mg/L as $CaCO_3$)* | - | <1 | 4 | 1 | 2 | 2 | 2 | 6 | 4 | 4 | 2 | 3 | 7 | 6 | 7 | 4 | 3 | 9 | 4 | 5 | 4 | 4 | 4 | 4 |
| Hydroxide Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 54 | 50 | 45 | 38 | 41 | 48 | 52 | 54 | 89 | 55 | 40 | 42 |
| Total Alkalinity (mg/L as $CaCO_3$)* | - | 40 | 42 | 34 | 70 | 28 | 41 | 38 | 40 | 43 | 35 | 64 | 54 | 50 | 45 | 38 | 41 | 48 | 52 | 54 | 89 | 55 | 40 | 42 |
| Net Alkalinity | - | 40 | 38 | 33 | 68 | 26 | 39 | 32 | 36 | 39 | 33 | 61 | 47 | 44 | 38 | 34 | 38 | 39 | 48 | 49 | 85 | 51 | 36 | 38 |
| **Major Ions (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Calcium | Ca | 1 | 1000 | 14 | 56 | 19 | 606 | 479 | 473 | 512 | 535 | 619 | 467 | 528 | 454 | 491 | 476 | 365 | 295 | 420 | 322 | 274 | 352 | 389 | 468 | 404 |
| Potassium | K | 1 | - | 18 | 43 | 13 | 178 | 198 | 128 | 34 | 76 | 87 | 51 | 45 | 49 | 43 | 38 | 24 | 20 | 25 | 22 | 18 | 22 | 22 | 20 | 18 |
| Magnesium | Mg | 1 | - | 2 | 6 | 2 | 58 | 62 | 56 | 119 | 29 | 31 | 22 | 17 | 14 | 17 | 14 | 9 | 6 | 8 | 6 | 5 | 6 | 7 | 8 | 6 |
| Sodium | Na | 1 | - | 80 | 172 | 83 | 556 | 558 | 299 | 82 | 74 | 80 | 44 | 25 | 34 | 33 | 26 | 13 | 9 | 20 | 12 | 11 | 15 | 18 | 17 | 16 |
| Chloride | Cl | 1 | - | 28 | 126 | 24 | 185 | 117 | 45 | 9 | 3 | 3 | 2 | 1 | 2 | 4 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 1 | <1 | <1 |
| Fluoride | F | 0.1 | 2 | 0.1 | 0.1 | <0.1 | 0.3 | 0.4 | 0.6 | 0.4 | 0.2 | 0.5 | 0.4 | 0.3 | 0.3 | 0.4 | 0.3 | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 | 0.3 | | 0.3 | 0.3 |
| Sulfate | $SO_4$ | 1 | 1,000 | 182 | 469 | 183 | 2,840 | 2,750 | 2,230 | 1,790 | 1,350 | 1,950 | 1,440 | 1,330 | 1,080 | 1,250 | 1,140 | 972 | 761 | 994 | 936 | 797 | 936 | 945 | 1,090 | 963 |
| **Trace metals/ metalloids (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Aluminium | Al | 0.01 | 5 | 0.27 | 0.05 | 0.12 | <0.01 | <0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Arsenic | As | 0.001 | 0.5 | 0.18 | 0.014 | 0.006 | 0.013 | 0.022 | 0.005 | 0.005 | 0.008 | 0.033 | 0.005 | 0.005 | 0.005 | 0.017 | 0.015 | 0.011 | 0.005 | 0.008 | 0.007 | 0.005 | 0.015 | 0.008 | 0.009 | 0.008 |
| Boron | B | 0.05 | 5 | 0.07 | 0.2 | 0.07 | 0.56 | 0.4 | 0.34 | 0.21 | 0.25 | 0.52 | 0.24 | 0.18 | 0.46 | 0.56 | 0.61 | 0.31 | 0.23 | 0.64 | 0.43 | 0.42 | 0.52 | 0.55 | 0.66 | 0.58 |
| Barium | Ba | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.016 | 0.022 | 0.022 | 0.018 | 0.014 | 0.02 | 0.019 | 0.015 | 0.022 | 0.02 | 0.021 | 0.016 |
| Beryllium | Be | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Bismuth | Bi | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | Cd | 0.0001 | 0.01 | <0.0001 | 0.0004 | 0.0002 | 0.0207 | 0.104 | 0.0091 | 0.0115 | 0.0155 | 0.013 | 0.0246 | 0.0318 | 0.0138 | 0.0149 | 0.0125 | 0.0148 | 0.021 | 0.0126 | 0.0198 | 0.0149 | 0.0154 | 0.008 | 0.0075 | 0.007 |
| Cerium | Ce | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Caesium | Cs | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.001 | 0.002 | 0.001 | 0.001 | <0.001 | 0.001 | 0.001 | <0.001 | 0.001 | 0.001 | <0.001 | <0.001 |
| Cobalt | Co | 0.001 | 1 | 0.004 | 0.004 | <0.001 | 0.014 | 0.013 | 0.005 | 0.003 | 0.003 | 0.002 | 0.003 | 0.002 | 0.002 | 0.002 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Chromium | Cr | 0.001 | 1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | Cu | 0.001 | 1 | 3.08 | 0.005 | <0.001 | 0.010 | 0.014 | 0.011 | 0.007 | 0.004 | 0.010 | 0.006 | 0.003 | 0.013 | 0.006 | 0.008 | 0.005 | 0.005 | 0.006 | 0.006 | 0.006 | 0.010 | 0.007 | 0.007 | 0.005 |
| Dysprosium | Dy | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | Er | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Europium | Eu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gadolinium | Gd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | Ga | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Hafnium | Hf | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Holmium | Ho | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | In | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lanthanum | La | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lithium | Li | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.046 | 0.06 | 0.061 | 0.038 | 36 | 0.044 | 0.048 | 0.035 | 0.037 | 0.034 | 0.037 | 0.031 |
| Lutetium | Lu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Iron | Fe | 0.05 | 1* | 0.06 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Mercury | Hg | 0.0001 | 0.002 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Manganese | Mn | 0.001 | 2* | 0.009 | 0.073 | 0.043 | 6.170 | 1.800 | 1.610 | 1.530 | 1.920 | 1.310 | 2.170 | 2.460 | 0.779 | 0.997 | 0.800 | 0.598 | 0.569 | 0.232 | 0.244 | 0.122 | 0.178 | 0.086 | 0.095 | 0.046 |
| Molybdenum | Mo | 0.001 | 0.15 | 0.032 | 0.018 | 0.002 | 0.042 | 0.097 | 0.064 | 0.077 | 0.105 | 0.137 | 0.095 | 0.054 | 0.038 | 0.057 | 0.054 | 0.039 | 0.036 | 0.043 | 0.034 | 0.027 | 0.028 | 0.033 | 0.046 | 0.041 |
| Neodymium | Nd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | Ni | 0.001 | 1 | 0.044 | 0.003 | <0.001 | 0.101 | 0.168 | 0.054 | 0.019 | 0.016 | 0.006 | 0.005 | 0.004 | 0.007 | 0.004 | 0.004 | 0.002 | 0.002 | 0.001 | 0.002 | 0.001 | 0.006 | 0.003 | 0.007 | 0.002 |
| Praseodymium | Pr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | Pb | 0.001 | 0.1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.05 | <0.05 | <0.001 | <0.001 |
| Antimony | Sb | 0.001 | - | 0.022 | 0.169 | 0.008 | 0.091 | 0.057 | 0.068 | 0.031 | 0.044 | 0.06 | 0.027 | 0.026 | 0.039 | 0.065 | 0.08 | 0.041 | 0.036 | 0.094 | 0.075 | 0.089 | 0.127 | 0.086 | 0.095 | 0.107 |
| Rubidium | Rb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.028 | 0.03 | 0.026 | 0.019 | 0.014 | 0.018 | 0.018 | 0.014 | 0.02 | 0.019 | 0.018 | 0.016 |
| Samarium | Sm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | Se | 0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Silver | Ag | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | Sr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1.95 | 2.46 | 2.14 | 1.71 | 1.3 | 1.66 | 1.62 | 1.4 | 1.8 | 1.82 | 2.13 | 1.67 |
| Tellurium | Te | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Terbium | Tb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | Tl | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | Sn | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | 0.002 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 |
| Thulium | Tm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | Ti | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium | Th | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | U | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | 0.001 | 0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | 0.001 | 0.001 | <0.001 | <0.001 |
| Vanadium | V | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | Yb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silicon | Si | - | - | 3 | 8.9 | 2.5 | 5.5 | 9.54 | 9.1 | 9.03 | 21.5 | 13 | 9.19 | 8.59 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | - | - | - | - |
| Zinc | Zn | 0.005 | 20 | <0.005 | 0.014 | <0.005 | 1.320 | 0.352 | 0.367 | 0.339 | 0.516 | 0.197 | 0.595 | 0.752 | 0.394 | 0.323 | 0.201 | 0.250 | 0.516 | 0.205 | 0.486 | 0.355 | 0.531 | 0.162 | 0.15 | 0.129 |
| Zirconium | Zr | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Ionic Balance** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Anions | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 24.6 | 21 | 16.7 | 21.6 | 20.5 | 17.7 | 21.3 | 20.8 | 23.5 | 20.9 |
| Total Cations | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 27 | 20.1 | 16.1 | 23.1 | 17.6 | 15 | 19.3 | 21.3 | 25.3 | 21.8 |
| Ionic Balance | % | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 4.6 | 2.1 | 1.66 | 3.28 | 7.54 | 8.1 | 4.98 | 1.26 | 3.63 | 2.16 |
| **Calculations**** | **Elements** | | | | | | | | | | | | | | | | | | | | | | | | | |
| $SO_4$ Release Rate | $SO_4$ | | | 19 | 56 | 15 | 142 | 394 | 314 | 235 | 156 | 107 | 200 | 187 | 92 | 176 | 112 | 89 | 103 | 56 | 95 | 78 | 72 | 24 | 56 | 36 |
| Cumulative $SO_4$ Release | Cum $SO_4$ | | | 19 | 75 | 90 | 233 | 627 | 941 | 1176 | 1,332 | 1,439 | 1,638 | 1,826 | 1,918 | 2,094 | 2,206 | 2,296 | 2,398 | 2,454 | 2,549 | 2,626 | 2,698 | 2,723 | 2,778 | 2,815 |
| Ca Release Rate | Ca | | | 1.4 | 6.7 | 1.6 | 30.4 | 68.6 | 66.7 | 67.3 | 61.8 | 33.9 | 64.7 | 74.4 | 38.8 | 69.2 | 46.8 | 33.5 | 39.7 | 23.5 | 32.8 | 26.7 | 27.0 | 10.1 | 24.0 | 15.2 |
| Cumulative Ca Release | Cum Ca | | | 1.4 | 8.2 | 9.7 | 40.1 | 108.8 | 175.4 | 242.7 | 304.5 | 338.4 | 403.1 | 477.4 | 516.2 | 585.5 | 632.2 | 665.8 | 705.5 | 729.0 | 761.8 | 788.4 | 815.4 | 825.4 | 849.4 | 864.7 |
| Mg Release Rate | Mg | | | 0.2 | 0.7 | 0.2 | 2.9 | 8.9 | 7.9 | 15.6 | 3.3 | 1.7 | 3.0 | 2.4 | 1.2 | 2.4 | 1.4 | 0.8 | 0.8 | 0.4 | 0.6 | 0.5 | 0.5 | 0.2 | 0.4 | 0.2 |
| Cumulative Mg Release | Cum Mg | | | 0.2 | 0.9 | 1.1 | 4.0 | 12.9 | 20.8 | 36.4 | 39.8 | 41.5 | 44.5 | 46.9 | 48.1 | 50.5 | 51.9 | 52.7 | 53.5 | 54.0 | 54.6 | 55.1 | 55.5 | 55.7 | 56.1 | 56.3 |
| Residual ANC (%) | Res. ANC | | | 100.0 | 99.9 | 99.9 | 99.7 | 99.1 | 98.6 | 97.9 | 97.4 | 97.2 | 96.7 | 96.2 | 95.9 | 95.4 | 95.0 | 94.8 | 94.5 | 94.3 | 94.1 | 93.9 | 93.7 | 93.7 | 93.5 | 93.4 |
| Residual Sulfur (%) | Res. S | | | 100.0 | 99.8 | 99.8 | 99.5 | 98.6 | 97.9 | 97.4 | 97.1 | 96.8 | 96.4 | 96.0 | 95.8 | 95.4 | 95.1 | 94.9 | 94.7 | 94.6 | 94.4 | 94.2 | 94.0 | 94.0 | 93.9 | 93.8 |
| $SO_4$/(Ca+Mg) molar ratio | $SO_4$/(Ca+Mg) | | | 4.4 | 3.0 | 3.4 | 1.7 | 2.0 | 1.6 | 1.1 | 1.0 | 1.2 | 1.2 | 1.0 | 0.9 | 1.0 | 1.0 | 1.1 | 1.0 | 1.0 | 1.2 | 1.2 | 1.1 | 1.0 | 0.9 | 1.0 |

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines 1. Recommended guideline limits for Livestock Drinking Water.

< indicates less than the laboratory limit of reporting. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm * Acidity and alkalinity data calculated in mg CaCO3/L. Shaded cells exceed applied guideline values. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm. ^ calculated based on total dissolved solids (TDS) conversion rate of 0.67 % of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water. ** SO4, Ca and Mg release rates calculated in mg/kg/flush. Residual ANC assumes that all leached Mg and Ca is due to dissolution of calcite or dolomite. Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity. MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential.

# KLC 5: Tailings on top of High PAF Waste Rock

| | | | | | |
|---|---|---|---|---|---|
| Weight (kg) | 18.00 | Total S (%) | 3.36 | ANC | 36.93 |
| pH (1:5) | 9.37 | Scr (%) | 2.81 | NAPP | 49.03 |
| EC (µS/cm) | 236.00 | MPA | 85.96 | ANC:MPA | 0.43 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | 29-Aug-16 | 27-Sep-16 | 31-Oct-16 | 28-Nov-16 | 28-Feb-17 | 29-May-17 | 29-Aug-17 | 28-Nov-17 | 28-Mar-18 | 29-May-18 | 30-Aug-18 | 25-Aug-21 | 25-Nov-21 | 22-Feb-22 | 24-May-22 | 23-Aug-22 | 24-Nov-22 | 28-Feb-23 | 23-May-23 | 01-Mar-24 | 29-May-24 | 28-Aug-24 | 29-Nov-24 |
| Number of Weeks | | 0 | 4 | 9 | 13 | 26 | 39 | 52 | 65 | 82 | 91 | 104 | 260 | 273 | 286 | 299 | 312 | 325 | 339 | 351 | 392 | 404 | 417 | 426 |
| Leach Number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| ALS Laboratory Number | | EB1621323 | EB1623451 | EB1626138 | EB1628241 | EB1703876 | EB1711556 | EB1718207 | EB1725119 | EB1808038 | EB1813063 | EB1820820 | EB2123896 | EB2134162 | EB2204864 | EB2214553 | EB2224653 | EB2235214 | EB2305995 | EB2315518 | EB2407152006 | EB2418286006 | EB2429597006 | EB2441569006 |
| Volume On (L) | | 1.5 | 1.5 | 1.6 | 1.2 | 1.2 | 1.2 | 1.2 | 1.8 | 1.2 | 1.2 | 1.2 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| Volume Off (L) | | 0.698 | 1.013 | 0.671 | 0.633 | 0.375 | 0.418 | 0.468 | 0.512 | 0.625 | 0.408 | 0.391 | 0.493 | 0.609 | 0.676 | 0.753 | 0.724 | 0.668 | 0.694 | 0.609 | 0.460 | 0.497 | 0.367 | 0.489 |
| Cum. Volume (L) | | 0.70 | 1.71 | 2.38 | 3.02 | 3.39 | 3.81 | 4.28 | 4.79 | 5.41 | 5.82 | 6.21 | 6.71 | 7.31 | 7.99 | 8.74 | 9.47 | 10.14 | 10.83 | 11.44 | 11.90 | 12.40 | 12.76 | 13.25 |
| Number of Pore Volumes through the Samples | WQ Guidelines | 0.6 | 1.5 | 2.1 | 2.6 | 2.9 | 3.3 | 3.7 | 4.2 | 4.7 | 5.1 | 5.4 | 5.8 | 6.4 | 6.9 | 7.6 | 8.2 | 8.8 | 9.4 | 9.9 | 10.3 | 10.8 | 11.1 | 11.5 |
| pH (RGS Measurement) | - | 7.78 | 6.97 | 7.17 | 7.12 | 7.89 | 8.01 | 7.88 | 7.08 | 7.78 | 7.22 | 7.76 | 7.43 | 7.78 | 6.78 | 7.97 | 7.23 | 7.39 | 7.49 | 7.78 | 7.04 | 6.90 | 7.57 | 7.52 |
| pH (ALS Measurement) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.86 | 7.67 | 6.45 | 6.76 | 7.55 | 7.17 | 7.24 | 7.49 | 7.61 | 7.13 | 7.45 | 7.49 |
| pH (deionised water used in test) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.07 | 5.79 | 6.05 | 5.83 | 6.05 | 5.38 | 5.57 | 5.77 | 5.58 | 6.45 | 5.73 | 5.66 |
| EC (RGS Measurement) (µS/cm) | 3,580^ | 3,560 | 1072 | 525 | 460 | 648 | 1132 | 1024 | 571 | 847 | 584 | 712 | 711 | 613 | 656 | 831 | 701 | 969 | 724 | 488 | 2,050 | 1,676 | 1,774 | 1,224 |
| EC (ALS Measurement) (µS/cm) | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 703 | 659 | 729 | 838 | 722 | 964 | 763 | 520 | 2,160 | 1,960 | 1,890 | 1,220 |
| Acidity (mg/L as $CaCO_3$)* | - | 3 | 3 | 3 | 4 | 4 | 1 | 1 | 1 | 2 | <1 | 1 | 1 | 2 | 3 | 2 | 1 | 5 | <1 | 1 | 5 | 4 | 4 | 3 |
| Hydroxide Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 33 | 37 | 18 | 15 | 15 | 18 | 21 | 21 | 78 | 42 | 42 | 39 |
| Total Alkalinity (mg/L as $CaCO_3$)* | - | 73 | 26 | 28 | 25 | 24 | 29 | 27 | 17 | 25 | 24 | 21 | 33 | 37 | 18 | 15 | 15 | 18 | 21 | 21 | 78 | 42 | 42 | 39 |
| Net Alkalinity | - | 70 | 23 | 25 | 21 | 20 | 28 | 26 | 16 | 23 | 23.5 | 20 | 32 | 35 | 15 | 13 | 14 | 13 | 21 | 20 | 73 | 38 | 38 | 36 |
| **Major Ions (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Calcium | Ca | 1 | 1000 | 363 | 97 | 48 | 49 | 91 | 59 | 81 | 58 | 120 | 59 | 65 | 75 | 52 | 65 | 71 | 54 | 72 | 73 | 50 | 406 | 385 | 322 | 223 |
| Potassium | K | 1 | - | 64 | 21 | 10 | 12 | 14 | 7 | 21 | 12 | 13 | 10 | 10 | 20 | 16 | 20 | 27 | 18 | 30 | 21 | 13 | 27 | 23 | 34 | 16 |
| Magnesium | Mg | 1 | - | 82 | 18 | 6 | 6 | 12 | 6 | 129 | 10 | 14 | 13 | 15 | 10 | 8 | 12 | 12 | 10 | 18 | 14 | 6 | 22 | 23 | 19 | 13 |
| Sodium | Na | 1 | - | 427 | 94 | 38 | 25 | 36 | 34 | 20 | 34 | 41 | 38 | 51 | 60 | 57 | 60 | 80 | 58 | 92 | 47 | 25 | 51 | 53 | 86 | 30 |
| Chloride | Cl | 1 | - | 313 | 52 | 7 | 7 | 3 | 2 | 2 | <1 | <1 | 2 | 1 | 5 | 3 | 2 | 4 | 3 | 6 | 1 | 1 | 3 | 2 | 6 | 2 |
| Fluoride | F | 0.1 | 2 | 0.7 | 0.2 | 0.3 | 0.2 | 0.3 | 0.4 | 0.2 | 0.1 | 0.2 | <0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.3 | 0.03 | 0.4 | 0.3 |
| Sulfate | $SO_4$ | 1 | 1,000 | 2,180 | 461 | 218 | 194 | 303 | 555 | 503 | 250 | 428 | 272 | 344 | 320 | 282 | 314 | 371 | 292 | 454 | 354 | 219 | 1,290 | 110 | 926 | 658 |
| **Trace metals/ metalloids (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Aluminium | Al | 0.01 | 5 | <0.01 | 0.02 | 0.03 | 0.02 | 0.02 | <0.01 | <0.01 | 0.02 | 0.01 | 0.01 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Arsenic | As | 0.001 | 0.5 | 0.002 | 0.005 | 0.004 | 0.004 | 0.006 | 0.002 | 0.001 | 0.003 | 0.004 | 0.002 | 0.002 | <0.001 | 0.002 | 0.002 | 0.002 | 0.001 | 0.002 | 0.002 | 0.002 | 0.007 | 0.003 | 0.004 | 0.004 |
| Boron | B | 0.05 | 5 | 0.05 | 0.07 | 0.06 | 0.1 | 0.15 | 0.09 | <0.05 | 0.14 | 0.33 | 0.1 | 0.09 | 0.27 | 0.2 | 0.23 | 0.18 | 0.15 | 0.14 | 0.26 | 0.15 | 0.66 | 0.47 | 0.42 | 0.38 |
| Barium | Ba | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.005 | 0.006 | 0.008 | 0.009 | 0.007 | 0.009 | 0.008 | 0.007 | 0.034 | 0.25 | 0.028 | 0.016 |
| Beryllium | Be | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Bismuth | Bi | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | Cd | 0.0001 | 0.01 | 0.0016 | 0.0015 | 0.0008 | 0.0013 | 0.0022 | 0.0018 | 0.0018 | 0.0019 | 0.0039 | 0.003 | 0.0033 | 0.0029 | 0.0013 | 0.0017 | 0.019 | 0.0016 | 0.0019 | 0.0023 | 0.0019 | 0.0471 | 0.0265 | 0.0162 | 0.0107 |
| Cerium | Ce | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Caesium | Cs | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.002 | 0.001 | 0.006 | 0.004 | 0.006 | 0.002 |
| Cobalt | Co | 0.001 | 1 | 0.022 | 0.004 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 | <0.001 | <0.001 | <0.001 |
| Chromium | Cr | 0.001 | 1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | Cu | 0.001 | 1 | 11.000 | 0.012 | 0.003 | 0.002 | 0.01 | 0.002 | 0.002 | 0.004 | 0.005 | 0.003 | 0.004 | 0.007 | <0.001 | 0.004 | 0.005 | 0.004 | 0.008 | 0.010 | 0.006 | 0.012 | 0.006 | 0.007 | 0.005 |
| Dysprosium | Dy | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | Er | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Europium | Eu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gadolinium | Gd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | Ga | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Hafnium | Hf | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Holmium | Ho | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | In | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lanthanum | La | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lithium | Li | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.021 | 0.016 | 0.02 | 0.022 | 0.015 | 0.026 | 0.03 | 0.017 | 0.051 | 0.04 | 0.042 | 0.028 |
| Lutetium | Lu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Iron | Fe | 0.05 | 1* | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Mercury | Hg | 0.0001 | 0.002 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Manganese | Mn | 0.001 | 2* | 2.900 | 0.592 | 0.386 | 0.421 | 0.487 | 0.383 | 0.271 | 0.217 | 0.246 | 0.167 | 0.161 | 0.207 | 0.080 | 0.092 | 0.094 | 0.075 | 0.085 | 0.109 | 0.094 | 1.62 | 0.526 | 0.199 | 0.139 |
| Molybdenum | Mo | 0.001 | 0.15 | 0.025 | 0.007 | 0.003 | 0.004 | 0.005 | 0.004 | 0.003 | 0.005 | 0.006 | 0.003 | 0.005 | 0.009 | 0.008 | 0.01 | 0.011 | 0.01 | 0.015 | 0.009 | 0.006 | 0.009 | 0.01 | 0.014 | 0.01 |
| Neodymium | Nd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | Ni | 0.001 | 1 | 0.077 | 0.006 | <0.001 | <0.001 | <0.001 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.005 | 0.001 | 0.001 | <0.001 |
| Praseodymium | Pr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | Pb | 0.001 | 0.1 | 0.003 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 | <0.001 | <0.001 | <0.001 |
| Antimony | Sb | 0.001 | - | 0.028 | 0.059 | 0.018 | 0.014 | 0.013 | 0.014 | 0.003 | 0.008 | 0.029 | 0.007 | 0.007 | 0.006 | 0.009 | 0.009 | 0.1 | 0.009 | 0.009 | 0.011 | 0.008 | 0.054 | 0.03 | 0.03 | 0.036 |
| Rubidium | Rb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.015 | 0.01 | 0.012 | 0.013 | 0.011 | 0.017 | 0.013 | 0.008 | 0.024 | 0.016 | 0.022 | 0.011 |
| Samarium | Sm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | Se | 0.01 | 0.02 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Silver | Ag | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | Sr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.384 | 0.317 | 0.4 | 0.428 | 0.244 | 0.472 | 0.446 | 0.313 | 1.93 | 1.57 | 1.49 | 0.913 |
| Tellurium | Te | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Terbium | Tb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | Tl | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | Sn | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 | <0.001 |
| Thulium | Tm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | Ti | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium | Th | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | U | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 0.001 | <0.001 | <0.001 |
| Vanadium | V | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | Yb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silicon | Si | - | - | 14 | 6.9 | 6.4 | 4.9 | 3.32 | 5.9 | 1.38 | 4.3 | 11 | 1.39 | 1.57 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | - | - | - | - |
| Zinc | Zn | 0.005 | 20 | 0.277 | 0.037 | 0.022 | 0.028 | 0.03 | 0.033 | 0.021 | 0.024 | 0.053 | 0.04 | 0.049 | 0.045 | 0.012 | 0.012 | <0.005 | 0.012 | 0.014 | 0.018 | 0.014 | 1.4 | 1.06 | 0.288 | 0.193 |
| Zirconium | Zr | 0.005 | - | | | | | | | | | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Ionic Balance** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Anions | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 6.95 | 8.14 | 6.46 | 9.98 | 7.82 | 5.01 | 28.5 | 23.8 | 20.3 | 14.5 |
| Total Cations | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.35 | 8.7 | 6.5 | 9.84 | 7.38 | 4.41 | 25 | 26.2 | 22.2 | 13.9 |
| Ionic Balance | % | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 2.79 | 3.35 | 0.28 | 0.7 | 2.91 | 6.36 | 6.58 | 3.2 | 4.59 | 2.19 |
| **Calculations**** | **Elements** | | | | | | | | | | | | | | | | | | | | | | | | | |
| $SO_4$ Release Rate | $SO_4$ | | | 85 | 26 | 8 | 7 | 6 | 13 | 13 | 7 | 15 | 6 | 7 | 9 | 10 | 12 | 16 | 12 | 17 | 14 | 7 | 33 | 3 | 19 | 18 |
| Cumulative $SO_4$ Release | Cum $SO_4$ | | | 85 | 110 | 119 | 125 | 132 | 145 | 158 | 165 | 180 | 186 | 193 | 202 | 212 | 223 | 239 | 251 | 268 | 281 | 289 | 322 | 325 | 343 | 361 |
| Ca Release Rate | Ca | | | 14.1 | 5.5 | 1.8 | 1.7 | 1.9 | 1.4 | 2.1 | 1.6 | 4.2 | 1.3 | 1.4 | 2.1 | 1.8 | 2.4 | 3.0 | 2.2 | 2.7 | 2.8 | 1.7 | 10.4 | 10.6 | 6.6 | 6.1 |
| Cumulative Ca Release | Cum Ca | | | 14.1 | 19.5 | 21.3 | 23.0 | 24.9 | 26.3 | 28.4 | 30.1 | 34.2 | 35.6 | 37.0 | 39.0 | 40.8 | 43.2 | 46.2 | 48.4 | 51.1 | 53.9 | 55.6 | 65.9 | 76.6 | 83.1 | 89.2 |
| Mg Release Rate | Mg | | | 3.2 | 1.0 | 0.2 | 0.2 | 0.3 | 0.1 | 3.4 | 0.3 | 0.5 | 0.3 | 0.3 | 0.3 | 0.3 | 0.5 | 0.5 | 0.4 | 0.7 | 0.5 | 0.2 | 0.6 | 0.6 | 0.4 | 0.4 |
| Cumulative Mg Release | Cum Mg | | | 3.2 | 4.2 | 4.4 | 4.6 | 4.9 | 5.0 | 8.4 | 8.7 | 9.1 | 9.4 | 9.8 | 10.0 | 10.3 | 10.8 | 11.3 | 11.7 | 12.3 | 12.9 | 13.1 | 13.6 | 14.3 | 14.7 | 15.0 |
| Residual ANC (%) | Res. ANC | | | 99.9 | 99.8 | 99.8 | 99.8 | 99.8 | 99.8 | 99.7 | 99.7 | 99.7 | 99.7 | 99.6 | 99.6 | 99.6 | 99.6 | 99.6 | 99.6 | 99.5 | 99.5 | 99.5 | 99.4 | 99.3 | 99.3 | 99.2 |
| Residual Sulfur (%) | Res. S | | | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.8 | 99.8 | 99.8 | 99.8 | 99.8 | 99.8 | 99.8 | 99.8 | 99.8 | 99.8 | 99.7 | 99.7 | 99.7 | 99.7 | 99.7 | 99.7 | 99.6 |
| $SO_4$/(Ca+Mg) molar ratio | $SO_4$/(Ca+Mg) | | | 1.8 | 1.5 | 1.6 | 1.4 | 1.1 | 3.4 | 0.7 | 1.4 | 1.2 | 1.4 | 1.6 | 1.5 | 1.8 | 1.5 | 1.7 | 1.7 | 1.9 | 1.5 | 1.5 | 1.2 | 0.1 | 1.1 | 1.1 |

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines 1. Recommended guideline limits for Livestock Drinking Water.

< indicates less than the laboratory limit of reporting. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm * Acidity and alkalinity data calculated in mg CaCO3/L. Shaded cells exceed applied guideline values. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm. ^ calculated based on total dissolved solids (TDS) conversion rate of 0.67 % of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water. ** SO4, Ca and Mg release rates calculated in mg/kg/flush. Residual ANC assumes that all leached Mg and Ca is due to dissolution of calcite or dolomite. Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity. MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential.

# KLC 6: Tailings mixed with High PAF Waste Rock

| | | | | | |
|---|---|---|---|---|---|
| Weight (kg) | 21.00 | Total S (%) | 3.36 | ANC | 36.93 |
| pH (1:5) | 9.37 | Scr (%) | 2.81 | NAPP | 49.03 |
| EC (µS/cm) | 236.00 | MPA | 85.96 | ANC:MPA | 0.43 |

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | 29-Aug-16 | 27-Sep-16 | 31-Oct-16 | 28-Nov-16 | 28-Feb-17 | 29-May-17 | 29-Aug-17 | 01-Dec-17 | 28-Mar-18 | 29-May-18 | 30-Aug-18 | 26-Aug-21 | 25-Nov-21 | 22-Feb-22 | 24-May-22 | 23-Aug-22 | 24-Nov-22 | 28-Feb-23 | 23-May-23 | 01-Mar-24 | 29-May-24 | 28-Aug-24 | 28-Nov-24 |
| Number of Weeks | | 0 | 4 | 9 | 13 | 26 | 39 | 52 | 66 | 82 | 91 | 104 | 260 | 273 | 286 | 299 | 312 | 325 | 339 | 351 | 392 | 404 | 417 | 426 |
| Leach Number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| ALS Laboratory Number | | EB1621323 | EB1623451 | EB1626138 | EB1628241 | EB1703876005 | EB1711556 | EB1718207 | EB1725503 | EB1808038 | EB1813063 | EB1820820 | EB2123896 | EB2134162 | EB2204864 | EB2214553 | EB2224653 | EB2235214 | EB2305995 | EB2315518 | EB2407152007 | EB2418286007 | EB2429597007 | EB2441569007 |
| Volume On (L) | | 1.5 | 1.5 | 1.6 | 1.2 | 1.2 | 2.2 | 1.2 | 2.2 | 1.8 | 1.2 | 1.2 | 2.4 | 2.4 | 2.4 | 1.9 | 1.4 | 1.4 | 1.9 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| Volume Off (L) | | 0.720 | 0.728 | 0.740 | 0.767 | 0.941 | 1.039 | 0.891 | 1.039 | 0.428 | 0.708 | 0.820 | 0.607 | 0.938 | 1.060 | 0.741 | 0.627 | 0.267 | 0.632 | 0.410 | 0.964 | 0.232 | 0.683 | 0.480 |
| Cum. Volume (L) | | 0.72 | 1.45 | 2.19 | 2.96 | 3.90 | 4.94 | 5.83 | 6.87 | 7.29 | 8.00 | 8.82 | 9.43 | 10.37 | 11.43 | 12.17 | 12.79 | 13.06 | 13.69 | 14.10 | 15.07 | 15.30 | 15.98 | 16.46 |
| Number of Pore Volumes through the Samples | WQ Guidelines | 0.6 | 1.3 | 1.9 | 2.6 | 3.4 | 4.3 | 5.1 | 6.0 | 6.3 | 7.0 | 7.7 | 8.2 | 9.0 | 9.9 | 10.6 | 11.1 | 11.4 | 11.9 | 12.3 | 13.1 | 13.3 | 13.9 | 14.3 |
| pH (RGS Measurement) | - | 8.11 | 7.08 | 7.49 | 7.73 | 8.07 | 8.07 | 7.70 | 7.25 | 7.57 | 7.07 | 7.64 | 7.20 | 7.56 | 6.81 | 7.54 | 7.13 | 7.44 | 7.13 | 7.41 | 6.78 | 6.92 | 7.25 | 7.34 |
| pH (ALS Measurement) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 7.82 | 7.50 | 6.78 | 7.07 | 7.53 | 7.60 | 7.32 | 7.62 | 7.59 | 7.08 | 7.40 | 7.37 |
| pH (deionised water used in test) | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 6.05 | 5.79 | 6.05 | 5.83 | 6.05 | 5.38 | 5.57 | 5.77 | 5.58 | 6.45 | 5.73 | 5.66 |
| EC (RGS Measurement) (µS/cm) | 3,580^ | 1,340 | 1,241 | 1,756 | 1,769 | 1,681 | 1,919 | 2,079 | 1,936 | 1,796 | 1,850 | 1,970 | 2,243 | 2,520 | 2,186 | 2,067 | 2,159 | 2,258 | 2,065 | 2,000 | 2,487 | 1,740 | 2,186 | 2,134 |
| EC (ALS Measurement) (µS/cm) | | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 2,670 | 2,360 | 2,530 | 2,020 | 2,130 | 2,170 | 2,160 | 2,050 | 2,360 | 2,030 | 2,390 | 2,070 |
| Acidity (mg/L as $CaCO_3$)* | - | 1 | 5 | 3 | 3 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 8 | 6 | 6 | 4 | 4 | 7 | 4 | 5 | 4 | 4 | 5 | 5 |
| Hydroxide Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity (mg/L as $CaCO_3$)* | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 67 | 32 | 31 | 30 | 28 | 36 | 37 | 38 | 56 | 37 | 40 | 33 |
| Total Alkalinity (mg/L as $CaCO_3$)* | - | 52 | 60 | 32 | 27 | 21 | 30 | 30 | 37 | 36 | 28 | 30 | 67 | 32 | 31 | 30 | 28 | 36 | 37 | 38 | 56 | 37 | 40 | 33 |
| Net Alkalinity | - | 51 | 55 | 29 | 24 | 20 | 29 | 28 | 34 | 33 | 26 | 28 | 59 | 26 | 25 | 26 | 24 | 29 | 33 | 33 | 52.0 | 33 | 35 | 28 |
| **Major Ions (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Calcium | Ca | 1 | 1000 | 82 | 90 | 187 | 136 | 141 | 210 | 208 | 236 | 285 | 193 | 238 | 538 | 436 | 448 | 420 | 379 | 395 | 401 | 342 | 468 | 417 | 508 | 455 |
| Potassium | K | 1 | - | 40 | 27 | 44 | 37 | 40 | 38 | 48 | 45 | 42 | 52 | 50 | 50 | 54 | 46 | 42 | 40 | 40 | 39 | 33 | 35 | 33 | 32 | 31 |
| Magnesium | Mg | 1 | - | 14 | 19 | 32 | 29 | 34 | 35 | 246 | 35 | 32 | 44 | 36 | 51 | 43 | 38 | 30 | 32 | 30 | 29 | 25 | 25 | 28 | 29 | 25 |
| Sodium | Na | 1 | - | 174 | 140 | 232 | 172 | 170 | 168 | 52 | 130 | 110 | 168 | 141 | 146 | 123 | 91 | 62 | 67 | 55 | 53 | 46 | 42 | 52 | 40 | 37 |
| Chloride | Cl | 1 | - | 90 | 34 | 47 | 32 | 31 | 16 | 24 | 18 | 12 | 21 | 14 | 8 | 22 | 10 | 7 | 6 | 6 | 4 | 5 | 5 | 6 | 5 | 4 |
| Fluoride | F | 0.1 | 2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.3 | 0.4 | 0.4 | 0.3 | 0.4 | <0.1 | 0.4 | 0.4 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.6 | 0.5 | 0.5 | 0.06 | 0.4 | 0.5 |
| Sulfate | $SO_4$ | 1 | 1,000 | 614 | 594 | 1,130 | 855 | 745 | 994 | 1,010 | 931 | 958 | 928 | 1,040 | 1,560 | 1,430 | 1,400 | 1,170 | 1,130 | 1,260 | 1,210 | 1,160 | 1490 | 1,150 | 1,310 | 1,160 |
| **Trace metals/ metalloids (mg/L)** | **Elements** | **LoR** | **Livestock Drinking Water[1]** | | | | | | | | | | | | | | | | | | | | | |
| Aluminium | Al | 0.01 | 5 | 0.06 | 0.02 | 0.02 | 0.01 | 0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | 0.03 | <0.01 | 0.03 | 0.02 | 0.01 | 0.02 | 0.03 | 0.03 | 0.02 | 0.05 | 0.02 | 0.04 |
| Arsenic | As | 0.001 | 0.5 | 0.035 | 0.003 | 0.003 | 0.002 | 0.003 | 0.003 | <0.001 | 0.004 | 0.005 | 0.002 | 0.004 | 0.008 | 0.007 | 0.009 | 0.009 | 0.008 | 0.008 | 0.011 | 0.009 | 0.009 | 0.01 | 0.008 | 0.008 |
| Boron | B | 0.05 | 5 | 0.08 | <0.05 | 0.14 | 0.14 | 0.11 | 0.18 | 0.05 | 0.25 | 0.51 | 0.19 | 0.24 | 1.28 | 0.74 | 1.02 | 0.58 | 0.5 | 0.57 | 1.04 | 0.82 | 0.72 | 0.95 | 0.55 | 0.52 |
| Barium | Ba | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.018 | 0.022 | 0.021 | 0.016 | 0.015 | 0.017 | 0.019 | 0.015 | 0.02 | 0.017 | 0.018 | 0.016 |
| Beryllium | Be | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Bismuth | Bi | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | Cd | 0.0001 | 0.01 | 0.0003 | 0.0014 | 0.0033 | 0.0049 | 0.0065 | 0.0108 | 0.0054 | 0.0097 | 0.0117 | 0.0159 | 0.0176 | 0.0343 | 0.0173 | 0.0167 | 0.0162 | 0.0197 | 0.0194 | 0.0215 | 0.0216 | 0.035 | 0.0298 | 0.0394 | 0.0357 |
| Cerium | Ce | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 | 0.002 | 0.006 |
| Caesium | Cs | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.004 | 0.007 | 0.005 | 0.004 | 0.004 | 0.005 | 0.005 | 0.004 | 0.004 | 0.004 | 0.003 | 0.003 |
| Cobalt | Co | 0.001 | 1 | 0.006 | 0.002 | 0.002 | <0.001 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | 0.007 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 | 0.002 | 0.003 | 0.003 | 0.003 | 0.004 |
| Chromium | Cr | 0.001 | 1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | Cu | 0.001 | 1 | 1.66 | 0.008 | 0.002 | 0.004 | 0.01 | 0.01 | 0.003 | 0.002 | 0.006 | 0.006 | 0.005 | 0.038 | 0.002 | 0.005 | 0.004 | 0.003 | 0.006 | 0.011 | 0.012 | 0.011 | 0.032 | 0.028 | 0.07 |
| Dysprosium | Dy | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | Er | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Europium | Eu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gadolinium | Gd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | Ga | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Hafnium | Hf | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Holmium | Ho | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | In | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lanthanum | La | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 | 0.002 | 0.005 |
| Lithium | Li | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.087 | 0.09 | 0.088 | 0.094 | 0.065 | 0.07 | 0.085 | 0.07 | 0.07 | 0.066 | 0.073 | 0.067 |
| Lutetium | Lu | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Iron | Fe | 0.05 | 1* | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Mercury | Hg | 0.0001 | 0.002 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Manganese | Mn | 0.001 | 2* | 0.082 | 0.607 | 1.300 | 1.210 | 0.607 | 0.160 | 0.051 | 0.057 | 0.035 | 0.064 | 0.033 | 0.619 | 0.021 | 0.022 | 0.019 | 0.015 | 0.061 | 0.162 | 0.245 | 0.673 | 0.524 | 0.546 | 0.666 |
| Molybdenum | Mo | 0.001 | 0.15 | 0.036 | 0.003 | 0.006 | 0.009 | 0.009 | 0.01 | 0.003 | 0.014 | 0.018 | 0.006 | 0.007 | 0.010 | 0.010 | 0.016 | 0.014 | 0.01 | 0.013 | 0.016 | 0.012 | 0.025 | 0.01 | 0.007 | 0.008 |
| Neodymium | Nd | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.003 |
| Nickel | Ni | 0.001 | 1 | 0.011 | <0.001 | 0.001 | <0.001 | 0.004 | 0.014 | 0.001 | 0.015 | 0.035 | 0.003 | 0.008 | 0.371 | 0.017 | 0.023 | 0.019 | 0.02 | 0.032 | 0.056 | 0.052 | 0.037 | 0.068 | 0.065 | 0.067 |
| Praseodymium | Pr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | Pb | 0.001 | 0.1 | <0.001 | <0.001 | 0.001 | 0.001 | 0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 0.003 |
| Antimony | Sb | 0.001 | - | 0.093 | 0.011 | 0.032 | 0.011 | 0.018 | 0.031 | 0.004 | 0.034 | 0.048 | 0.013 | 0.018 | 0.103 | 0.049 | 0.086 | 0.066 | 0.061 | 0.08 | 0.127 | 0.107 | 0.087 | 0.108 | 0.053 | 0.065 |
| Rubidium | Rb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.035 | 0.038 | 0.031 | 0.026 | 0.025 | 0.025 | 0.03 | 0.024 | 0.031 | 0.024 | 0.024 | 0.022 |
| Samarium | Sm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | Se | 0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Silver | Ag | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | Sr | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 3.43 | 3.19 | 2.77 | 2.38 | 2.25 | 2.27 | 2.77 | 2.34 | 3.33 | 2.7 | 3.34 | 2.78 |
| Tellurium | Te | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Terbium | Tb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | Tl | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | Sn | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 |
| Thulium | Tm | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | Ti | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium | Th | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | U | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Vanadium | V | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | Yb | 0.001 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silicon | Si | - | - | 6.7 | 2.8 | 8.6 | 5.3 | 2.69 | 4.8 | 2.64 | 11.5 | 17.1 | 2.81 | 4.03 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Zinc | Zn | 0.005 | 20 | 0.014 | 0.032 | 0.082 | 0.108 | 0.076 | 0.388 | 0.123 | 0.345 | 0.340 | 0.421 | 0.486 | 1.380 | 0.420 | 0.460 | 0.431 | 0.500 | 0.491 | 0.685 | 0.677 | 0.878 | 1.06 | 1.35 | 2.65 |
| Zirconium | Zr | 0.005 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Ionic Balance** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Anions | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 30.0 | 25.2 | 24.2 | 27.1 | 26.0 | 25.0 | 32.3 | 24.8 | 28.2 | 24.9 |
| Total Cations | meq/L | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 30.6 | 27.2 | 25.5 | 25.6 | 25.7 | 22.0 | 28.1 | 26.2 | 30.3 | 27.2 |
| Ionic Balance | % | 0.01 | - | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 0.94 | 3.90 | 2.47 | 2.90 | 0.67 | 6.56 | 6.87 | 2.68 | 3.55 | 4.30 |
| **Calculations**** | **Elements** | | | | | | | | | | | | | | | | | | | | | | | | | |
| $SO_4$ Release Rate | $SO_4$ | | | 21 | 21 | 40 | 31 | 33 | 49 | 43 | 46 | 20 | 31 | 41 | 45 | 64 | 71 | 41 | 34 | 16 | 36 | 23 | 68 | 13 | 43 | 27 |
| Cumulative $SO_4$ Release | Cum $SO_4$ | | | 21 | 42 | 81 | 113 | 146 | 195 | 238 | 284 | 304 | 335 | 376 | 421 | 485 | 555 | 597 | 630 | 646 | 683 | 705 | 774 | 786 | 829 | 856 |
| Ca Release Rate | Ca | | | 2.8 | 3.1 | 6.6 | 5.0 | 6.3 | 10.4 | 8.8 | 11.7 | 5.8 | 6.5 | 9.3 | 15.6 | 19.5 | 22.6 | 14.8 | 11.3 | 5.0 | 12.1 | 6.7 | 21.5 | 4.6 | 16.5 | 10.4 |
| Cumulative Ca Release | Cum Ca | | | 2.8 | 5.9 | 12.5 | 17.5 | 23.8 | 34.2 | 43.0 | 54.7 | 60.5 | 67.0 | 76.3 | 91.9 | 111.3 | 133.9 | 148.8 | 160.1 | 165.1 | 177.2 | 183.8 | 205.3 | 209.9 | 226.5 | 236.9 |
| Mg Release Rate | Mg | | | 0.5 | 0.7 | 1.1 | 1.1 | 1.5 | 1.7 | 10.4 | 1.7 | 0.7 | 1.5 | 1.4 | 1.5 | 1.9 | 1.9 | 1.1 | 1.0 | 0.4 | 0.9 | 0.5 | 1.1 | 0.3 | 0.9 | 0.6 |
| Cumulative Mg Release | Cum Mg | | | 0.5 | 1.1 | 2.3 | 3.3 | 4.8 | 6.6 | 17.0 | 18.7 | 19.4 | 20.9 | 22.3 | 23.8 | 25.7 | 27.6 | 28.7 | 29.6 | 30.0 | 30.9 | 31.4 | 32.5 | 32.8 | 33.8 | 34.3 |
| Residual ANC (%) | Res. ANC | | | 100.0 | 99.9 | 99.9 | 99.8 | 99.8 | 99.7 | 99.5 | 99.4 | 99.4 | 99.3 | 99.3 | 99.1 | 99.0 | 98.8 | 98.7 | 98.6 | 98.6 | 98.5 | 98.4 | 98.3 | 98.3 | 98.1 | 98.1 |
| Residual Sulfur (%) | Res. S | | | 100.0 | 100.0 | 99.9 | 99.9 | 99.9 | 99.8 | 99.8 | 99.7 | 99.7 | 99.7 | 99.6 | 99.6 | 99.5 | 99.4 | 99.4 | 99.4 | 99.4 | 99.3 | 99.3 | 99.2 | 99.2 | 99.2 | 99.2 |
| $SO_4$/(Ca+Mg) molar ratio | $SO_4$/(Ca+Mg) | | | 2.4 | 2.0 | 2.0 | 1.9 | 1.6 | 1.5 | 0.7 | 1.3 | 1.2 | 1.5 | 1.5 | 1.0 | 1.2 | 1.1 | 1.0 | 1.1 | 1.2 | 1.1 | 1.3 | 1.2 | 1.0 | 1.0 | 1.0 |

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines 1. Recommended guideline limits for Livestock Drinking Water.

< indicates less than the laboratory limit of reporting. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm * Acidity and alkalinity data calculated in mg CaCO3/L. Shaded cells exceed applied guideline values. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm. ^ calculated based on total dissolved solids (TDS) conversion rate of 0.67 % of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water. ** SO4, Ca and Mg release rates calculated in mg/kg/flush. Residual ANC assumes that all leached Mg and Ca is due to dissolution of calcite or dolomite. Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity. MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential.

# KLC 3 High PAF Waste Rock Acid Wash (AW)

| | | | |
|---|---|---|---|
| Weight (kg) | | | |
| pH (1:5) | 9.00 | Scr (%) | 3.60 | NAPP | 110.25 |
| EC (µS/cm) | 187.00 | MPA | 110.25 | ANC:MPA | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| Date | | 01-Mar-24 | 29-May-24 | 28-Aug-24 | 28-Nov-24 |
| Number of Weeks | | 392 | 404 | 417 | 426 |
| Leach Number | | 20 | 21 | 22 | 23 |
| ALS Laboratory Number | | EB2407152004 | EB2418286004 | EB2429597004 | EB2441569009 |
| Volume On (L) | | 1.4 | 1.4 | 1.4 | 1.4 |
| Volume Off (L) | | 0.964 | 1.028 | 0.975 | 0.996 |
| Cum. Volume (L) | | 0.96 | 1.99 | 2.97 | 3.96 |
| Number of Pore Volumes through the Samples | WQ Guidelines | 0.8 | 1.7 | 2.6 | 3.4 |
| pH (RGS Measurement) | - | 6.78 | 7.97 | 7.01 | 6.97 |
| pH (ALS Measurement) | - | 6.91 | 6.73 | 7.09 | 7.10 |
| pH (deionised water used in test) | - | 4.01 | 4.12 | 4.21 | 4.25 |
| EC (RGS Measurement) (µS/cm) | 3,580^ | 2,487 | 1,900 | 2,023 | 1,722 |
| EC (ALS Measurement) (µS/cm) | | 2,420 | 2,250 | 2,180 | 1,660 |
| Acidity (mg/L as $CaCO_3$)* | - | 11 | 6 | 7 | 7 |
| Hydroxide Alkalinity (mg/L as $CaCO_3$)* | - | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity (mg/L as $CaCO_3$)* | - | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity (mg/L as $CaCO_3$)* | - | 65 | 36 | 34 | 32 |
| Total Alkalinity (mg/L as $CaCO_3$)* | - | 65 | 36 | 34 | 32 |
| Net Alkalinity | - | 54 | 30 | 27 | 25 |

| Major Ions (mg/L) | Elements | LoR | Livestock Drinking Water[1] | | | | |
|---|---|---|---|---|---|---|---|
| Calcium | Ca | 1 | 1000 | 602 | 542 | 541 | 406 |
| Potassium | K | 1 | - | 7 | 30 | 4 | 3 |
| Magnesium | Mg | 1 | - | 40 | 8 | 19 | 14 |
| Sodium | Na | 1 | - | 17 | 5 | 3 | 3 |
| Chloride | Cl | 1 | - | 4 | 3 | 3 | 3 |
| Fluoride | F | 0.1 | 2 | 0.3 | 0.2 | 0.2 | 0.2 |
| Sulfate | $SO_4$ | 1 | 1,000 | 1,600 | 1,400 | 1,204 | 973 |

| Trace metals/ metalloids (mg/L) | Elements | LoR | Livestock Drinking Water[1] | | | | |
|---|---|---|---|---|---|---|---|
| Aluminium | Al | 0.01 | 5 | <0.01 | <0.01 | <0.01 | <0.01 |
| Arsenic | As | 0.001 | 0.5 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | B | 0.05 | 5 | 0.32 | 0.26 | 0.20 | 0.19 |
| Barium | Ba | 0.001 | - | 0.022 | 0.013 | 0.011 | 0.009 |
| Beryllium | Be | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Bismuth | Bi | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | Cd | 0.0001 | 0.01 | 0.122 | 0.077 | 0.0656 | 0.0559 |
| Cerium | Ce | 0.001 | - | 0.015 | 0.012 | 0.011 | 0.007 |
| Caesium | Cs | 0.001 | - | 0.007 | 0.004 | 0.003 | 0.002 |
| Cobalt | Co | 0.001 | 1 | 0.009 | 0.005 | 0.004 | 0.003 |
| Chromium | Cr | 0.001 | 1 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | Cu | 0.001 | 1 | 0.032 | 0.019 | 0.019 | 0.016 |
| Dysprosium | Dy | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | Er | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Europium | Eu | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Gadolinium | Gd | 0.001 | - | 0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | Ga | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Hafnium | Hf | 0.01 | - | <0.01 | <0.01 | <0.01 | <0.01 |
| Holmium | Ho | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | In | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Lanthanum | La | 0.001 | - | 0.023 | 0.021 | 0.017 | 0.012 |
| Lithium | Li | 0.001 | - | 0.091 | 0.045 | 0.028 | 0.022 |
| Lutetium | Lu | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Iron | Fe | 0.05 | 1* | <0.05 | <0.05 | <0.05 | <0.05 |
| Mercury | Hg | 0.0001 | 0.002 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Manganese | Mn | 0.001 | 2* | 5.17 | 2.68 | 2.06 | 1.56 |
| Molybdenum | Mo | 0.001 | 0.15 | <0.001 | 0.001 | <0.001 | <0.001 |
| Neodymium | Nd | 0.001 | - | 0.008 | 0.007 | 0.006 | 0.005 |
| Nickel | Ni | 0.001 | 1 | 0.02 | 0.01 | 0.008 | 0.006 |
| Praseodymium | Pr | 0.001 | - | 0.002 | 0.002 | 0.002 | 0.001 |
| Lead | Pb | 0.001 | 0.1 | 0.025 | 0.021 | 0.018 | 0.014 |
| Antimony | Sb | 0.001 | - | 0.012 | 0.005 | 0.006 | 0.009 |
| Rubidium | Rb | 0.001 | - | 0.017 | 0.008 | 0.005 | 0.004 |
| Samarium | Sm | 0.001 | - | 0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | Se | 0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 |
| Silver | Ag | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | Sr | 0.001 | - | 2.55 | 1.84 | 1.50 | 1.08 |
| Tellurium | Te | 0.005 | - | <0.005 | <0.005 | <0.005 | <0.005 |
| Terbium | Tb | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | Tl | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | Sn | 0.001 | - | <0.001 | <0.001 | 0.002 | <0.001 |
| Thulium | Tm | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | Ti | 0.01 | - | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium | Th | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | U | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Vanadium | V | 0.01 | - | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | Yb | 0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Silicon | Si | - | - | - | - | - | - |
| Zinc | Zn | 0.005 | 20 | 5.76 | 3.36 | 2.97 | 2.65 |
| Zirconium | Zr | 0.005 | - | <0.005 | <0.005 | <0.005 | <0.005 |

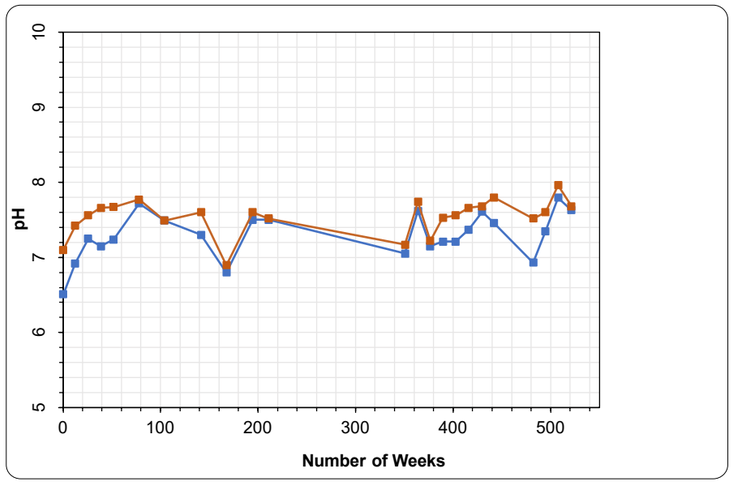
| Ionic Balance | | | | | | | |
|---|---|---|---|---|---|---|---|
| Total Anions | meq/L | 0.01 | - | 34.7 | 30.0 | 26.1 | 21 |
| Total Cations | meq/L | 0.01 | - | 29.3 | 30.0 | 28.1 | 21.6 |
| Ionic Balance | % | 0.01 | - | 8.54 | 0.06 | 3.79 | 1.49 |

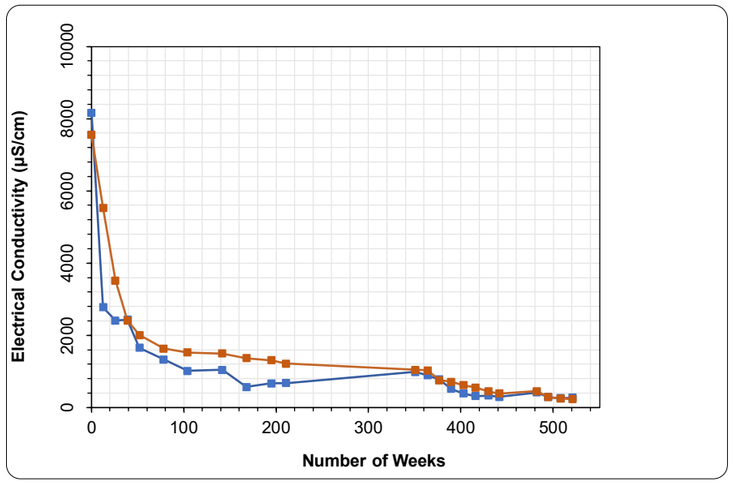
| Calculations** | Elements | | | | | |
|---|---|---|---|---|---|---|
| $SO_4$ Release Rate | $SO_4$ | | 110 | 103 | 84 | 69 |
| Cumulative $SO_4$ Release | Cum $SO_4$ | | 110 | 213 | 297 | 366 |
| Ca Release Rate | Ca | | 41.5 | 39.8 | 37.7 | 28.9 |
| Cumulative Ca Release | Cum Ca | | 41.5 | 81.3 | 118.9 | 147.8 |
| Mg Release Rate | Mg | | 2.8 | 0.6 | 1.3 | 1.0 |
| Cumulative Mg Release | Cum Mg | | 2.8 | 3.3 | 4.7 | 5.7 |
| Residual ANC (%) | Res. ANC | | 99.7 | 99.4 | 99.2 | 99.0 |
| Residual Sulfur (%) | Res. S | | 99.9 | 99.8 | 99.8 | 99.7 |
| $SO_4$/(Ca+Mg) molar ratio | $SO_4$/(Ca+Mg) | | 1.0 | 1.1 | 0.9 | 0.9 |

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines 1. Recommended guideline limits for Livestock Drinking Water.

< indicates less than the laboratory limit of reporting. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm * Acidity and alkalinity data calculated in mg CaCO3/L. Shaded cells exceed applied guideline values. # for still water bodies only, moving rivers at low flow rates should not exceed 2,200 µS/cm. ^ calculated based on total dissolved solids (TDS) conversion rate of 0.67 % of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water. ** SO4, Ca and Mg release rates calculated in mg/kg/flush. Residual ANC assumes that all leached Mg and Ca is due to dissolution of calcite or dolomite. Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity. MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential.

## KLC Plots

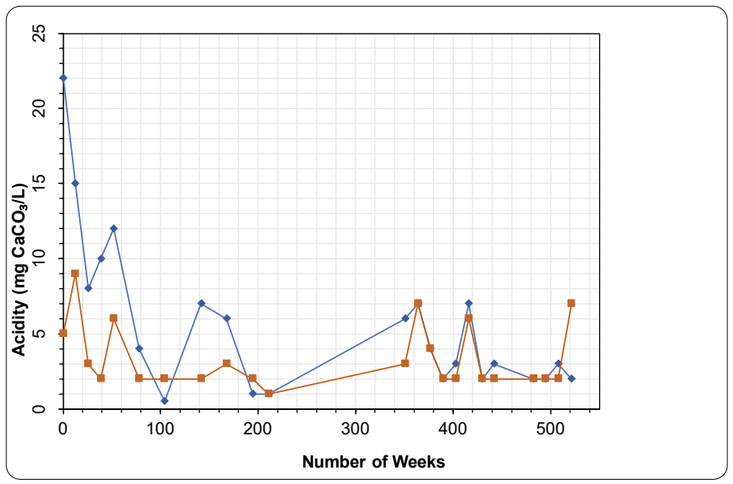


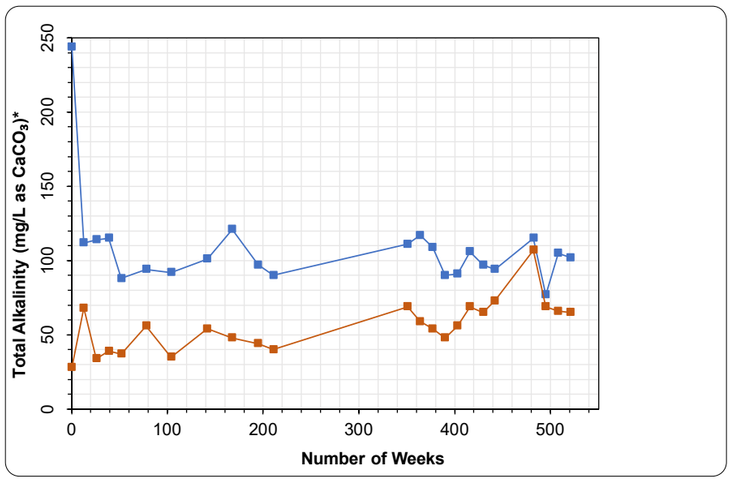



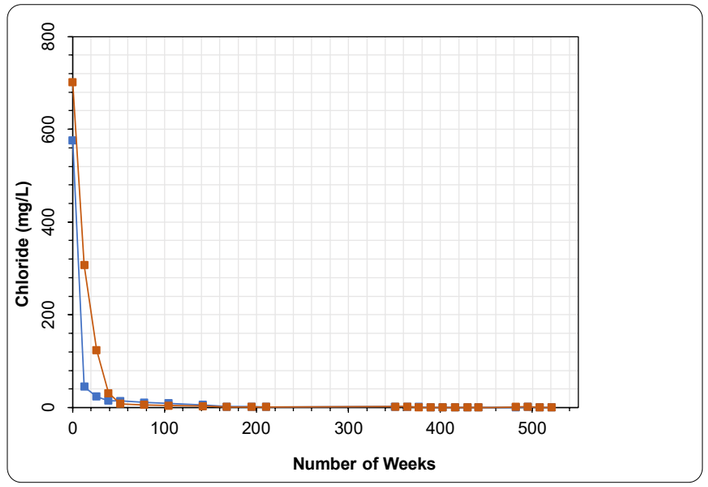

LEGEND:

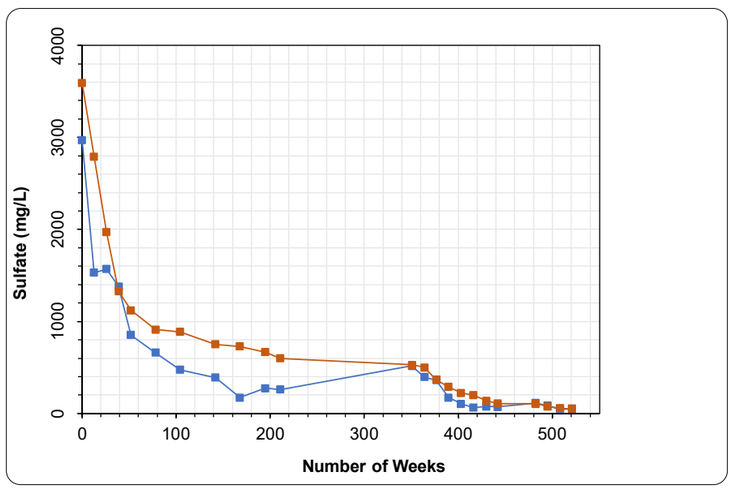
KLC1A: Tailings (saturated)

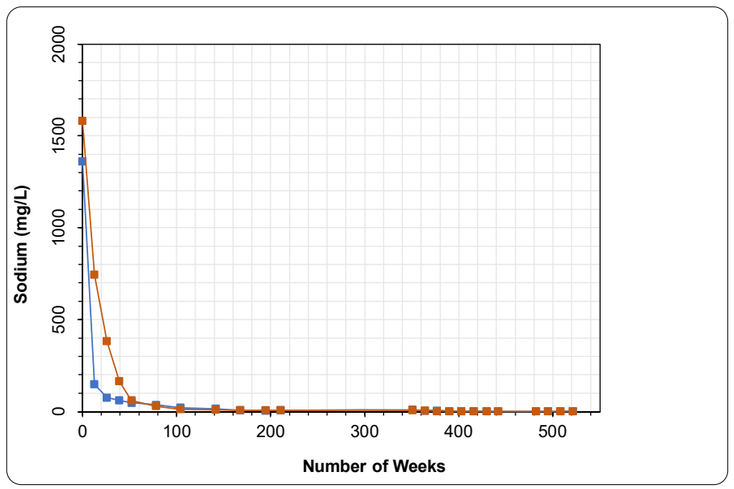
KLC3A: Tailings (Oxic)

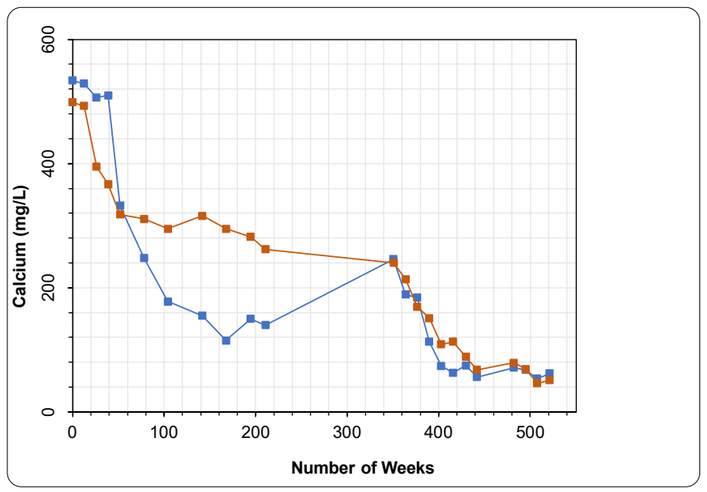


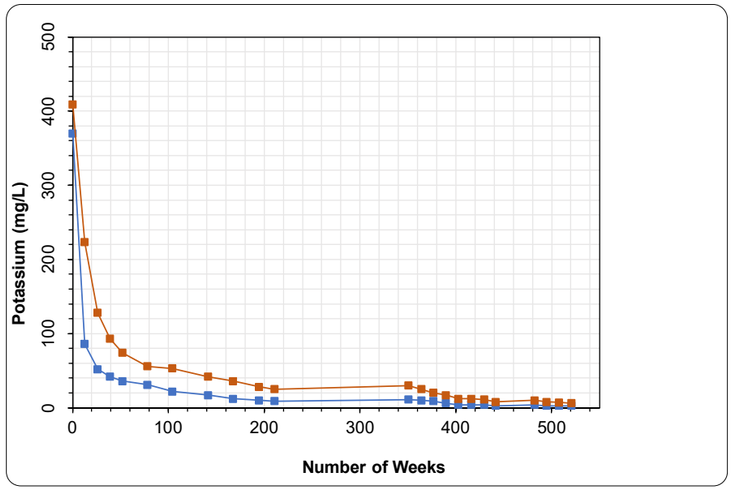



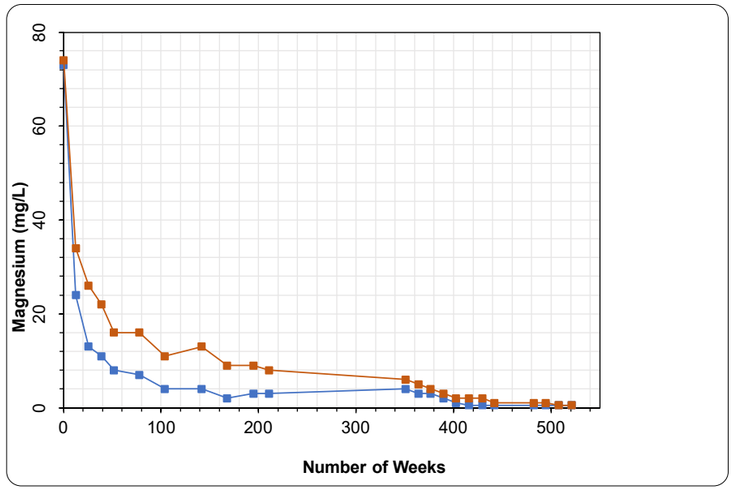



# KLC Plots




LEGEND:

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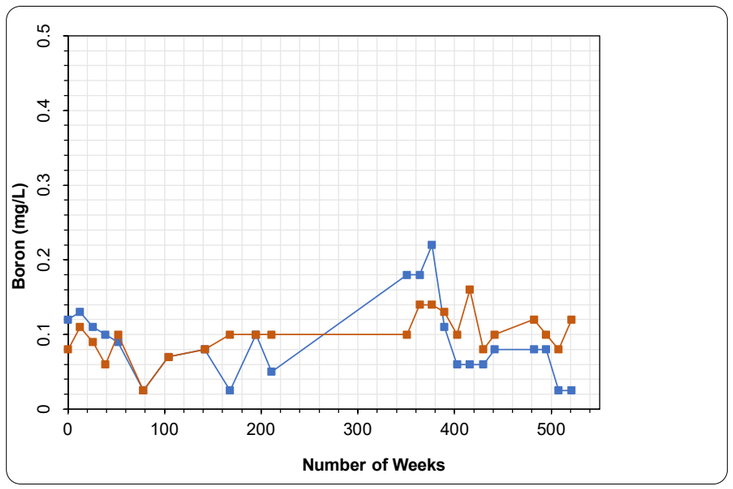


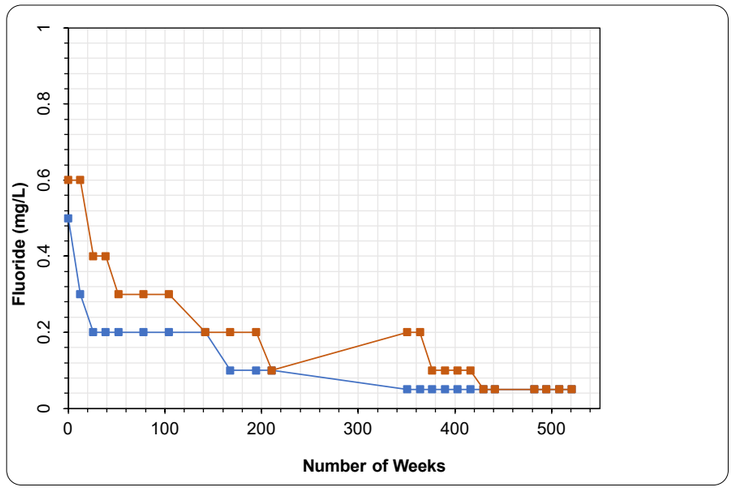


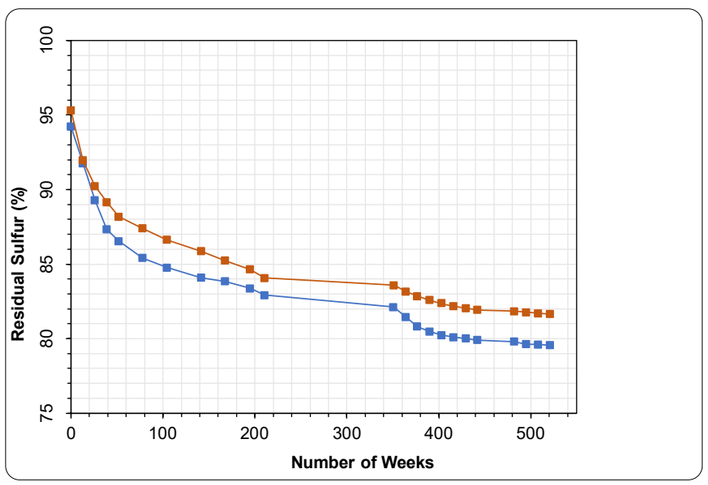


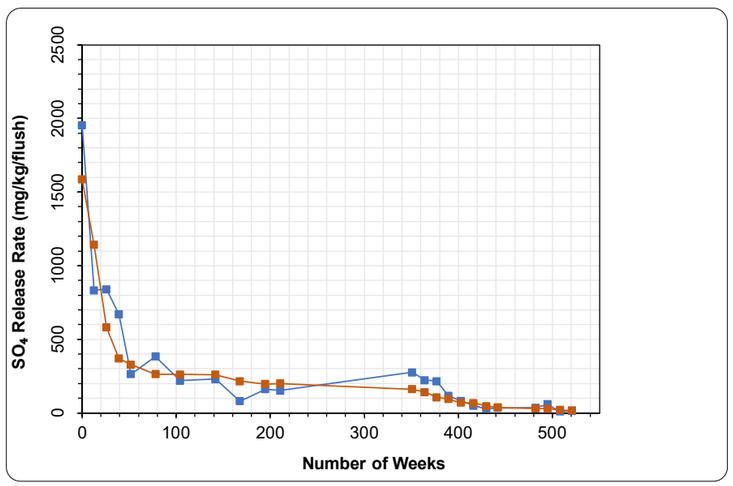


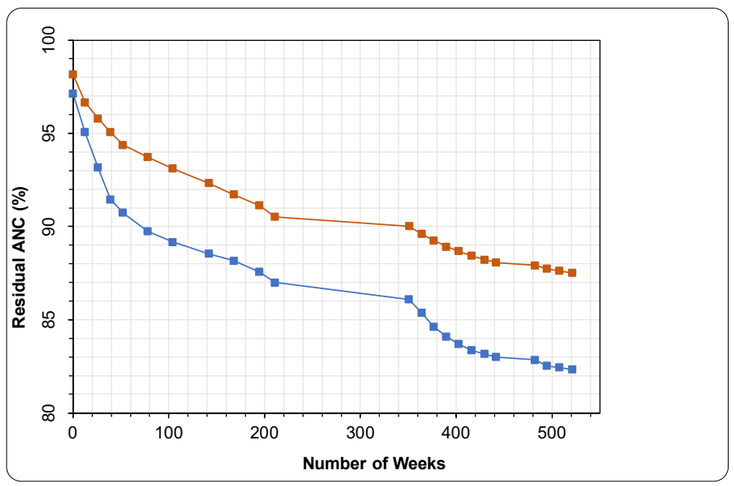


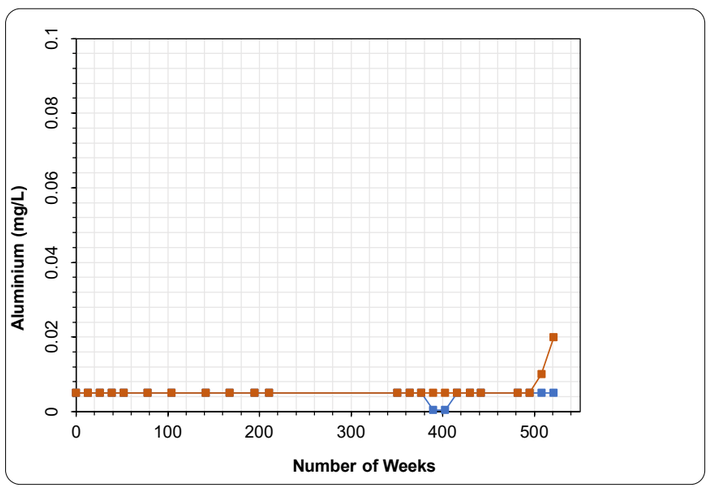

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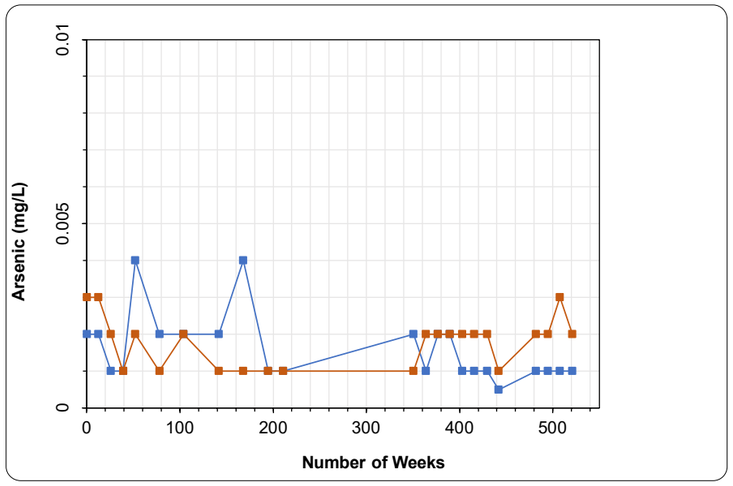


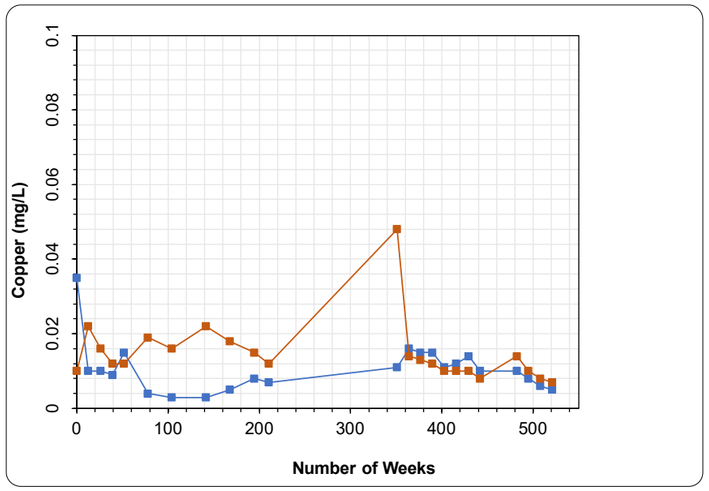


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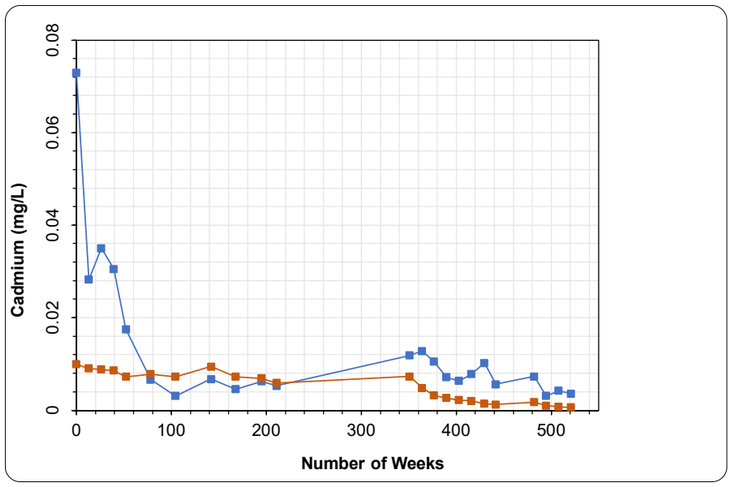
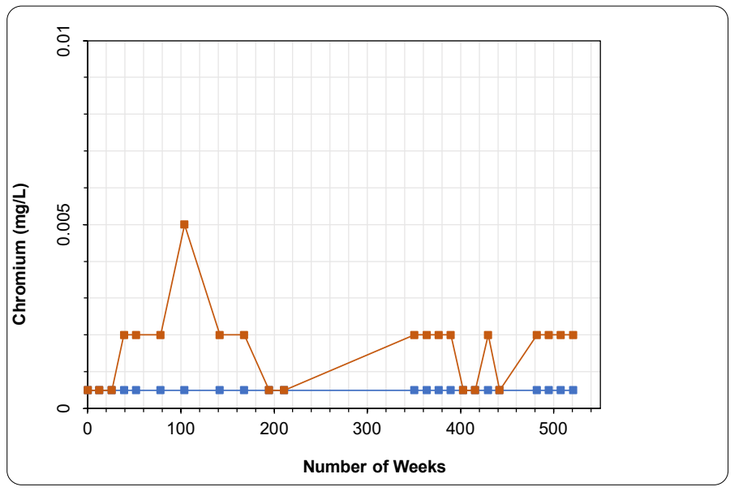
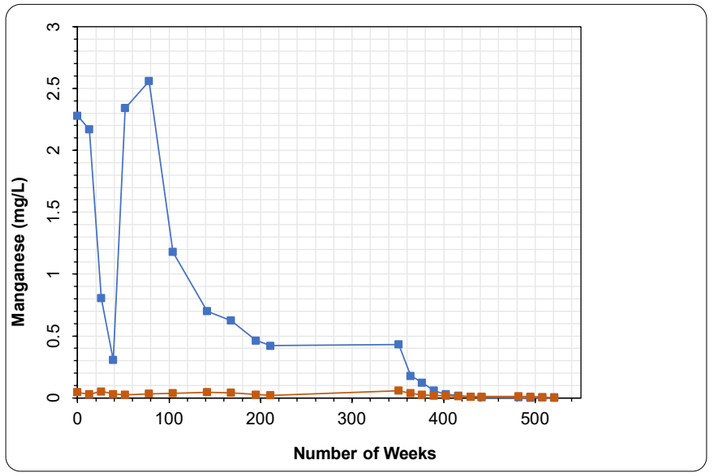
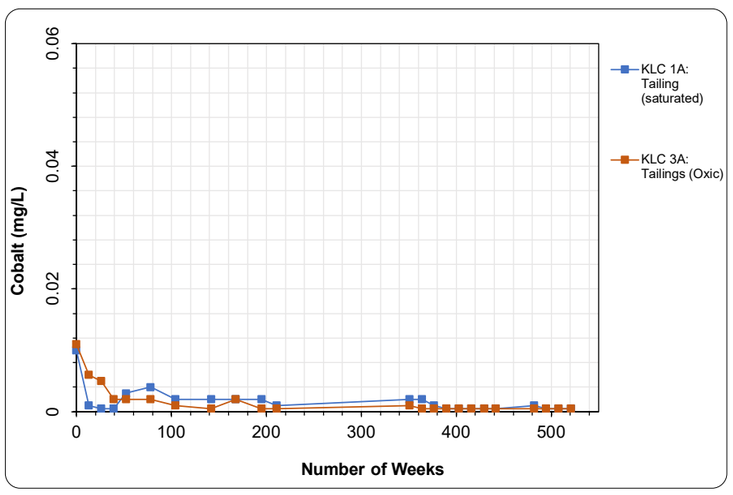
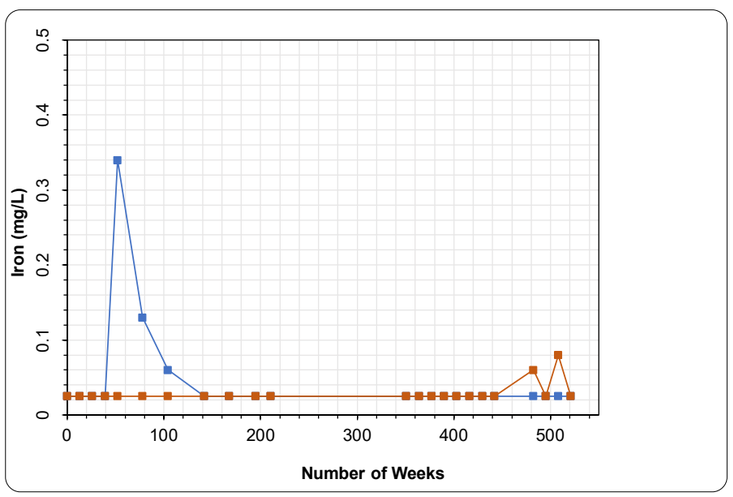
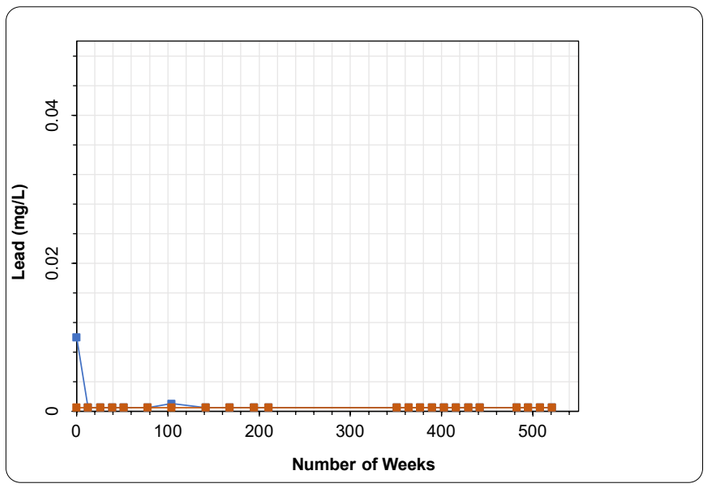


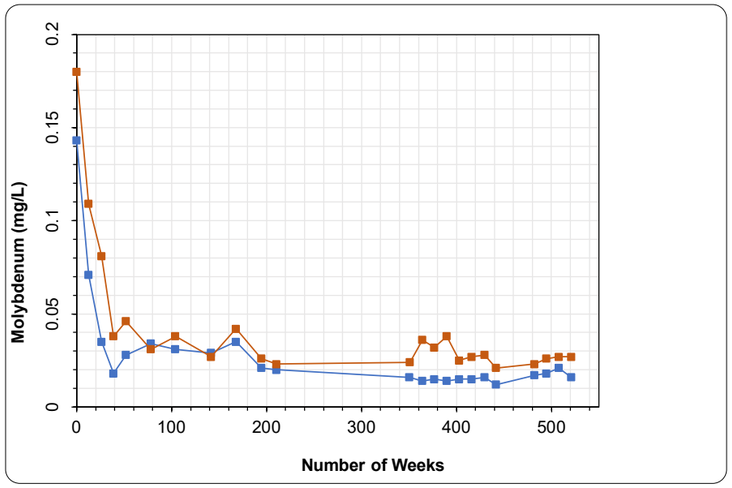



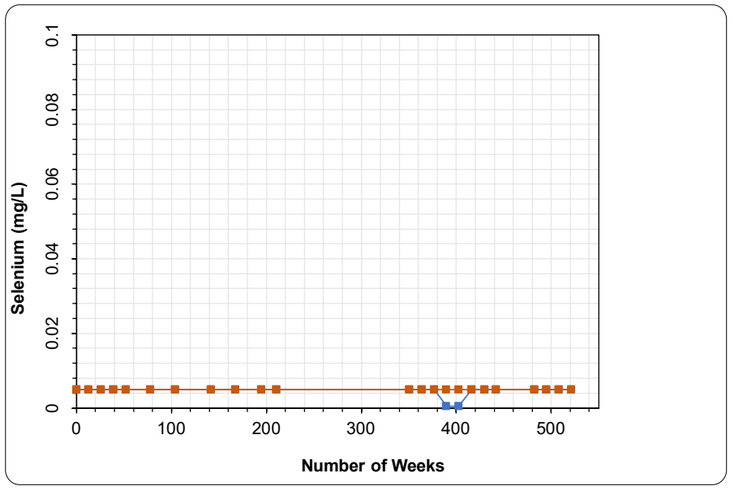



## KLC Plots




LEGEND:

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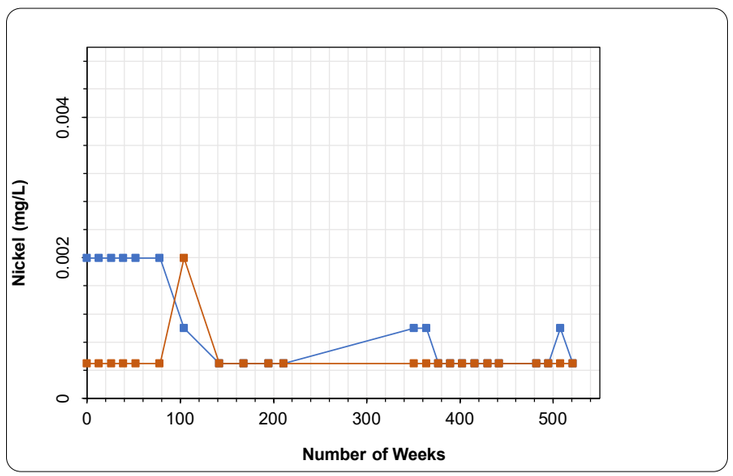
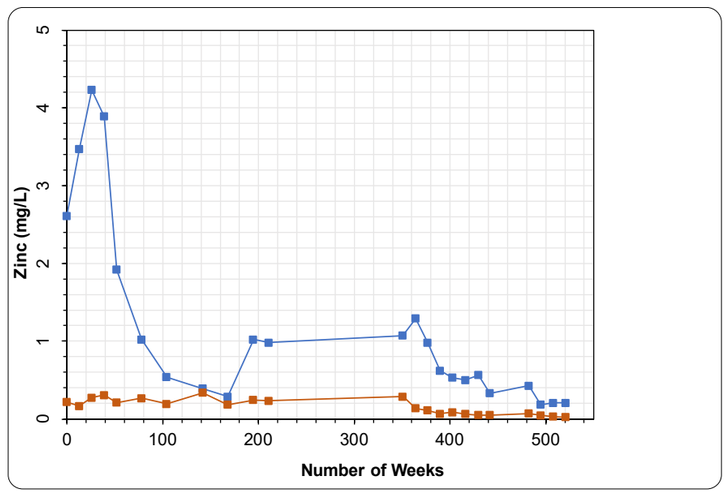
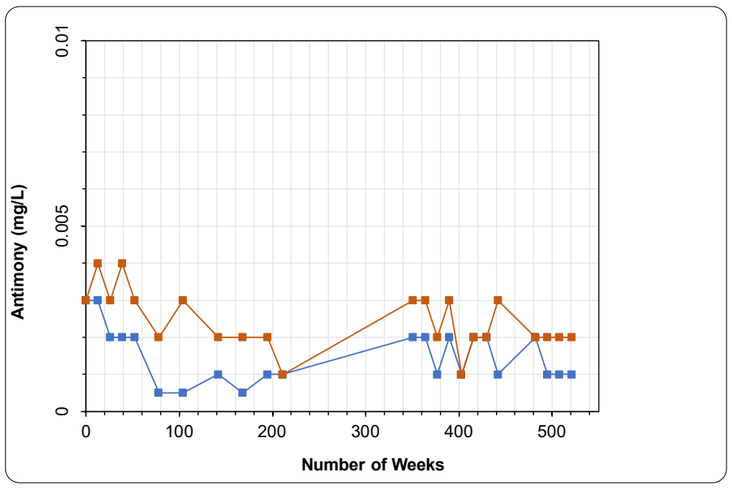
KLC3A: Tailings (Oxic)



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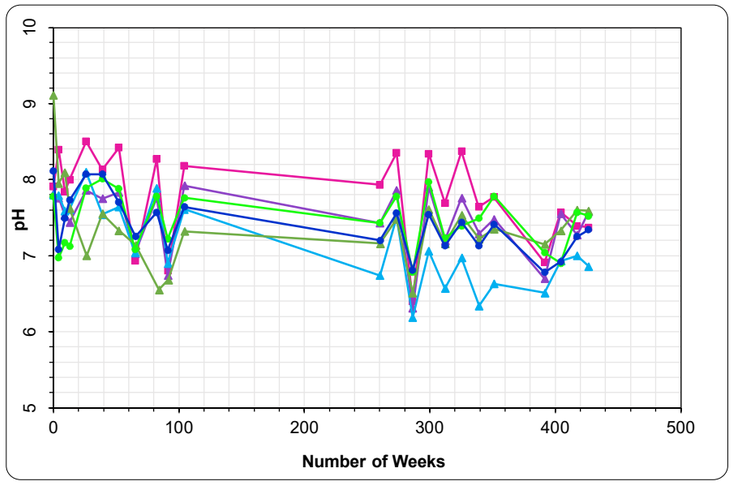
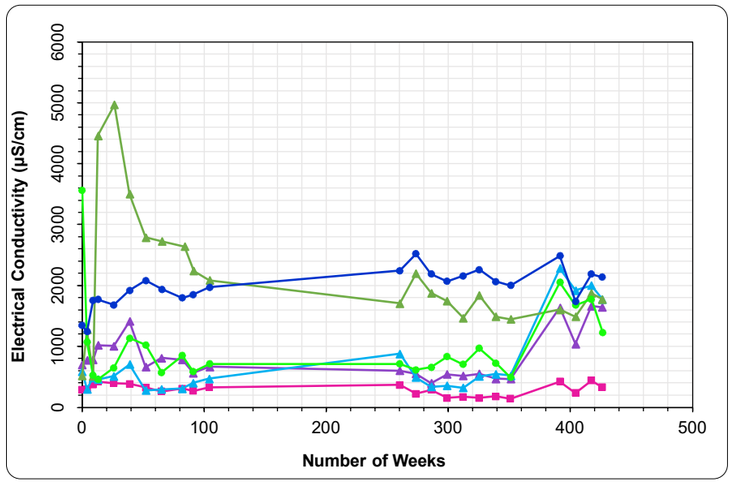
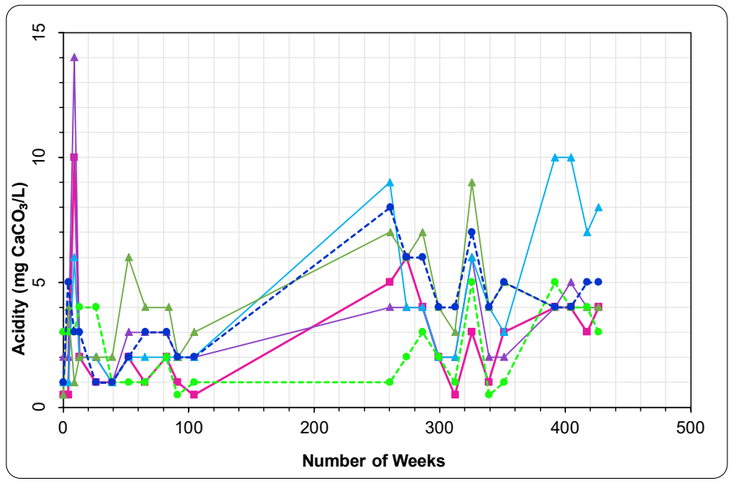
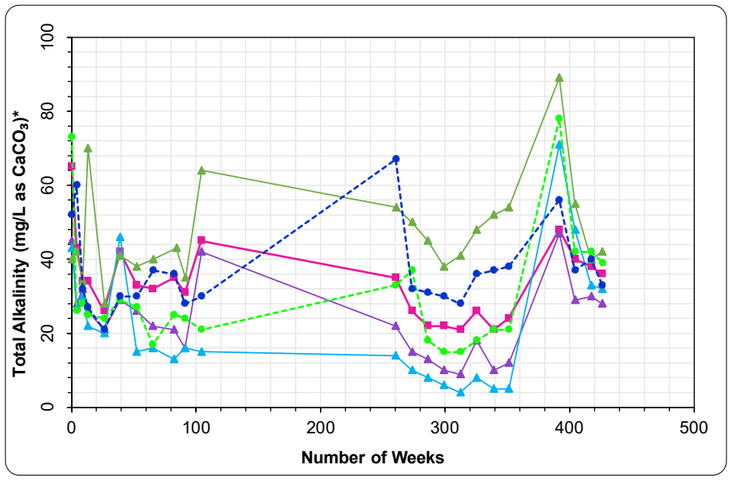


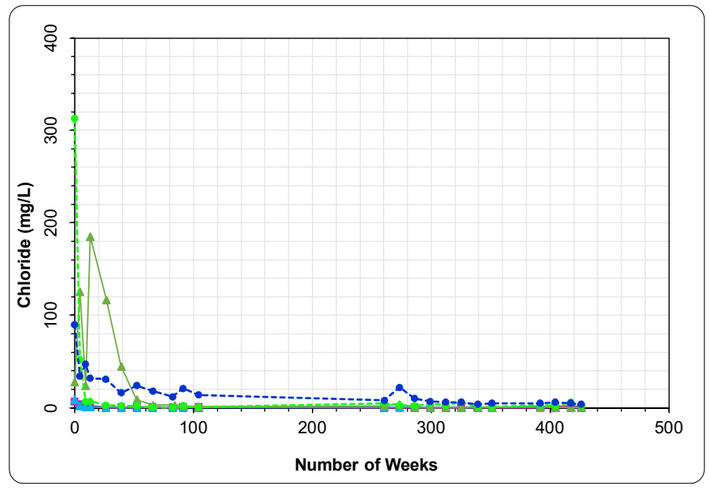



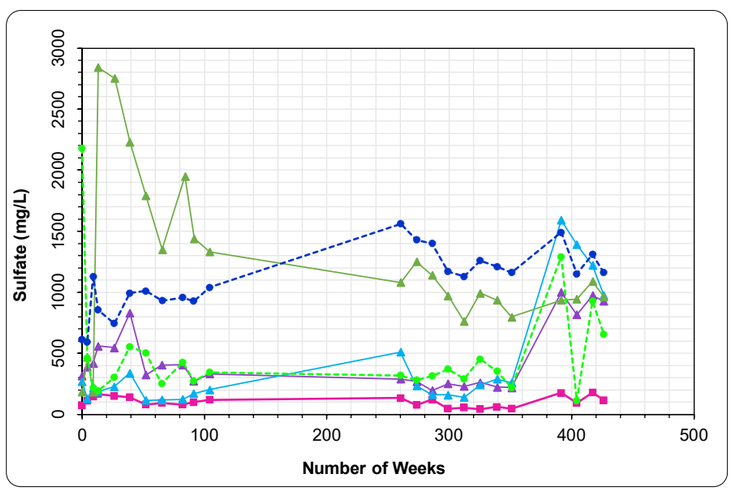

LEGEND:

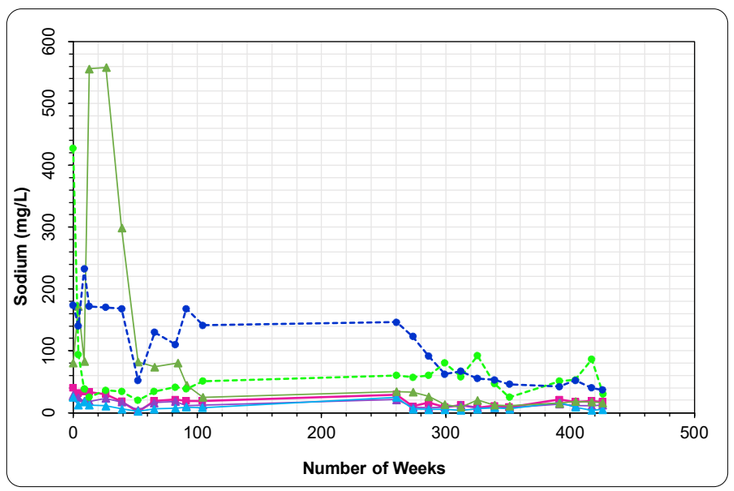
- KLC 1: NAF Waste Rock
- KLC 2: Medium PAF Waste Rock
- KLC 3: High PAF Waste Rock
- KLC 4: Uncertain Tailings
- KLC 5: Tailings on top of High PAF Waste Rock
- KLC 6: Tailings mixed with High PAF Waste Rock

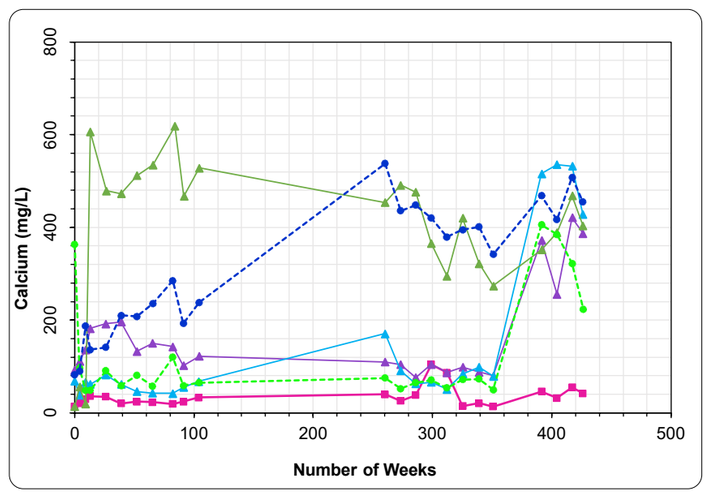


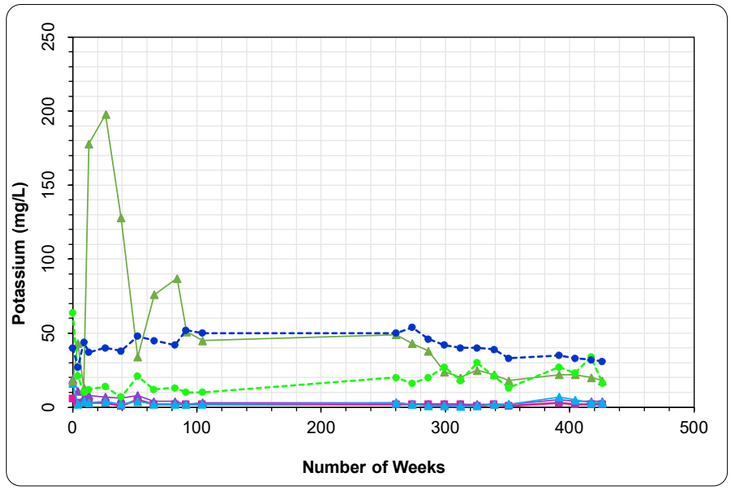



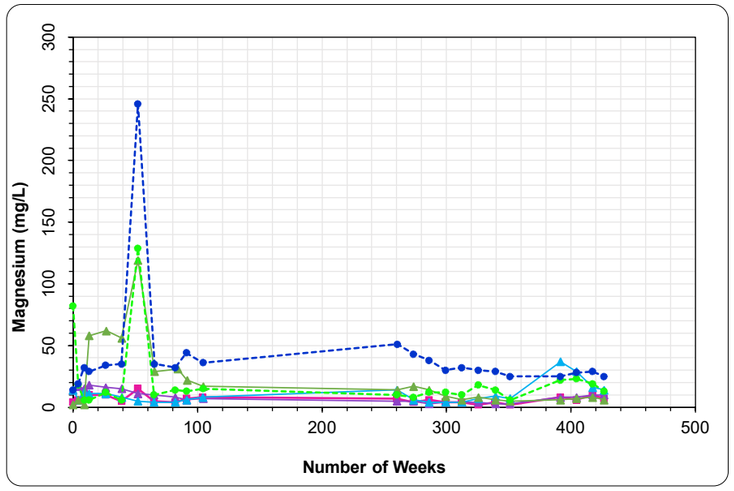



## KLC Plots




LEGEND:

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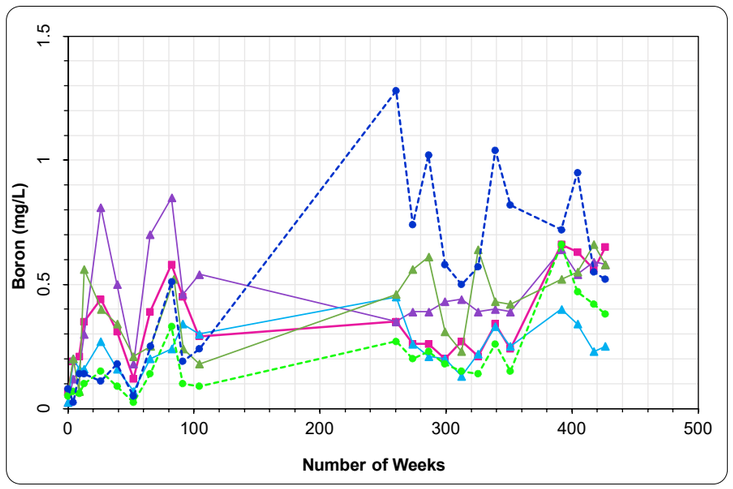
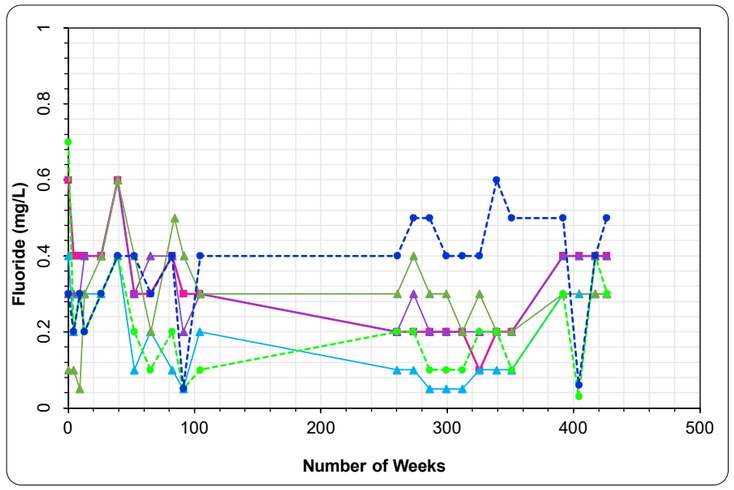
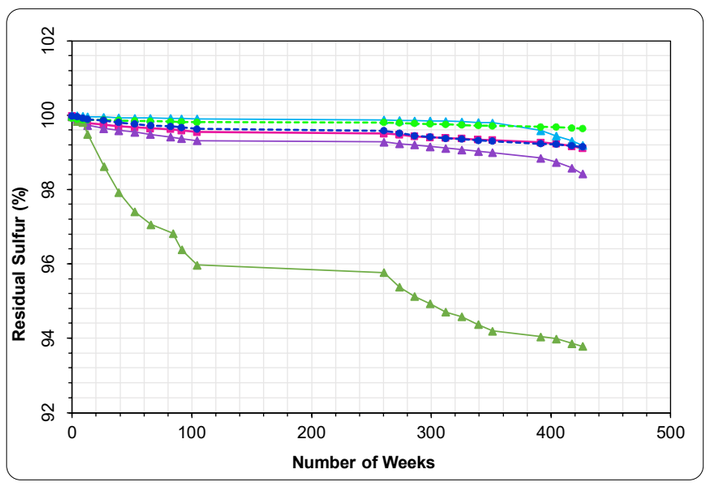
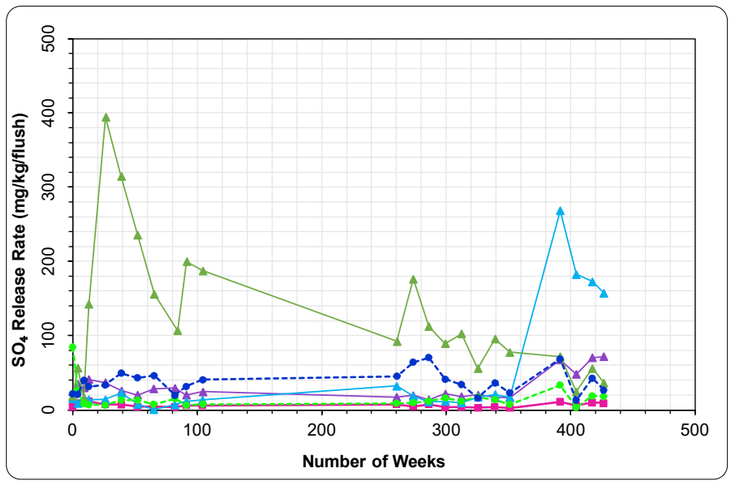
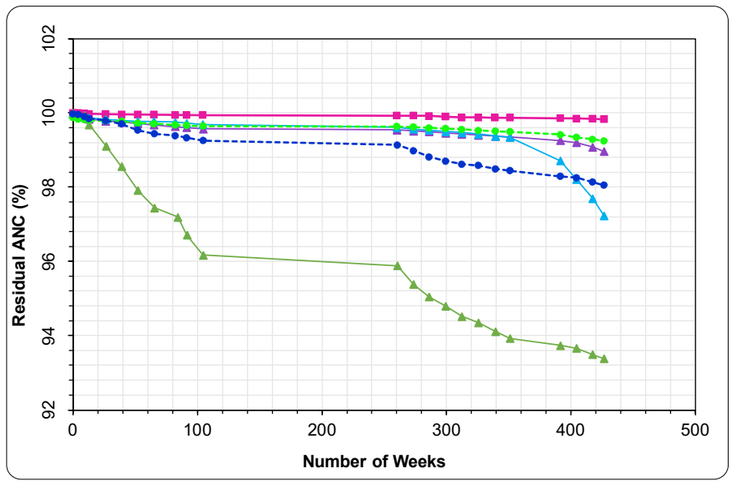
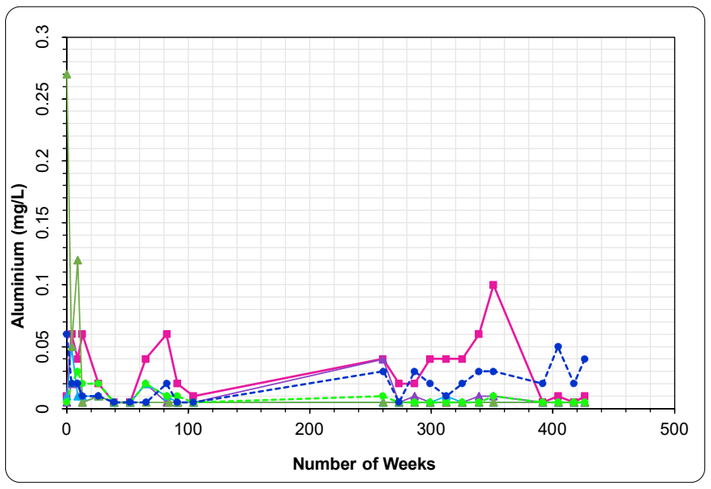


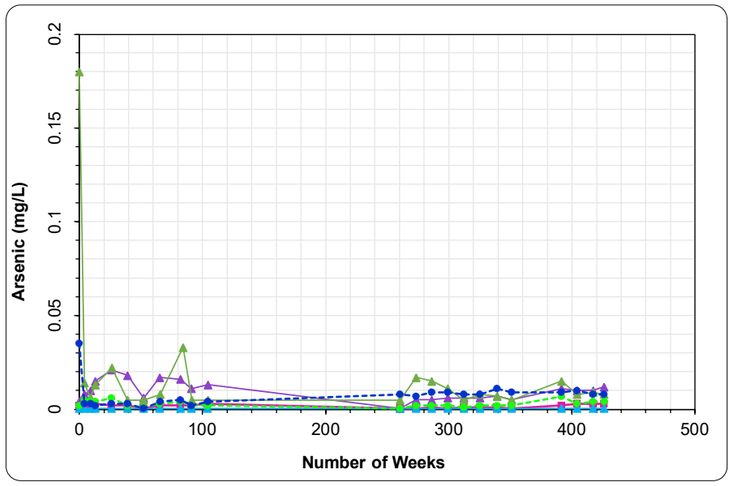



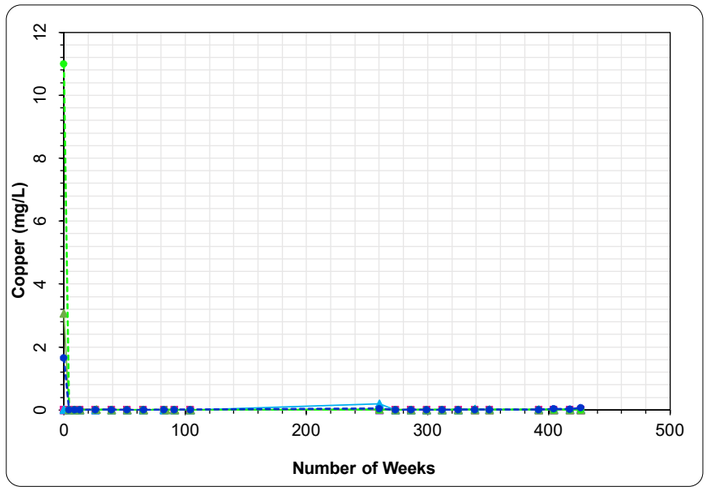



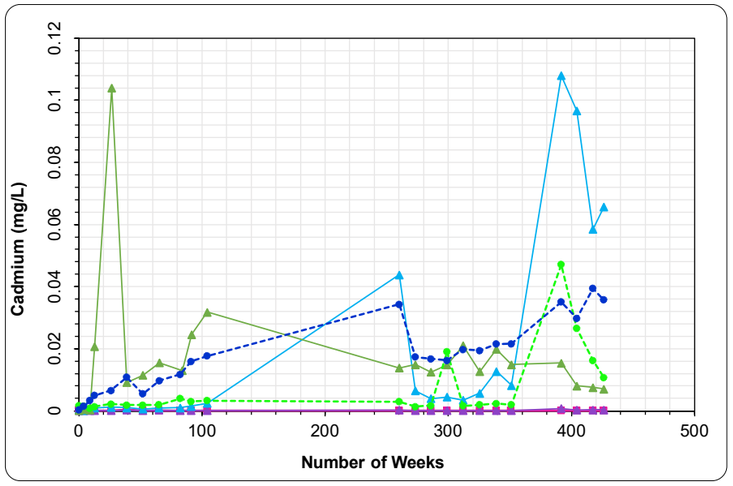
## KLC Plots

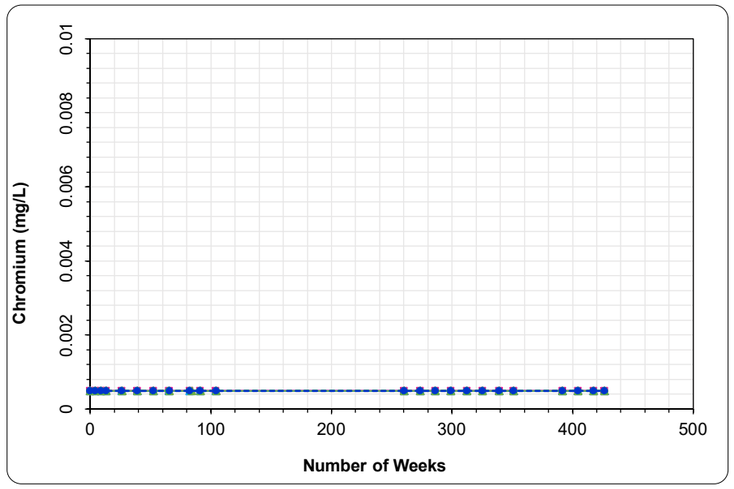


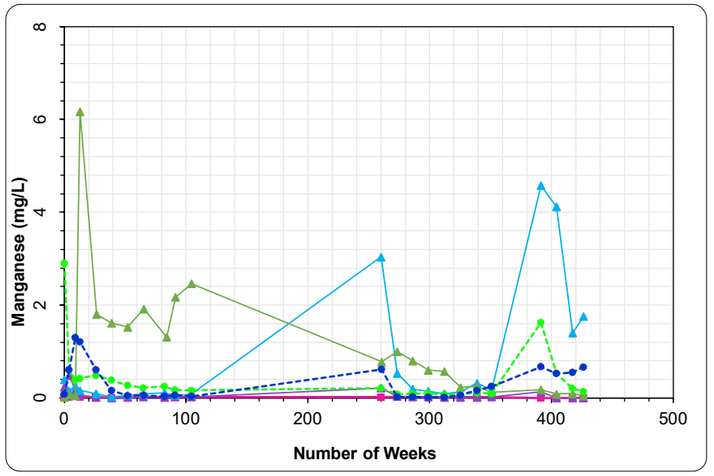



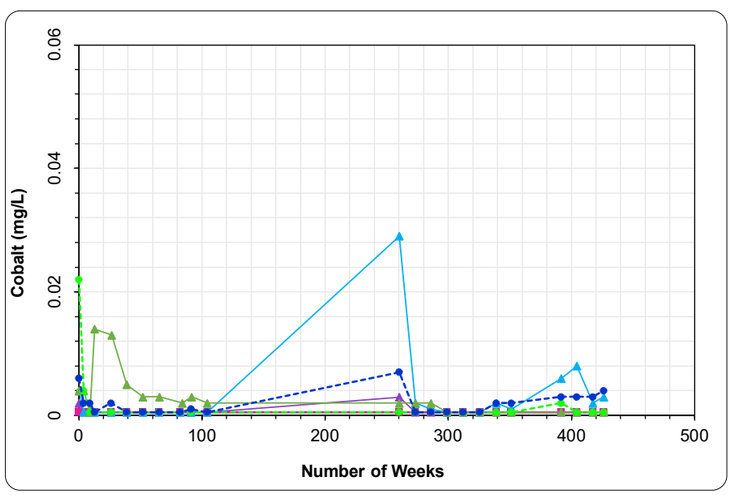

LEGEND:

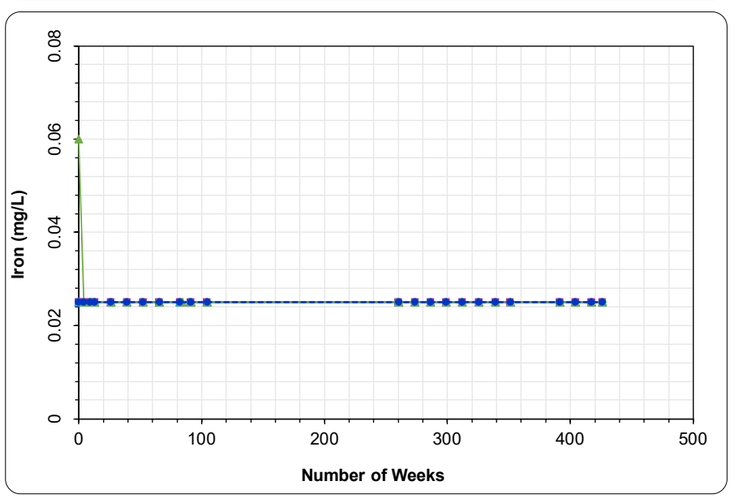
- KLC 1: NAF Waste Rock
- KLC 2: Medium PAF Waste Rock
- KLC 3: High PAF Waste Rock
- KLC 4: Uncertain Tailings
- KLC 5: Tailings on top of High PAF Waste Rock
- KLC 6: Tailings mixed with High PAF Waste Rock

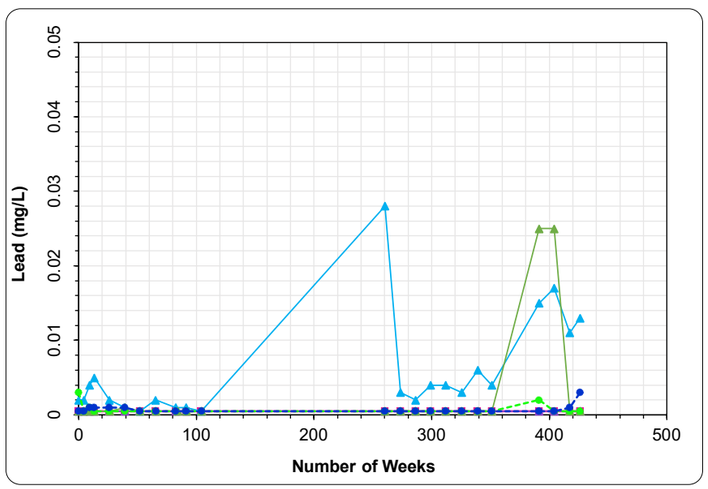


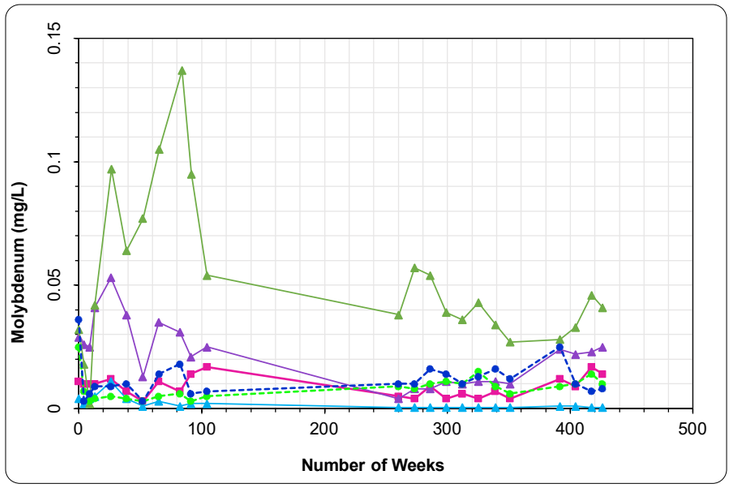



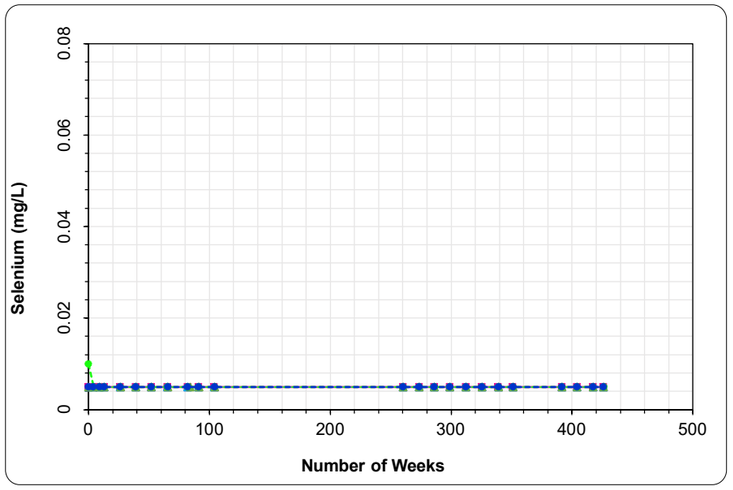



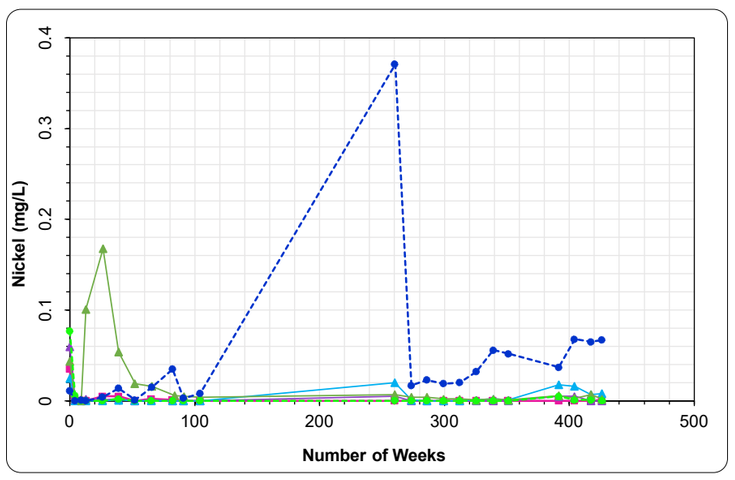
## KLC Plots

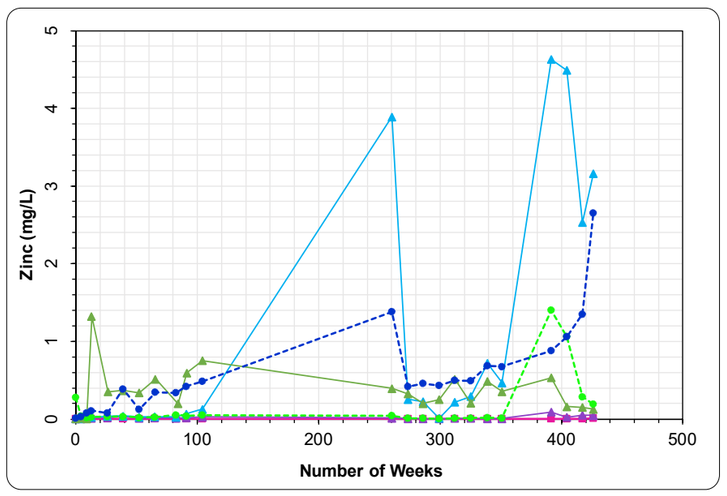


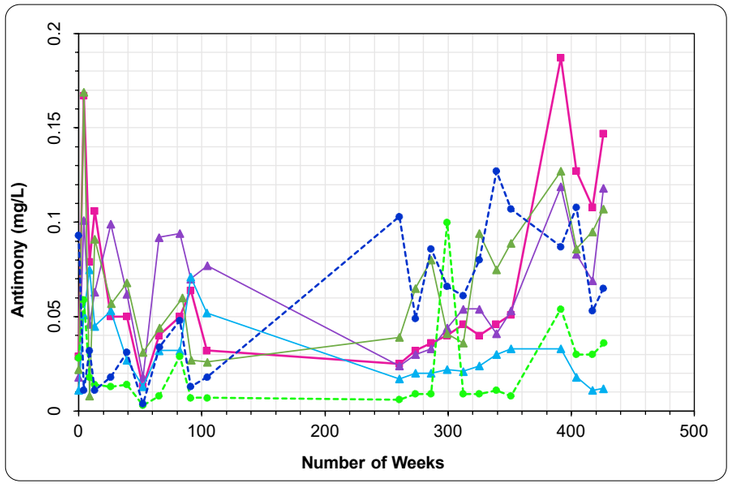




LEGEND:

- KLC 1: NAF Waste Rock
- KLC 2: Medium PAF Waste Rock
- KLC 3: High PAF Waste Rock
- KLC 4: Uncertain Tailings
- KLC 5: Tailings on top of High PAF Waste Rock
- KLC 6: Tailings mixed with High PAF Waste Rock



## 9.3 Attachment C: ALS, and Trilab Laboratory results

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1619048** | Page | : 1 of 2 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon | Date Samples Received | : 28-Jul-2016 09:40 |
| Order number | : ---- | Date Analysis Commenced | : 29-Aug-2016 |
| C-O-C number | : ---- | Issue Date | : 31-Aug-2016 17:00 |
| Sampler | : MARK GASTALDON - MT RAWDON | | |
| Site | : ---- | | |
| Quote number | : ---- | | |
| No. of samples received | : 3 | | |
| No. of samples analysed | : 3 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ben Felgendrejeris | | Brisbane Acid Sulphate Soils, Stafford, QLD |
| Greg Vogel | Laboratory Manager | Brisbane Acid Sulphate Soils, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.

## Analytical Results

| Sub-Matrix: **ROCK** (Matrix: **SOIL**) | | | Client sample ID | **N** | **M** | **H** | **----** | **----** |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [26-Jul-2016] | [26-Jul-2016] | [26-Jul-2016] | ---- | ---- |
| *Compound* | *CAS Number* | *LOR* | *Unit* | **EB1619048-001** | **EB1619048-002** | **EB1619048-003** | **--------** | **--------** |
| | | | | Result | Result | Result | ---- | ---- |
| **EA002 : pH (Soils)** | | | | | | | | |
| **pH Value** | ---- | 0.1 | pH Unit | **9.5** | **9.4** | **9.0** | **----** | **----** |
| **EA009: Nett Acid Production Potential** | | | | | | | | |
| **Net Acid Production Potential** | ---- | 0.5 | kg H2SO4/t | **-73.7** | **-20.5** | **93.6** | **----** | **----** |
| **EA010: Conductivity** | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | **104** | **120** | **187** | **----** | **----** |
| **EA013: Acid Neutralising Capacity** | | | | | | | | |
| **ANC as H2SO4** | ---- | 0.5 | kg H2SO4 equiv./t | **90.2** | **66.1** | **37.7** | **----** | **----** |
| **ANC as CaCO3** | ---- | 0.1 | % CaCO3 | **9.2** | **6.7** | **3.8** | **----** | **----** |
| **Fizz Rating** | ---- | 0 | Fizz Unit | **2** | **2** | **2** | **----** | **----** |
| **EA026 : Chromium Reducible Sulfur** | | | | | | | | |
| **Chromium Reducible Sulphur** | ---- | 0.005 | % | **0.355** | **1.34** | **3.60** | **----** | **----** |
| **ED042T: Total Sulfur by LECO** | | | | | | | | |
| **Sulfur - Total as S (LECO)** | ---- | 0.01 | % | **0.54** | **1.49** | **4.29** | **----** | **----** |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1619582** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61 7 3243 7222 |
| Project | : 2016019 Mt Rawdon | Date Samples Received | : 03-Aug-2016 10:55 |
| Order number | : ---- | Date Analysis Commenced | : 08-Aug-2016 |
| C-O-C number | : ---- | Issue Date | : 18-Aug-2016 13:30 |
| Sampler | : Mark Gastaldon - Mt Rawdon | | |
| Site | : ---- | | |
| Quote number | : ---- | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

NATA
WORLD RECOGNISED ACCREDITATION

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ben Felgendrejeris | | Brisbane Acid Sulphate Soils, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Acid Sulphate Soils, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Client sample ID | Tailings | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [02-Aug-2016] | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1619582-001 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA002 : pH (Soils)** | | | | | | | | |
| **pH Value** | ---- | 0.1 | pH Unit | **10.1** | ---- | ---- | ---- | ---- |
| **EA009: Nett Acid Production Potential** | | | | | | | | |
| **Net Acid Production Potential** | ---- | 0.5 | kg H2SO4/t | **10.8** | ---- | ---- | ---- | ---- |
| **EA010: Conductivity** | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | **335** | ---- | ---- | ---- | ---- |
| **EA013: Acid Neutralising Capacity** | | | | | | | | |
| **ANC as H2SO4** | ---- | 0.5 | kg H2SO4 equiv./t | **35.4** | ---- | ---- | ---- | ---- |
| **ANC as CaCO3** | ---- | 0.1 | % CaCO3 | **3.6** | ---- | ---- | ---- | ---- |
| **Fizz Rating** | ---- | 0 | Fizz Unit | **2** | ---- | ---- | ---- | ---- |
| **EA026 : Chromium Reducible Sulfur** | | | | | | | | |
| **Chromium Reducible Sulphur** | ---- | 0.005 | % | **1.22** | ---- | ---- | ---- | ---- |
| **EA055: Moisture Content** | | | | | | | | |
| **Moisture Content (dried @ 103°C)** | ---- | 1 | % | **25.3** | ---- | ---- | ---- | ---- |
| **ED042T: Total Sulfur by LECO** | | | | | | | | |
| **Sulfur - Total as S (LECO)** | ---- | 0.01 | % | **1.51** | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | Blank DI water used in 1:5. | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [02-Aug-2016] | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1619582-002 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| **pH Value** | ---- | 0.01 | pH Unit | **6.19** | ---- | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | <1 | ---- | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1621104** | Page | : 1 of 3 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon | Date Samples Received | : 26-Aug-2016 11:08 |
| Order number | : ---- | Date Analysis Commenced | : 26-Aug-2016 |
| C-O-C number | : ---- | Issue Date | : 01-Sep-2016 15:50 |
| Sampler | : ---- | | |
| Site | : ---- | | |
| Quote number | : ---- | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

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

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- Analytical Results

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## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Andrew Epps | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |
| Greg Vogel | Laboratory Manager | Brisbane Inorganics, Stafford, QLD |

## General Comments

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **This work order has been created to rebatch samples from previous ALS workorder EB1619048 and EB1619582.**

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Client sample ID | EB1619048-001 N | EB1619048-002 M | EB1619048-003 H | EB1619582-001 Tailings SLurry | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [26-Jul-2016] | [26-Jul-2016] | [26-Jul-2016] | [26-Jul-2016] | ---- |
| Compound | CAS Number | LOR | Unit | EB1621104-001 | EB1621104-002 | EB1621104-003 | EB1621104-004 | -------- |
| | | | | Result | Result | Result | Result | ---- |
| **ED093S: Soluble Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 10 | mg/kg | 90 | 100 | 70 | 90 | ---- |
| Magnesium | 7439-95-4 | 10 | mg/kg | 20 | 20 | 10 | 20 | ---- |
| Sodium | 7440-23-5 | 10 | mg/kg | 70 | 50 | 20 | 220 | ---- |
| Potassium | 7440-09-7 | 10 | mg/kg | 50 | 90 | 80 | 110 | ---- |
| **EG005T: Total Metals by ICP-AES** | | | | | | | | |
| Aluminium | 7429-90-5 | 50 | mg/kg | 22700 | 12200 | 8000 | 11300 | ---- |
| Boron | 7440-42-8 | 50 | mg/kg | <50 | <50 | <50 | <50 | ---- |
| Iron | 7439-89-6 | 50 | mg/kg | 39200 | 24200 | 39700 | 28500 | ---- |
| **EG020T: Total Metals by ICP-MS** | | | | | | | | |
| Arsenic | 7440-38-2 | 0.1 | mg/kg | 7.5 | 25.5 | 25.9 | 134 | ---- |
| Selenium | 7782-49-2 | 1 | mg/kg | <1 | <1 | <1 | <1 | ---- |
| Silver | 7440-22-4 | 0.1 | mg/kg | <0.1 | 0.2 | 2.5 | 1.3 | ---- |
| Barium | 7440-39-3 | 0.1 | mg/kg | 28.9 | 39.8 | 19.7 | 68.5 | ---- |
| Thallium | 7440-28-0 | 0.1 | mg/kg | <0.1 | <0.1 | <0.1 | 0.1 | ---- |
| Beryllium | 7440-41-7 | 0.1 | mg/kg | 0.6 | 0.6 | 0.4 | 0.5 | ---- |
| Cadmium | 7440-43-9 | 0.1 | mg/kg | <0.1 | 0.2 | 4.0 | 8.6 | ---- |
| Bismuth | 7440-69-9 | 0.1 | mg/kg | 0.2 | 1.1 | 11.6 | 22.2 | ---- |
| Cobalt | 7440-48-4 | 0.1 | mg/kg | 15.4 | 9.0 | 9.8 | 6.9 | ---- |
| Chromium | 7440-47-3 | 0.1 | mg/kg | 35.1 | 82.5 | 30.0 | 25.8 | ---- |
| Copper | 7440-50-8 | 0.1 | mg/kg | 8.8 | 26.9 | 140 | 358 | ---- |
| Thorium | 7440-29-1 | 0.1 | mg/kg | 1.4 | 2.4 | 1.7 | 4.2 | ---- |
| Manganese | 7439-96-5 | 0.1 | mg/kg | 2260 | 1940 | 1950 | 1180 | ---- |
| Strontium | 7440-24-6 | 0.1 | mg/kg | 109 | 70.0 | 43.1 | 68.4 | ---- |
| Molybdenum | 7439-98-7 | 0.1 | mg/kg | 0.6 | 1.9 | 1.0 | 1.9 | ---- |
| Nickel | 7440-02-0 | 0.1 | mg/kg | 10.4 | 28.6 | 12.1 | 12.2 | ---- |
| Lead | 7439-92-1 | 0.1 | mg/kg | 4.0 | 8.3 | 160 | 52.6 | ---- |
| Antimony | 7440-36-0 | 0.1 | mg/kg | 0.6 | 3.5 | 1.3 | 0.5 | ---- |
| Uranium | 7440-61-1 | 0.1 | mg/kg | 0.1 | 0.4 | 0.2 | 0.6 | ---- |
| Zinc | 7440-66-6 | 0.5 | mg/kg | 141 | 126 | 748 | 1490 | ---- |
| Lithium | 7439-93-2 | 0.1 | mg/kg | 50.3 | 30.8 | 17.8 | 10.6 | ---- |
| Vanadium | 7440-62-2 | 1 | mg/kg | 72 | 25 | 11 | 17 | ---- |
| Tin | 7440-31-5 | 0.1 | mg/kg | 1.2 | 0.9 | 0.6 | 0.7 | ---- |
| **EG035T: Total Recoverable Mercury by FIMS** | | | | | | | | |
| Mercury | 7439-97-6 | 0.1 | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1621999** | Page | : 1 of 2 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61 7 3243 7222 |
| Project | : 2016019 Mt Rawdon | Date Samples Received | : 07-Sep-2016 10:37 |
| Order number | : ---- | Date Analysis Commenced | : 08-Sep-2016 |
| C-O-C number | : ---- | Issue Date | : 13-Sep-2016 12:49 |
| Sampler | : Mark Gastaldon - Mt Rawdon | | |
| Site | : ---- | | |
| Quote number | : ---- | | |
| No. of samples received | : 1 | | |
| No. of samples analysed | : 1 | | |

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Accredited for compliance with ISO/IEC 17025 - Testing

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Andrew Epps | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

## Analytical Results

| Sub-Matrix: **SOIL** (Matrix: **SOIL**) | | | | Client sample ID | **Tailings** | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [02-Aug-2016] | ---- | ---- | ---- | ---- |
| *Compound* | *CAS Number* | *LOR* | *Unit* | | **EB1621999-001** | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EA055: Moisture Content** | | | | | | | | | |
| **Moisture Content (dried @ 103°C)** | ---- | 1 | % | | **20.6** | ---- | ---- | ---- | ---- |
| **EK026SF: Total CN by Segmented Flow Analyser** | | | | | | | | | |
| **Total Cyanide** | 57-12-5 | 1 | mg/kg | | **12** | ---- | ---- | ---- | ---- |
| **EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser** | | | | | | | | | |
| **Weak Acid Dissociable Cyanide** | ---- | 1 | mg/kg | | <1 | ---- | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1621323** | Page | : 1 of 6 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61 7 3243 7222 |
| Project | : 201417 Mt Rawdon Tailings Project | Date Samples Received | : 30-Aug-2016 13:50 |
| Order number | : ---- | Date Analysis Commenced | : 01-Sep-2016 |
| C-O-C number | : ---- | Issue Date | : 05-Sep-2016 08:54 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : ---- | | |
| No. of samples received | : 6 | | |
| No. of samples analysed | : 6 | | |

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Accredited for compliance with ISO/IEC 17025 - Testing

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID | Mt Rawdon Waste Rock (NAF) Leachate | Mt Rawdon Waste Rock (Moderate PAF) Leachate | Mt Rawdon Waste Rock (High PAF) Leachate | Mt Rawdon Tailings Leachate | Mt Rawdon Waste Rock (High PAF) + Tailings Leachate |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [30-Aug-2016] | [30-Aug-2016] | [30-Aug-2016] | [30-Aug-2016] | [30-Aug-2016] |
| | | | | | EB1621323-001 | EB1621323-002 | EB1621323-003 | EB1621323-004 | EB1621323-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | | 7.82 | 7.68 | 7.71 | 8.53 | 7.79 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | | 315 | 735 | 623 | 559 | 3880 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | | <1 | <1 | <1 | 6 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | | 65 | 45 | 43 | 35 | 73 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | | 65 | 45 | 43 | 40 | 73 |
| **ED038A: Acidity** | | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | | <1 | 2 | 1 | <1 | 3 |
| **ED040F: Dissolved Major Anions** | | | | | | | | | |
| Sulfate as SO4 2- | 14808-79-8 | 1 | mg/L | | 74 | 316 | 267 | 182 | 2180 |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | | 7.7 | 6.8 | 4.4 | 3.0 | 14.0 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | | 77 | 314 | 232 | 158 | 1920 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | | 7 | 8 | 9 | 28 | 313 |
| **ED093F: Dissolved Major Cations** | | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | | 14 | 92 | 69 | 14 | 363 |
| Magnesium | 7439-95-4 | 1 | mg/L | | 4 | 14 | 14 | 2 | 82 |
| Sodium | 7440-23-5 | 1 | mg/L | | 40 | 28 | 25 | 80 | 427 |
| Potassium | 7440-09-7 | 1 | mg/L | | 6 | 19 | 16 | 18 | 64 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | | 0.01 | <0.01 | 0.01 | 0.27 | <0.01 |
| Antimony | 7440-36-0 | 0.001 | mg/L | | 0.029 | 0.018 | 0.011 | 0.022 | 0.028 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | | 0.002 | 0.004 | <0.001 | 0.180 | 0.002 |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | 0.0001 | 0.0004 | <0.0001 | 0.0016 |
| Chromium | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | | 0.009 | 0.006 | 0.025 | 3.08 | 11.0 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | | <0.001 | 0.002 | 0.004 | 0.004 | 0.022 |
| Nickel | 7440-02-0 | 0.001 | mg/L | | 0.035 | 0.060 | 0.025 | 0.044 | 0.077 |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | 0.002 | <0.001 | 0.003 |

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID: Mt Rawdon Waste Rock (NAF) Leachate | Mt Rawdon Waste Rock (Moderate PAF) Leachate | Mt Rawdon Waste Rock (High PAF) Leachate | Mt Rawdon Tailings Leachate | Mt Rawdon Waste Rock (High PAF) + Tailings Leachate |
|---|---|---|---|---|---|---|---|---|
| Client sampling date / time | | | | [30-Aug-2016] | [30-Aug-2016] | [30-Aug-2016] | [30-Aug-2016] | [30-Aug-2016] |
| | | | | EB1621323-001 | EB1621323-002 | EB1621323-003 | EB1621323-004 | EB1621323-005 |
| | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | <0.005 | <0.005 | **0.007** | <0.005 | **0.277** |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.020** | **0.238** | **0.396** | **0.009** | **2.90** |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.011** | **0.029** | **0.004** | **0.032** | **0.025** |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | **0.01** |
| **Boron** | 7440-42-8 | 0.05 | mg/L | **0.07** | <0.05 | <0.05 | **0.07** | **0.05** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | **0.06** | <0.05 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.6** | **0.3** | **0.4** | **0.1** | **0.7** |
| **EN055: Ionic Balance** | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | **3.10** | **7.66** | **5.94** | **4.88** | **50.3** |
| **Total Cations** | ---- | 0.01 | meq/L | **2.92** | **7.45** | **6.09** | **4.80** | **45.1** |
| **Ionic Balance** | ---- | 0.01 | % | **2.98** | **1.39** | **1.26** | **0.80** | **5.43** |

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID: Mt Rawdon Waste Rock (High PAF) + Tailings Leachate | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [30-Aug-2016] | ---- | ---- | ---- | ---- |
| | | | | EB1621323-006 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| **pH Value** | ---- | 0.01 | pH Unit | **7.71** | ---- | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | **1410** | ---- | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| **Hydroxide Alkalinity as CaCO3** | DMO-210-001 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| **Carbonate Alkalinity as CaCO3** | 3812-32-6 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| **Bicarbonate Alkalinity as CaCO3** | 71-52-3 | 1 | mg/L | **52** | ---- | ---- | ---- | ---- |
| **Total Alkalinity as CaCO3** | ---- | 1 | mg/L | **52** | ---- | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| **Acidity as CaCO3** | ---- | 1 | mg/L | **1** | ---- | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| **Sulfate as SO4 2-** | 14808-79-8 | 1 | mg/L | **614** | ---- | ---- | ---- | ---- |
| **Silicon as SiO2** | 14464-46-1 | 0.1 | mg/L | **6.7** | ---- | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| **Sulfate as SO4 - Turbidimetric** | 14808-79-8 | 1 | mg/L | **473** | ---- | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| **Chloride** | 16887-00-6 | 1 | mg/L | **90** | ---- | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| **Calcium** | 7440-70-2 | 1 | mg/L | **82** | ---- | ---- | ---- | ---- |
| **Magnesium** | 7439-95-4 | 1 | mg/L | **14** | ---- | ---- | ---- | ---- |
| **Sodium** | 7440-23-5 | 1 | mg/L | **174** | ---- | ---- | ---- | ---- |
| **Potassium** | 7440-09-7 | 1 | mg/L | **40** | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| **Aluminium** | 7429-90-5 | 0.01 | mg/L | **0.06** | ---- | ---- | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.093** | ---- | ---- | ---- | ---- |
| **Arsenic** | 7440-38-2 | 0.001 | mg/L | **0.035** | ---- | ---- | ---- | ---- |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0003** | ---- | ---- | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **1.66** | ---- | ---- | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | **0.006** | ---- | ---- | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.011** | ---- | ---- | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: LIQUID (Matrix: WATER) | | | | Client sample ID | Mt Rawdon Waste Rock (High PAF) + Tailings Leachate | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [30-Aug-2016] | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1621323-006 | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | | **0.014** | ---- | ---- | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.082** | ---- | ---- | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.036** | ---- | ---- | ---- | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | ---- | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.08** | ---- | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | ---- | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.3** | ---- | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **13.4** | ---- | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **13.8** | ---- | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **1.50** | ---- | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1623451** | Page | : 1 of 6 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 201417 Mt Rawdon Waste Rock Project | Date Samples Received | : 28-Sep-2016 13:40 |
| Order number | : ---- | Date Analysis Commenced | : 29-Sep-2016 |
| C-O-C number | : ---- | Issue Date | : 05-Oct-2016 09:32 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : ---- | | |
| No. of samples received | : 6 | | |
| No. of samples analysed | : 6 | | |

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Accredited for compliance with ISO/IEC 17025 - Testing

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- Analytical Results

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|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

## Analytical Results

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

| | | | | Client sample ID | Mt Rawdon Waste Rock (NAF) | Mt Rawdon Waste Rock (Moderate PAF) | Mt Rawdon Waste Rock (High PAF) | Mt Rawdon Tailings | Mt Rawdon Waste Rock (High PAF + Tailings) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [27-Sep-2016] | [27-Sep-2016] | [27-Sep-2016] | [27-Sep-2016] | [27-Sep-2016] |
| Compound | CAS Number | LOR | Unit | | EB1623451-001 | EB1623451-002 | EB1623451-003 | EB1623451-004 | EB1623451-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | | 7.38 | 6.81 | 6.86 | 7.06 | 6.68 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | | 318 | 815 | 312 | 1520 | 1110 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | | 43 | 28 | 27 | 42 | 26 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | | 43 | 28 | 27 | 42 | 26 |
| **ED038A: Acidity** | | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | | <1 | 2 | 1 | 4 | 3 |
| **ED040F: Dissolved Major Anions** | | | | | | | | | |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | | 11.1 | 11.0 | 6.0 | 8.9 | 6.9 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | | 110 | 389 | 128 | 469 | 461 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | | 4 | 4 | 2 | 126 | 52 |
| **ED093F: Dissolved Major Cations** | | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | | 20 | 111 | 38 | 56 | 97 |
| Magnesium | 7439-95-4 | 1 | mg/L | | 6 | 17 | 6 | 6 | 18 |
| Sodium | 7440-23-5 | 1 | mg/L | | 32 | 24 | 12 | 172 | 94 |
| Potassium | 7440-09-7 | 1 | mg/L | | 3 | 11 | 2 | 43 | 21 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | | 0.06 | 0.02 | 0.05 | 0.05 | 0.02 |
| Antimony | 7440-36-0 | 0.001 | mg/L | | 0.167 | 0.101 | 0.051 | 0.169 | 0.059 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | | 0.002 | 0.008 | <0.001 | 0.014 | 0.005 |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | 0.0001 | 0.0004 | 0.0015 |
| Chromium | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | | 0.001 | 0.001 | 0.004 | 0.005 | 0.012 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | 0.004 | 0.004 |
| Nickel | 7440-02-0 | 0.001 | mg/L | | 0.001 | 0.003 | <0.001 | 0.003 | 0.006 |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | 0.002 | <0.001 | <0.001 |
| Zinc | 7440-66-6 | 0.005 | mg/L | | <0.005 | 0.005 | <0.005 | 0.014 | 0.037 |

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID: Mt Rawdon Waste Rock (NAF) | Mt Rawdon Waste Rock (Moderate PAF) | Mt Rawdon Waste Rock (High PAF) | Mt Rawdon Tailings | Mt Rawdon Waste Rock (High PAF + Tailings) |
|---|---|---|---|---|---|---|---|---|
| Client sampling date / time | | | | [27-Sep-2016] | [27-Sep-2016] | [27-Sep-2016] | [27-Sep-2016] | [27-Sep-2016] |
| | | | | **EB1623451-001** | **EB1623451-002** | **EB1623451-003** | **EB1623451-004** | **EB1623451-005** |
| | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.026** | **0.487** | **0.143** | **0.073** | **0.592** |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.010** | **0.026** | **0.002** | **0.018** | **0.007** |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Boron** | 7440-42-8 | 0.05 | mg/L | **0.19** | **0.12** | **0.20** | **0.20** | **0.07** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.4** | **0.3** | **0.2** | **0.1** | **0.2** |
| **EN055: Ionic Balance** | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | **3.26** | **8.77** | **3.26** | **14.2** | **11.6** |
| **Total Cations** | ---- | 0.01 | meq/L | **2.96** | **8.26** | **2.96** | **11.9** | **10.9** |
| **Ionic Balance** | ---- | 0.01 | % | **4.86** | **2.94** | **4.76** | **8.80** | **2.81** |

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | Mt Rawdon Waste Rock (High PAF + Tailings) | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [27-Sep-2016] | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1623451-006 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **6.62** | ---- | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **1340** | ---- | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **60** | ---- | ---- | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **60** | ---- | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **5** | ---- | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | **2.8** | ---- | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **594** | ---- | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **34** | ---- | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **90** | ---- | ---- | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **19** | ---- | ---- | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **140** | ---- | ---- | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **27** | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.02** | ---- | ---- | ---- | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.011** | ---- | ---- | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.003** | ---- | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0014** | ---- | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.008** | ---- | ---- | ---- | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | **0.002** | ---- | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **0.032** | ---- | ---- | ---- | ---- |

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID: Mt Rawdon Waste Rock (High PAF + Tailings) | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [27-Sep-2016] | ---- | ---- | ---- | ---- |
| | | | | **EB1623451-006** | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.607** | ---- | ---- | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.003** | ---- | ---- | ---- | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | ---- | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | <0.05 | ---- | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | ---- | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.2** | ---- | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | **14.5** | ---- | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | **12.8** | ---- | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | **6.18** | ---- | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1626138** | Page | : 1 of 6 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61 7 3243 7222 |
| Project | : 201417 Mt Rawdon Waste Rock Project | Date Samples Received | : 02-Nov-2016 14:10 |
| Order number | : ---- | Date Analysis Commenced | : 02-Nov-2016 |
| C-O-C number | : ---- | Issue Date | : 15-Nov-2016 14:25 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : ---- | | |
| No. of samples received | : 6 | | |
| No. of samples analysed | : 6 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID: Mt Rawdon Waste Rock (NAF) | Mt Rawdon Waste Rock (Moderate PAF) | Mt Rawdon Waste Rock (High PAF) | Mt Rawdon Tailings | Mt Rawdon Waste Rock (High PAF) + Tailings |
|---|---|---|---|---|---|---|---|---|
| Client sampling date / time | | | | [02-Nov-2016] | [02-Nov-2016] | [02-Nov-2016] | [02-Nov-2016] | [02-Nov-2016] |
| | | | | EB1626138-001 | EB1626138-002 | EB1626138-003 | EB1626138-004 | EB1626138-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 8.04 | 7.52 | 7.54 | 8.16 | 7.15 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 423 | 853 | 516 | 535 | 550 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 34 | 32 | 30 | 34 | 28 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 34 | 32 | 30 | 34 | 28 |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 10 | 14 | 6 | 1 | 3 |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | 10.3 | 11.4 | 12.6 | 2.5 | 6.4 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 144 | 419 | 220 | 183 | 218 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | 3 | 2 | 1 | 24 | 7 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 30 | 136 | 66 | 19 | 48 |
| Magnesium | 7439-95-4 | 1 | mg/L | 8 | 15 | 12 | 2 | 6 |
| Sodium | 7440-23-5 | 1 | mg/L | 34 | 19 | 17 | 83 | 38 |
| Potassium | 7440-09-7 | 1 | mg/L | 3 | 7 | 4 | 13 | 10 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | 0.04 | 0.02 | 0.01 | 0.12 | 0.03 |
| Antimony | 7440-36-0 | 0.001 | mg/L | 0.079 | 0.046 | 0.075 | 0.008 | 0.018 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | 0.002 | 0.010 | <0.001 | 0.006 | 0.004 |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0007 | 0.0002 | 0.0008 |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | 0.001 | 0.001 | 0.002 | <0.001 | 0.003 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | 0.002 | <0.001 | <0.001 | <0.001 |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.004 | <0.001 | 0.001 |
| Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | 0.007 | 0.016 | <0.005 | 0.022 |

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID | Mt Rawdon Waste Rock (NAF) | Mt Rawdon Waste Rock (Moderate PAF) | Mt Rawdon Waste Rock (High PAF) | Mt Rawdon Tailings | Mt Rawdon Waste Rock (High PAF) + Tailings |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [02-Nov-2016] | [02-Nov-2016] | [02-Nov-2016] | [02-Nov-2016] | [02-Nov-2016] |
| | | | | | EB1626138-001 | EB1626138-002 | EB1626138-003 | EB1626138-004 | EB1626138-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.040** | **0.179** | **0.262** | **0.043** | **0.386** |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.010** | **0.025** | **0.004** | **0.002** | **0.003** |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.21** | **0.15** | **0.16** | **0.07** | **0.06** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.4** | **0.3** | **0.3** | <0.1 | **0.3** |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **3.76** | **9.42** | **5.21** | **5.17** | **5.30** |
| **Total Cations** | ---- | 0.01 | meq/L | | **3.71** | **9.03** | **5.12** | **5.06** | **4.80** |
| **Ionic Balance** | ---- | 0.01 | % | | **0.68** | **2.13** | **0.82** | **1.08** | **4.93** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | Mt Rawdon Waste Rock (High PAF) + Tailings | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [02-Nov-2016] | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1626138-006 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.52** | ---- | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2240** | ---- | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **32** | ---- | ---- | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **32** | ---- | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **3** | ---- | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | **8.6** | ---- | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1130** | ---- | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **47** | ---- | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **187** | ---- | ---- | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **32** | ---- | ---- | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **232** | ---- | ---- | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **44** | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.02** | ---- | ---- | ---- | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.032** | ---- | ---- | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.003** | ---- | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0033** | ---- | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.002** | ---- | ---- | ---- | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | **0.002** | ---- | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | **0.001** | ---- | ---- | ---- | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | **0.001** | ---- | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **0.082** | ---- | ---- | ---- | ---- |

## Analytical Results

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

| | | | | Client sample ID | Mt Rawdon Waste Rock (High PAF) + Tailings | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [02-Nov-2016] | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1626138-006 | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **1.30** | ---- | ---- | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.006** | ---- | ---- | ---- | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | ---- | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.14** | ---- | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | ---- | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.3** | ---- | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **25.5** | ---- | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **23.2** | ---- | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **4.75** | ---- | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1628241** | Page | : 1 of 6 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 29-Nov-2016 15:45 |
| Order number | : ---- | Date Analysis Commenced | : 30-Nov-2016 |
| C-O-C number | : ---- | Issue Date | : 12-Dec-2016 14:35 |
| Sampler | : MINGRUI YUAN | | |
| Site | : ---- | | |
| Quote number | : BNBQ/218/16 | | |
| No. of samples received | : 6 | | |
| No. of samples analysed | : 6 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Andrew Epps | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID | Mt Rawdon Waste Rock (NAF) | Mt Rawdon Waste Rock (Moderate PAF) | Mt Rawdon Waste Rock (High PAF) | Mt Rawdon Tailings | Mt Rawdon Waste Rock (High PAF) + Tailings |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 29-Nov-2016 00:00 | 29-Nov-2016 00:00 | 29-Nov-2016 00:00 | 29-Nov-2016 00:00 | 29-Nov-2016 00:00 |
| | | | | | EB1628241-001 | EB1628241-002 | EB1628241-003 | EB1628241-004 | EB1628241-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | | |
| **pH Value** | ---- | 0.01 | pH Unit | | **7.52** | **7.43** | **7.44** | **7.49** | **7.20** |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | | **441** | **1060** | **471** | **5220** | **492** |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | | |
| **Hydroxide Alkalinity as CaCO3** | DMO-210-001 | 1 | mg/L | | <1 | <1 | <1 | <1 | <1 |
| **Carbonate Alkalinity as CaCO3** | 3812-32-6 | 1 | mg/L | | <1 | <1 | <1 | <1 | <1 |
| **Bicarbonate Alkalinity as CaCO3** | 71-52-3 | 1 | mg/L | | **34** | **26** | **22** | **70** | **25** |
| **Total Alkalinity as CaCO3** | ---- | 1 | mg/L | | **34** | **26** | **22** | **70** | **25** |
| **ED038A: Acidity** | | | | | | | | | |
| **Acidity as CaCO3** | ---- | 1 | mg/L | | **2** | **2** | **2** | **2** | **4** |
| **ED040F: Dissolved Major Anions** | | | | | | | | | |
| **Silicon as SiO2** | 14464-46-1 | 0.1 | mg/L | | **15.8** | **16.7** | **11.9** | **22.9** | **6.0** |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | | |
| **Sulfate as SO4 - Turbidimetric** | 14808-79-8 | 1 | mg/L | | **167** | **559** | **186** | **2840** | **194** |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | | |
| **Chloride** | 16887-00-6 | 1 | mg/L | | **2** | **2** | **1** | **185** | **7** |
| **ED093F: Dissolved Major Cations** | | | | | | | | | |
| **Calcium** | 7440-70-2 | 1 | mg/L | | **36** | **182** | **62** | **606** | **49** |
| **Magnesium** | 7439-95-4 | 1 | mg/L | | **10** | **18** | **11** | **58** | **6** |
| **Sodium** | 7440-23-5 | 1 | mg/L | | **33** | **18** | **12** | **556** | **25** |
| **Potassium** | 7440-09-7 | 1 | mg/L | | **3** | **8** | **3** | **178** | **12** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| **Aluminium** | 7429-90-5 | 0.01 | mg/L | | **0.06** | <0.01 | **0.01** | <0.01 | **0.02** |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | | **0.106** | **0.063** | **0.045** | **0.091** | **0.014** |
| **Arsenic** | 7440-38-2 | 0.001 | mg/L | | **0.003** | **0.015** | <0.001 | **0.013** | **0.004** |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | **0.0009** | **0.0207** | **0.0013** |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | **0.007** | **0.001** | **0.002** | **0.010** | **0.002** |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.014** | <0.001 |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | | <0.001 | **0.002** | <0.001 | **0.101** | <0.001 |
| **Lead** | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.005** | <0.001 | <0.001 |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.015** | **0.024** | **1.32** | **0.028** |

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID: Mt Rawdon Waste Rock (NAF) | Mt Rawdon Waste Rock (Moderate PAF) | Mt Rawdon Waste Rock (High PAF) | Mt Rawdon Tailings | Mt Rawdon Waste Rock (High PAF) + Tailings |
|---|---|---|---|---|---|---|---|---|
| *Client sampling date / time* | | | | 29-Nov-2016 00:00 | 29-Nov-2016 00:00 | 29-Nov-2016 00:00 | 29-Nov-2016 00:00 | 29-Nov-2016 00:00 |
| | | | | **EB1628241-001** | **EB1628241-002** | **EB1628241-003** | **EB1628241-004** | **EB1628241-005** |
| | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.024** | **0.069** | **0.165** | **6.17** | **0.421** |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.010** | **0.041** | **0.005** | **0.042** | **0.004** |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Boron** | 7440-42-8 | 0.05 | mg/L | **0.35** | **0.30** | **0.16** | **0.56** | **0.10** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.4** | **0.4** | **0.3** | **0.3** | **0.2** |

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID: Mt Rawdon Waste Rock (High PAF) + Tailings | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 29-Nov-2016 00:00 | ---- | ---- | ---- | ---- |
| | | | | EB1628241-006 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| **pH Value** | ---- | 0.01 | pH Unit | **7.41** | ---- | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | **1800** | ---- | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| **Hydroxide Alkalinity as CaCO3** | DMO-210-001 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| **Carbonate Alkalinity as CaCO3** | 3812-32-6 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| **Bicarbonate Alkalinity as CaCO3** | 71-52-3 | 1 | mg/L | **27** | ---- | ---- | ---- | ---- |
| **Total Alkalinity as CaCO3** | ---- | 1 | mg/L | **27** | ---- | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| **Acidity as CaCO3** | ---- | 1 | mg/L | **3** | ---- | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| **Silicon as SiO2** | 14464-46-1 | 0.1 | mg/L | **6.4** | ---- | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| **Sulfate as SO4 - Turbidimetric** | 14808-79-8 | 1 | mg/L | **855** | ---- | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| **Chloride** | 16887-00-6 | 1 | mg/L | **32** | ---- | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| **Calcium** | 7440-70-2 | 1 | mg/L | **136** | ---- | ---- | ---- | ---- |
| **Magnesium** | 7439-95-4 | 1 | mg/L | **29** | ---- | ---- | ---- | ---- |
| **Sodium** | 7440-23-5 | 1 | mg/L | **172** | ---- | ---- | ---- | ---- |
| **Potassium** | 7440-09-7 | 1 | mg/L | **37** | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| **Aluminium** | 7429-90-5 | 0.01 | mg/L | **0.01** | ---- | ---- | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.011** | ---- | ---- | ---- | ---- |
| **Arsenic** | 7440-38-2 | 0.001 | mg/L | **0.002** | ---- | ---- | ---- | ---- |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0049** | ---- | ---- | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **0.004** | ---- | ---- | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | **0.001** | ---- | ---- | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.108** | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | Mt Rawdon Waste Rock (High PAF) + Tailings | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 29-Nov-2016 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1628241-006 | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **1.21** | ---- | ---- | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.009** | ---- | ---- | ---- | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | ---- | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.14** | ---- | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | ---- | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | ---- | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1703876** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 28-Feb-2017 16:40 |
| Order number | : ---- | Date Analysis Commenced | : 02-Mar-2017 |
| C-O-C number | : ---- | Issue Date | : 07-Mar-2017 21:12 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : BNBQ/218/16 | | |
| No. of samples received | : 5 | | |
| No. of samples analysed | : 5 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 5 | KLC 6 |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 28-Feb-2017 00:00 | 28-Feb-2017 00:00 | 28-Feb-2017 00:00 | 28-Feb-2017 00:00 | 28-Feb-2017 00:00 |
| Compound | CAS Number | LOR | Unit | EB1703876-001 | EB1703876-002 | EB1703876-003 | EB1703876-004 | EB1703876-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.22 | 7.13 | 7.15 | 7.34 | 7.25 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 398 | 1030 | 522 | 701 | 1600 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 26 | 21 | 20 | 24 | 21 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 26 | 21 | 20 | 24 | 21 |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 1 | 2 | 2 | 4 | 1 |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon | 7440-21-3 | 0.05 | mg/L | 6.27 | 7.88 | 5.12 | 3.32 | 2.69 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 152 | 547 | 228 | 303 | 745 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | <1 | 3 | 31 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 35 | 192 | 82 | 91 | 141 |
| Magnesium | 7439-95-4 | 1 | mg/L | 10 | 16 | 11 | 12 | 34 |
| Sodium | 7440-23-5 | 1 | mg/L | 30 | 23 | 11 | 36 | 170 |
| Potassium | 7440-09-7 | 1 | mg/L | 3 | 7 | 4 | 14 | 40 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | 0.02 | 0.01 | 0.01 | 0.02 | 0.01 |
| Antimony | 7440-36-0 | 0.001 | mg/L | 0.050 | 0.099 | 0.053 | 0.013 | 0.018 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | 0.002 | 0.021 | <0.001 | 0.006 | 0.003 |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | 0.0001 | 0.0012 | 0.0022 | 0.0065 |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | 0.002 | 0.005 | 0.004 | 0.010 | 0.010 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 |
| Nickel | 7440-02-0 | 0.001 | mg/L | 0.005 | 0.001 | <0.001 | <0.001 | 0.004 |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.002 | <0.001 | 0.001 |
| Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | 0.017 | 0.036 | 0.030 | 0.076 |
| Manganese | 7439-96-5 | 0.001 | mg/L | 0.019 | 0.014 | 0.093 | 0.487 | 0.607 |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | 0.012 | 0.053 | 0.011 | 0.005 | 0.009 |

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 5 | KLC 6 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 28-Feb-2017 00:00 | 28-Feb-2017 00:00 | 28-Feb-2017 00:00 | 28-Feb-2017 00:00 | 28-Feb-2017 00:00 |
| Compound | CAS Number | LOR | Unit | | EB1703876-001 | EB1703876-002 | EB1703876-003 | EB1703876-004 | EB1703876-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.44** | **0.81** | **0.27** | **0.15** | **0.11** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.4** | **0.4** | **0.3** | **0.3** | **0.3** |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1704234** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 03-Mar-2017 14:25 |
| Order number | : ---- | Date Analysis Commenced | : 07-Mar-2017 |
| C-O-C number | : ---- | Issue Date | : 13-Mar-2017 16:56 |
| Sampler | : Mary MacElroy | | |
| Site | : ---- | | |
| Quote number | : BNBQ/218/16 | | |
| No. of samples received | : 1 | | |
| No. of samples analysed | : 1 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | KCL 4 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [03-Mar-2017] | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1704234-001 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| **pH Value** | ---- | 0.01 | pH Unit | **6.70** | ---- | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | **4830** | ---- | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| **Hydroxide Alkalinity as CaCO3** | DMO-210-001 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| **Carbonate Alkalinity as CaCO3** | 3812-32-6 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| **Bicarbonate Alkalinity as CaCO3** | 71-52-3 | 1 | mg/L | **28** | ---- | ---- | ---- | ---- |
| **Total Alkalinity as CaCO3** | ---- | 1 | mg/L | **28** | ---- | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| **Acidity as CaCO3** | ---- | 1 | mg/L | **2** | ---- | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| **Silicon** | 7440-21-3 | 0.05 | mg/L | **9.54** | ---- | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| **Sulfate as SO4 - Turbidimetric** | 14808-79-8 | 1 | mg/L | **2750** | ---- | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| **Chloride** | 16887-00-6 | 1 | mg/L | **117** | ---- | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| **Calcium** | 7440-70-2 | 1 | mg/L | **479** | ---- | ---- | ---- | ---- |
| **Magnesium** | 7439-95-4 | 1 | mg/L | **62** | ---- | ---- | ---- | ---- |
| **Sodium** | 7440-23-5 | 1 | mg/L | **558** | ---- | ---- | ---- | ---- |
| **Potassium** | 7440-09-7 | 1 | mg/L | **198** | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| **Aluminium** | 7429-90-5 | 0.01 | mg/L | <0.01 | ---- | ---- | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.057** | ---- | ---- | ---- | ---- |
| **Arsenic** | 7440-38-2 | 0.001 | mg/L | **0.022** | ---- | ---- | ---- | ---- |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0104** | ---- | ---- | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **0.014** | ---- | ---- | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | **0.013** | ---- | ---- | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.168** | ---- | ---- | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.352** | ---- | ---- | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **1.80** | ---- | ---- | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.097** | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | KCL 4 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [03-Mar-2017] | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1704234-001 | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | ---- | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.40** | ---- | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | ---- | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.4** | ---- | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **61.1** | ---- | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **58.3** | ---- | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **2.32** | ---- | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1711556** | Page | : 1 of 6 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 06-Jun-2017 15:40 |
| Order number | : ---- | Date Analysis Commenced | : 09-Jun-2017 |
| C-O-C number | : ---- | Issue Date | : 13-Jun-2017 17:00 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : BNBQ/218/16 | | |
| No. of samples received | : 6 | | |
| No. of samples analysed | : 6 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Greg Vogel | Laboratory Manager | Brisbane Inorganics, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- Ionic Balance out of acceptable limits due to analytes not quantified in this report.

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 4 | KLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [30-May-2017] | [30-May-2017] | [30-May-2017] | [06-Jun-2017] | [30-May-2017] |
| Compound | CAS Number | LOR | Unit | EB1711556-001 | EB1711556-002 | EB1711556-003 | EB1711556-004 | EB1711556-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.55** | **7.21** | **7.27** | **7.25** | **7.22** |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **398** | **1480** | **741** | **3850** | **1180** |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **42** | **29** | **46** | **41** | **29** |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **42** | **29** | **46** | **41** | **29** |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **1** | **1** | **1** | **2** | **1** |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon | 7440-21-3 | 0.05 | mg/L | **12.0** | **9.97** | **6.53** | **9.08** | **5.90** |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **140** | **832** | **338** | **2230** | **555** |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | <1 | **45** | **2** |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **20** | **196** | **62** | **473** | **59** |
| Magnesium | 7439-95-4 | 1 | mg/L | **5** | **15** | **8** | **56** | **6** |
| Sodium | 7440-23-5 | 1 | mg/L | **18** | **17** | **6** | **299** | **34** |
| Potassium | 7440-09-7 | 1 | mg/L | **1** | **6** | **2** | **128** | **7** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.047** | **0.062** | **0.027** | **0.068** | **0.014** |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.002** | **0.018** | <0.001 | **0.005** | **0.002** |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | **0.0002** | **0.0010** | **0.0091** | **0.0018** |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.001** | **0.002** | **0.002** | **0.011** | **0.002** |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **0.005** | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | **0.005** | **0.002** | **0.001** | **0.054** | **0.002** |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | **0.001** | **0.001** | <0.001 |
| Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | **0.034** | **0.041** | **0.367** | **0.033** |
| Manganese | 7439-96-5 | 0.001 | mg/L | **0.005** | **0.002** | **0.024** | **1.61** | **0.383** |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | **0.007** | **0.038** | **0.004** | **0.064** | **0.004** |

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 4 | KLC 5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [30-May-2017] | [30-May-2017] | [30-May-2017] | [06-Jun-2017] | [30-May-2017] |
| Compound | CAS Number | LOR | Unit | | EB1711556-001 | EB1711556-002 | EB1711556-003 | EB1711556-004 | EB1711556-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.31** | **0.50** | **0.16** | **0.34** | **0.09** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.6** | **0.6** | **0.4** | **0.6** | **0.4** |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **3.75** | **17.9** | **7.96** | **48.5** | **12.2** |
| **Total Cations** | ---- | 0.01 | meq/L | | **2.22** | **11.9** | **4.06** | **44.5** | **5.10** |
| **Ionic Balance** | ---- | 0.01 | % | | **25.7** | **20.1** | **32.4** | **4.33** | **41.0** |

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | KLC 6 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [06-Jun-2017] | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1711556-006 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| **pH Value** | ---- | 0.01 | pH Unit | **7.06** | ---- | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | **2010** | ---- | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| **Hydroxide Alkalinity as CaCO3** | DMO-210-001 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| **Carbonate Alkalinity as CaCO3** | 3812-32-6 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| **Bicarbonate Alkalinity as CaCO3** | 71-52-3 | 1 | mg/L | **30** | ---- | ---- | ---- | ---- |
| **Total Alkalinity as CaCO3** | ---- | 1 | mg/L | **30** | ---- | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| **Acidity as CaCO3** | ---- | 1 | mg/L | **1** | ---- | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| **Silicon** | 7440-21-3 | 0.05 | mg/L | **4.83** | ---- | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| **Sulfate as SO4 - Turbidimetric** | 14808-79-8 | 1 | mg/L | **994** | ---- | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| **Chloride** | 16887-00-6 | 1 | mg/L | **16** | ---- | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| **Calcium** | 7440-70-2 | 1 | mg/L | **210** | ---- | ---- | ---- | ---- |
| **Magnesium** | 7439-95-4 | 1 | mg/L | **35** | ---- | ---- | ---- | ---- |
| **Sodium** | 7440-23-5 | 1 | mg/L | **168** | ---- | ---- | ---- | ---- |
| **Potassium** | 7440-09-7 | 1 | mg/L | **38** | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| **Aluminium** | 7429-90-5 | 0.01 | mg/L | <0.01 | ---- | ---- | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.031** | ---- | ---- | ---- | ---- |
| **Arsenic** | 7440-38-2 | 0.001 | mg/L | **0.003** | ---- | ---- | ---- | ---- |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0108** | ---- | ---- | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **0.010** | ---- | ---- | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.014** | ---- | ---- | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | **0.001** | ---- | ---- | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.388** | ---- | ---- | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.160** | ---- | ---- | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.010** | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: **LEACHATE** (Matrix: **WATER**) | | | | Client sample ID | **KLC 6** | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [06-Jun-2017] | ---- | ---- | ---- | ---- |
| *Compound* | *CAS Number* | *LOR* | *Unit* | | **EB1711556-006** | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | ---- | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.18** | ---- | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | ---- | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.4** | ---- | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **21.7** | ---- | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **21.6** | ---- | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **0.25** | ---- | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1718207** | Page | : 1 of 6 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 05-Sep-2017 17:05 |
| Order number | : ---- | Date Analysis Commenced | : 06-Sep-2017 |
| C-O-C number | : ---- | Issue Date | : 13-Sep-2017 09:19 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : BNBQ/218/16 | | |
| No. of samples received | : 6 | | |
| No. of samples analysed | : 6 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 4 | KLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 29-Aug-2017 00:00 | 29-Aug-2017 00:00 | 29-Aug-2017 00:00 | 05-Sep-2017 00:00 | 29-Aug-2017 00:00 |
| Compound | CAS Number | LOR | Unit | EB1718207-001 | EB1718207-002 | EB1718207-003 | EB1718207-004 | EB1718207-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.40 | 7.15 | 7.07 | 7.38 | 7.43 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 239 | 690 | 284 | 2840 | 1090 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 33 | 26 | 15 | 38 | 27 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 33 | 26 | 15 | 38 | 27 |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 2 | 3 | 2 | 6 | 1 |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon | 7440-21-3 | 0.05 | mg/L | 3.97 | 4.98 | 2.39 | 9.03 | 1.38 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 81 | 323 | 116 | 1790 | 503 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | <1 | 9 | 2 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 24 | 133 | 46 | 512 | 81 |
| Magnesium | 7439-95-4 | 1 | mg/L | 5 | 8 | 4 | 34 | 21 |
| Sodium | 7440-23-5 | 1 | mg/L | 15 | 11 | 5 | 119 | 129 |
| Potassium | 7440-09-7 | 1 | mg/L | 1 | 4 | 2 | 82 | 20 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Antimony | 7440-36-0 | 0.001 | mg/L | 0.013 | 0.018 | 0.013 | 0.031 | 0.003 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | 0.006 | <0.001 | 0.005 | 0.001 |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0006 | 0.0115 | 0.0018 |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | <0.001 | 0.005 | 0.007 | 0.002 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | 0.003 | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | 0.019 | <0.001 |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | 0.010 | 0.027 | 0.339 | 0.021 |
| Manganese | 7439-96-5 | 0.001 | mg/L | 0.014 | 0.012 | 0.055 | 1.53 | 0.271 |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | 0.003 | 0.013 | 0.001 | 0.077 | 0.003 |

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 4 | KLC 5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 29-Aug-2017 00:00 | 29-Aug-2017 00:00 | 29-Aug-2017 00:00 | 05-Sep-2017 00:00 | 29-Aug-2017 00:00 |
| Compound | CAS Number | LOR | Unit | | EB1718207-001 | EB1718207-002 | EB1718207-003 | EB1718207-004 | EB1718207-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.12** | **0.18** | **0.07** | **0.21** | <0.05 |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.3** | **0.3** | **0.1** | **0.4** | **0.2** |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **2.34** | **7.24** | **2.71** | **38.3** | **11.1** |
| **Total Cations** | ---- | 0.01 | meq/L | | **2.29** | **7.88** | **2.89** | **35.6** | **11.9** |
| **Ionic Balance** | ---- | 0.01 | % | | **----** | **4.18** | **3.18** | **3.60** | **3.59** |

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | KLC 6 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 29-Aug-2017 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1718207-006 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.40** | ---- | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2120** | ---- | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **30** | ---- | ---- | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **30** | ---- | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **2** | ---- | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon | 7440-21-3 | 0.05 | mg/L | **2.64** | ---- | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1010** | ---- | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **24** | ---- | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **208** | ---- | ---- | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **48** | ---- | ---- | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **246** | ---- | ---- | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **52** | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | ---- | ---- | ---- | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.004** | ---- | ---- | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0054** | ---- | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.003** | ---- | ---- | ---- | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | **0.001** | ---- | ---- | ---- | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **0.123** | ---- | ---- | ---- | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | **0.051** | ---- | ---- | ---- | ---- |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | **0.003** | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: **LEACHATE** (Matrix: **WATER**) | | | | Client sample ID | **KLC 6** | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 29-Aug-2017 00:00 | ---- | ---- | ---- | ---- |
| *Compound* | *CAS Number* | *LOR* | *Unit* | | **EB1718207-006** | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | ---- | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.05** | ---- | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | ---- | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.4** | ---- | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **22.3** | ---- | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **26.4** | ---- | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **8.33** | ---- | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1725119** | Page | : 1 of 4 |
| **Amendment** | : **1** | | |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 28-Nov-2017 16:45 |
| Order number | : ---- | Date Analysis Commenced | : 29-Nov-2017 |
| C-O-C number | : ---- | Issue Date | : 09-Apr-2018 13:19 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : EN/222/17 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 5 | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 28-Nov-2017 00:00 | 28-Nov-2017 00:00 | 28-Nov-2017 00:00 | 28-Nov-2017 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | EB1725119-001 | EB1725119-002 | EB1725119-003 | EB1725119-004 | -------- |
| | | | | Result | Result | Result | Result | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.75** | **7.44** | **7.34** | **7.65** | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **267** | **842** | **294** | **604** | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **32** | **22** | **16** | **17** | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **32** | **22** | **16** | **17** | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **1** | **3** | **2** | **1** | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | **13.2** | **18.9** | **7.0** | **4.3** | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **93** | **405** | **120** | **250** | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **1** | <1 | <1 | <1 | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **23** | **150** | **43** | **58** | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **5** | **10** | **4** | **10** | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **19** | **16** | **6** | **34** | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **2** | **4** | **2** | **12** | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.04** | **0.02** | **0.02** | **0.02** | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.040** | **0.092** | **0.032** | **0.008** | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.002** | **0.017** | <0.001 | **0.003** | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | **0.0002** | **0.0009** | **0.0019** | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.004** | **0.003** | **0.003** | **0.004** | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | **0.002** | **0.001** | <0.001 | <0.001 | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | **0.002** | <0.001 | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | **0.019** | **0.030** | **0.024** | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | **0.033** | **0.024** | **0.087** | **0.217** | ---- |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | **0.011** | **0.035** | **0.003** | **0.005** | ---- |

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 5 | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 28-Nov-2017 00:00 | 28-Nov-2017 00:00 | 28-Nov-2017 00:00 | 28-Nov-2017 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | EB1725119-001 | EB1725119-002 | EB1725119-003 | EB1725119-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.39** | **0.70** | **0.20** | **0.14** | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.3** | **0.4** | **0.1** | **0.1** | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **2.60** | **8.87** | **2.82** | **5.54** | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **2.44** | **9.11** | **2.79** | **5.50** | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **----** | **1.30** | **----** | **0.38** | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1725503** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 01-Dec-2017 15:20 |
| Order number | : ---- | Date Analysis Commenced | : 04-Dec-2017 |
| C-O-C number | : ---- | Issue Date | : 11-Dec-2017 15:27 |
| Sampler | : MARY MACELROY | | |
| Site | : ---- | | |
| Quote number | : EN/222/17 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | KLC 4 | KLC 6 | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 01-Dec-2017 00:00 | 01-Dec-2017 00:00 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1725503-001 | EB1725503-002 | -------- | -------- | -------- |
| | | | | Result | Result | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **6.65** | **6.96** | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2700** | **1940** | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | ---- | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | ---- | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **40** | **37** | ---- | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **40** | **37** | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **4** | **3** | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | **21.5** | **11.5** | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1350** | **931** | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **3** | **18** | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **535** | **236** | ---- | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **29** | **35** | ---- | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **74** | **130** | ---- | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **76** | **45** | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | ---- | ---- | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.044** | **0.034** | ---- | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.008** | **0.004** | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0155** | **0.0097** | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | ---- | ---- | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.004** | **0.002** | ---- | ---- | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | **0.003** | <0.001 | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | **0.016** | **0.015** | ---- | ---- | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **0.516** | **0.345** | ---- | ---- | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | **1.92** | **0.057** | ---- | ---- | ---- |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | **0.105** | **0.014** | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | KLC 4 | KLC 6 | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 01-Dec-2017 00:00 | 01-Dec-2017 00:00 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1725503-001 | EB1725503-002 | -------- | -------- | -------- |
| | | | | | Result | Result | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.25** | **0.25** | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.3** | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **29.0** | **20.6** | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **34.2** | **21.5** | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **8.31** | **1.98** | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1808038** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 28-Mar-2018 13:30 |
| Order number | : | Date Analysis Commenced | : 29-Mar-2018 |
| C-O-C number | : ---- | Issue Date | : 06-Apr-2018 15:23 |
| Sampler | : MARY MACELROY | | |
| Site | : ---- | | |
| Quote number | : EN/222/17 | | |
| No. of samples received | : 5 | | |
| No. of samples analysed | : 5 | | |

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ISO/IEC 17025 - Testing

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Andrew Epps | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 5 | KLC 6 |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 28-Mar-2018 00:00 | 28-Mar-2018 00:00 | 28-Mar-2018 00:00 | 28-Mar-2018 00:00 | 28-Mar-2018 00:00 |
| Compound | CAS Number | LOR | Unit | EB1808038-001 | EB1808038-002 | EB1808038-003 | EB1808038-004 | EB1808038-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.33 | 7.19 | 7.28 | 7.47 | 7.48 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 237 | 822 | 309 | 893 | 1930 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 35 | 21 | 13 | 25 | 36 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 35 | 21 | 13 | 25 | 36 |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 2 | 3 | 2 | 2 | 3 |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | 14.0 | 17.7 | 6.4 | 11.0 | 17.1 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 80 | 406 | 124 | 428 | 958 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | <1 | <1 | 12 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 19 | 143 | 42 | 120 | 285 |
| Magnesium | 7439-95-4 | 1 | mg/L | 4 | 8 | 4 | 14 | 32 |
| Sodium | 7440-23-5 | 1 | mg/L | 21 | 18 | 7 | 41 | 110 |
| Potassium | 7440-09-7 | 1 | mg/L | 2 | 4 | 2 | 13 | 42 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | 0.06 | <0.01 | 0.01 | 0.01 | 0.02 |
| Antimony | 7440-36-0 | 0.001 | mg/L | 0.050 | 0.094 | 0.032 | 0.029 | 0.048 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | 0.002 | 0.016 | <0.001 | 0.004 | 0.005 |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | 0.0001 | 0.0010 | 0.0039 | 0.0117 |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | 0.001 | 0.001 | 0.002 | 0.005 | 0.006 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | 0.001 | <0.001 | <0.001 | <0.001 | 0.035 |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 |
| Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | 0.015 | 0.026 | 0.053 | 0.340 |
| Manganese | 7439-96-5 | 0.001 | mg/L | 0.025 | 0.016 | 0.113 | 0.246 | 0.035 |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | 0.007 | 0.031 | 0.001 | 0.006 | 0.018 |

## Analytical Results

| Sub-Matrix: **LEACHATE** (Matrix: **WATER**) | | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 5 | KLC 6 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 28-Mar-2018 00:00 | 28-Mar-2018 00:00 | 28-Mar-2018 00:00 | 28-Mar-2018 00:00 | 28-Mar-2018 00:00 |
| *Compound* | *CAS Number* | *LOR* | *Unit* | | **EB1808038-001** | **EB1808038-002** | **EB1808038-003** | **EB1808038-004** | **EB1808038-005** |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.58** | **0.85** | **0.24** | **0.33** | **0.51** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.4** | **0.4** | **0.1** | **0.2** | **0.4** |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1808901** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 10-Apr-2018 16:00 |
| Order number | : | Date Analysis Commenced | : 12-Apr-2018 |
| C-O-C number | : ---- | Issue Date | : 17-Apr-2018 12:19 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : EN/222/17 | | |
| No. of samples received | : 1 | | |
| No. of samples analysed | : 1 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Andrew Epps | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | KLC 4 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 10-Apr-2018 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1808901-001 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| **pH Value** | ---- | 0.01 | pH Unit | **7.58** | ---- | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | **2770** | ---- | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| **Hydroxide Alkalinity as CaCO3** | DMO-210-001 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| **Carbonate Alkalinity as CaCO3** | 3812-32-6 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| **Bicarbonate Alkalinity as CaCO3** | 71-52-3 | 1 | mg/L | **43** | ---- | ---- | ---- | ---- |
| **Total Alkalinity as CaCO3** | ---- | 1 | mg/L | **43** | ---- | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| **Acidity as CaCO3** | ---- | 1 | mg/L | **4** | ---- | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| **Silicon** | 7440-21-3 | 0.05 | mg/L | **13.0** | ---- | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| **Sulfate as SO4 - Turbidimetric** | 14808-79-8 | 1 | mg/L | **1950** | ---- | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| **Chloride** | 16887-00-6 | 1 | mg/L | **3** | ---- | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| **Calcium** | 7440-70-2 | 1 | mg/L | **619** | ---- | ---- | ---- | ---- |
| **Magnesium** | 7439-95-4 | 1 | mg/L | **31** | ---- | ---- | ---- | ---- |
| **Sodium** | 7440-23-5 | 1 | mg/L | **80** | ---- | ---- | ---- | ---- |
| **Potassium** | 7440-09-7 | 1 | mg/L | **87** | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| **Aluminium** | 7429-90-5 | 0.01 | mg/L | <0.01 | ---- | ---- | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.060** | ---- | ---- | ---- | ---- |
| **Arsenic** | 7440-38-2 | 0.001 | mg/L | **0.033** | ---- | ---- | ---- | ---- |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0130** | ---- | ---- | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **0.010** | ---- | ---- | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | **0.002** | ---- | ---- | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.006** | ---- | ---- | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.197** | ---- | ---- | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **1.31** | ---- | ---- | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.137** | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | KLC 4 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 10-Apr-2018 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1808901-001 | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | ---- | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.52** | ---- | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | ---- | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.5** | ---- | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **41.5** | ---- | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **39.1** | ---- | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **2.97** | ---- | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1813063** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 29-May-2018 16:15 |
| Order number | : | Date Analysis Commenced | : 30-May-2018 |
| C-O-C number | : ---- | Issue Date | : 04-Jun-2018 13:58 |
| Sampler | : MARY MACELROY | | |
| Site | : ---- | | |
| Quote number | : EN/222/17 | | |
| No. of samples received | : 5 | | |
| No. of samples analysed | : 5 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Greg Vogel | Laboratory Manager | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 5 | KLC 6 |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 29-May-2018 00:00 | 29-May-2018 00:00 | 29-May-2018 00:00 | 29-May-2018 00:00 | 29-May-2018 00:00 |
| Compound | CAS Number | LOR | Unit | EB1813063-001 | EB1813063-002 | EB1813063-003 | EB1813063-004 | EB1813063-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 6.97 | 6.73 | 6.71 | 6.85 | 6.89 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 294 | 598 | 422 | 625 | 1930 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 31 | 16 | 16 | 24 | 28 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 31 | 16 | 16 | 24 | 28 |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 1 | 2 | 2 | <1 | 2 |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon | 7440-21-3 | 0.05 | mg/L | 5.78 | 5.61 | 5.03 | 1.39 | 2.81 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 100 | 273 | 170 | 272 | 928 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | 1 | <1 | <1 | 2 | 21 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 24 | 102 | 55 | 59 | 193 |
| Magnesium | 7439-95-4 | 1 | mg/L | 7 | 6 | 6 | 13 | 44 |
| Sodium | 7440-23-5 | 1 | mg/L | 19 | 11 | 9 | 38 | 168 |
| Potassium | 7440-09-7 | 1 | mg/L | 2 | 2 | 2 | 10 | 52 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | 0.02 | <0.01 | <0.01 | 0.01 | <0.01 |
| Antimony | 7440-36-0 | 0.001 | mg/L | 0.064 | 0.070 | 0.071 | 0.007 | 0.013 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | 0.002 | 0.011 | <0.001 | 0.002 | 0.002 |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | 0.0001 | 0.0015 | 0.0030 | 0.0159 |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | 0.002 | 0.001 | 0.002 | 0.003 | 0.006 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | 0.003 |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 |
| Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | 0.016 | 0.067 | 0.040 | 0.421 |
| Manganese | 7439-96-5 | 0.001 | mg/L | 0.019 | 0.021 | 0.059 | 0.167 | 0.064 |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | 0.014 | 0.021 | 0.002 | 0.003 | 0.006 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 5 | KLC 6 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 29-May-2018 00:00 | 29-May-2018 00:00 | 29-May-2018 00:00 | 29-May-2018 00:00 | 29-May-2018 00:00 |
| Compound | CAS Number | LOR | Unit | | EB1813063-001 | EB1813063-002 | EB1813063-003 | EB1813063-004 | EB1813063-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.45** | **0.46** | **0.34** | **0.10** | **0.19** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.3** | **0.2** | <0.1 | <0.1 | <0.1 |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **2.73** | **6.00** | **3.86** | **6.20** | **20.5** |
| **Total Cations** | ---- | 0.01 | meq/L | | **2.65** | **6.11** | **3.68** | **5.92** | **21.9** |
| **Ionic Balance** | ---- | 0.01 | % | | **----** | **0.90** | **2.36** | **2.28** | **3.34** |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1813420** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 01-Jun-2018 16:10 |
| Order number | : 2016019 | Date Analysis Commenced | : 04-Jun-2018 |
| C-O-C number | : ---- | Issue Date | : 07-Jun-2018 09:17 |
| Sampler | : MARY MACELROY | | |
| Site | : ---- | | |
| Quote number | : EN/222/17 | | |
| No. of samples received | : 1 | | |
| No. of samples analysed | : 1 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | KLC 4 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 01-Jun-2018 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1813420-001 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.45** | ---- | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **35** | ---- | ---- | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **35** | ---- | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **2** | ---- | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon | 7440-21-3 | 0.05 | mg/L | **9.19** | ---- | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1440** | ---- | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **2** | ---- | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **467** | ---- | ---- | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **22** | ---- | ---- | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **44** | ---- | ---- | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **51** | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | ---- | ---- | ---- | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.027** | ---- | ---- | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.005** | ---- | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0246** | ---- | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.006** | ---- | ---- | ---- | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | **0.003** | ---- | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | **0.005** | ---- | ---- | ---- | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **0.595** | ---- | ---- | ---- | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | **2.17** | ---- | ---- | ---- | ---- |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | **0.095** | ---- | ---- | ---- | ---- |
| Selenium | 7782-49-2 | 0.01 | mg/L | <0.01 | ---- | ---- | ---- | ---- |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.24** | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | KLC 4 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 01-Jun-2018 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1813420-001 | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | ---- | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.4** | ---- | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **30.7** | ---- | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **28.3** | ---- | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **4.07** | ---- | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1820820** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 28-Aug-2018 16:15 |
| Order number | : | Date Analysis Commenced | : 28-Aug-2018 |
| C-O-C number | : ---- | Issue Date | : 03-Sep-2018 15:41 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 6 | | |
| No. of samples analysed | : 5 | | |

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 5 | KLC 6 |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 28-Aug-2018 00:00 | 28-Aug-2018 00:00 | 28-Aug-2018 00:00 | 28-Aug-2018 00:00 | 28-Aug-2018 00:00 |
| Compound | CAS Number | LOR | Unit | EB1820820-001 | EB1820820-002 | EB1820820-003 | EB1820820-005 | EB1820820-006 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.86 | 7.45 | 7.11 | 7.59 | 7.47 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 346 | 709 | 499 | 768 | 2060 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 45 | 42 | 15 | 21 | 30 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 45 | 42 | 15 | 21 | 30 |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | <1 | 2 | 2 | 1 | 2 |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon | 7440-21-3 | 0.05 | mg/L | 6.05 | 7.25 | 4.57 | 1.57 | 4.03 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 119 | 332 | 202 | 344 | 1040 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | 1 | <1 | <1 | 1 | 14 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 33 | 122 | 68 | 65 | 238 |
| Magnesium | 7439-95-4 | 1 | mg/L | 8 | 7 | 8 | 15 | 36 |
| Sodium | 7440-23-5 | 1 | mg/L | 19 | 12 | 8 | 51 | 141 |
| Potassium | 7440-09-7 | 1 | mg/L | 2 | 3 | 2 | 10 | 50 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Antimony | 7440-36-0 | 0.001 | mg/L | 0.032 | 0.077 | 0.052 | 0.007 | 0.018 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | 0.003 | 0.013 | <0.001 | 0.002 | 0.004 |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | 0.0001 | 0.0024 | 0.0033 | 0.0176 |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | <0.001 | 0.004 | 0.004 | 0.005 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | 0.008 |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | 0.026 | 0.127 | 0.049 | 0.486 |
| Manganese | 7439-96-5 | 0.001 | mg/L | 0.018 | 0.022 | 0.071 | 0.161 | 0.033 |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | 0.017 | 0.025 | 0.002 | 0.005 | 0.007 |

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 5 | KLC 6 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 28-Aug-2018 00:00 | 28-Aug-2018 00:00 | 28-Aug-2018 00:00 | 28-Aug-2018 00:00 | 28-Aug-2018 00:00 |
| | | | | | EB1820820-001 | EB1820820-002 | EB1820820-003 | EB1820820-005 | EB1820820-006 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.29** | **0.54** | **0.30** | **0.09** | **0.24** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.3** | **0.3** | **0.2** | **0.1** | **0.4** |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **3.40** | **7.75** | **4.50** | **7.61** | **22.6** |
| **Total Cations** | ---- | 0.01 | meq/L | | **3.18** | **7.26** | **4.45** | **6.95** | **22.2** |
| **Ionic Balance** | ---- | 0.01 | % | | **3.37** | **3.26** | **0.61** | **4.52** | **0.88** |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1821049** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2016019 Mt Rawdon Waste Rock Project | Date Samples Received | : 30-Aug-2018 14:15 |
| Order number | : | Date Analysis Commenced | : 31-Aug-2018 |
| C-O-C number | : ---- | Issue Date | : 05-Sep-2018 14:50 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 1 | | |
| No. of samples analysed | : 1 | | |

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

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- Analytical Results

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | KLC 4 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 30-Aug-2018 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1821049-001 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.17** | ---- | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2160** | ---- | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | ---- | ---- | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **64** | ---- | ---- | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **64** | ---- | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **3** | ---- | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon | 7440-21-3 | 0.05 | mg/L | **8.59** | ---- | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1330** | ---- | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **1** | ---- | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **528** | ---- | ---- | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **17** | ---- | ---- | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **25** | ---- | ---- | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **45** | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | ---- | ---- | ---- | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.026** | ---- | ---- | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.005** | ---- | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0318** | ---- | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.003** | ---- | ---- | ---- | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | **0.002** | ---- | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | **0.004** | ---- | ---- | ---- | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **0.752** | ---- | ---- | ---- | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | **2.46** | ---- | ---- | ---- | ---- |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | **0.054** | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | KLC 4 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 30-Aug-2018 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1821049-001 | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | ---- | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.18** | ---- | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | ---- | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.3** | ---- | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **29.0** | ---- | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **30.0** | ---- | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **1.67** | ---- | ---- | ---- | ---- |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1446978** | Page | : 1 of 2 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| E-mail | : alan@rgsenv.com | E-mail | : ALSEnviro.Brisbane@alsglobal.com |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Facsimile | : +61 07 3344 1222 | Facsimile | : +61-7-3243 7218 |
| Project | : Mt Rawdon | QC Level | : NEPM 2013 Schedule B(3) and ALS QCS3 requirement |
| Order number | : ---- | Date Samples Received | : 24-Nov-2014 15:00 |
| C-O-C number | : ---- | Date Analysis Commenced | : 26-Nov-2014 |
| Sampler | : SCOTT WALLACE (MT. RAWDON) | Issue Date | : 01-Dec-2014 17:50 |
| Site | : Mt Rawdon Gold Mine | | |
| | | No. of samples received | : 4 |
| Quote number | : ---- | No. of samples analysed | : 4 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Andrew Epps | Senior Inorganic Chemist | Brisbane Inorganics |
| Satishkumar Trivedi | 2 IC Acid Sulfate Soils Supervisor | Brisbane Acid Sulphate Soils |

## General Comments

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

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

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

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

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

- **ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.**

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Client sample ID | MR01 | MR02 | MR03 | MR04 | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 20-Nov-2014 11:00 | 20-Nov-2014 11:00 | 20-Nov-2014 11:00 | 20-Nov-2014 11:00 | ---- |
| Compound | CAS Number | LOR | Unit | EB1446978-001 | EB1446978-002 | EB1446978-003 | EB1446978-004 | -------- |
| | | | | Result | Result | Result | Result | Result |
| **EA002 : pH (Soils)** | | | | | | | | |
| **pH Value** | ---- | 0.1 | pH Unit | **8.2** | **8.6** | **8.6** | **8.3** | **----** |
| **EA010: Conductivity** | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | **2040** | **3330** | **1530** | **759** | **----** |
| **EA013: Acid Neutralising Capacity** | | | | | | | | |
| **ANC as H2SO4** | ---- | 0.5 | kg H2SO4 equiv./t | **47.5** | **43.3** | **28.0** | **27.5** | **----** |
| ^ **ANC as CaCO3** | ---- | 0.1 | % CaCO3 | **4.8** | **4.4** | **2.9** | **2.8** | **----** |
| **Fizz Rating** | ---- | 0 | Fizz Unit | **2** | **2** | **1** | **1** | **----** |
| **ED042T: Total Sulfur by LECO** | | | | | | | | |
| **Sulfur - Total as S (LECO)** | ---- | 0.01 | % | **1.14** | **1.15** | **1.07** | **1.16** | **----** |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1447772** | Page | : 1 of 3 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| E-mail | : alan@rgsenv.com | E-mail | : ALSEnviro.Brisbane@alsglobal.com |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Facsimile | : +61 07 3344 1222 | Facsimile | : +61-7-3243 7218 |
| Project | : 201417 | QC Level | : NEPM 2013 Schedule B(3) and ALS QCS3 requirement |
| Order number | : ---- | Date Samples Received | : 04-Dec-2014 23:51 |
| C-O-C number | : ---- | Date Analysis Commenced | : 08-Dec-2014 |
| Sampler | : SCOTT WALLACE (MT. RAWDON) | Issue Date | : 16-Dec-2014 18:26 |
| Site | : ---- | | |
| | | No. of samples received | : 4 |
| Quote number | : ---- | No. of samples analysed | : 4 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

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- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Andrew Epps | Senior Inorganic Chemist | Brisbane Inorganics |
| Satishkumar Trivedi | 2 IC Acid Sulfate Soils Supervisor | Brisbane Acid Sulphate Soils |

## General Comments

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

## Analytical Results

| Sub-Matrix: PULP (Matrix: SOIL) | | | Client sample ID | MR01 | MR02 | MR03 | MR04 | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [20-Nov-2014] | [20-Nov-2014] | [20-Nov-2014] | [20-Nov-2014] | ---- |
| Compound | CAS Number | LOR | Unit | EB1447772-001 | EB1447772-002 | EB1447772-003 | EB1447772-004 | -------- |
| | | | | Result | Result | Result | Result | Result |
| **EA011: Net Acid Generation** | | | | | | | | |
| pH (OX) | ---- | 0.1 | pH Unit | 9.5 | 8.9 | 9.2 | 9.1 | ---- |
| NAG (pH 4.5) | ---- | 0.1 | kg H2SO4/t | <0.1 | <0.1 | <0.1 | <0.1 | ---- |
| NAG (pH 7.0) | ---- | 0.1 | kg H2SO4/t | <0.1 | <0.1 | <0.1 | <0.1 | ---- |
| **EA026 : Chromium Reducible Sulfur** | | | | | | | | |
| Chromium Reducible Sulphur | ---- | 0.005 | % | 0.795 | 0.797 | 0.795 | 0.839 | ---- |
| **ED093T: Total Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 50 | mg/kg | 20800 | 19600 | 13000 | 12000 | ---- |
| Magnesium | 7439-95-4 | 50 | mg/kg | 6190 | 6140 | 3000 | 3020 | ---- |
| Sodium | 7440-23-5 | 50 | mg/kg | 910 | 1880 | 250 | 1240 | ---- |
| Potassium | 7440-09-7 | 50 | mg/kg | 2630 | 2760 | 1120 | 1820 | ---- |
| **EG005T: Total Metals by ICP-AES** | | | | | | | | |
| Aluminium | 7429-90-5 | 50 | mg/kg | 11600 | 10700 | 4970 | 5410 | ---- |
| Antimony | 7440-36-0 | 5 | mg/kg | <5 | <5 | <5 | <5 | ---- |
| Arsenic | 7440-38-2 | 5 | mg/kg | 77 | 95 | 84 | 69 | ---- |
| Boron | 7440-42-8 | 50 | mg/kg | <50 | <50 | <50 | <50 | ---- |
| Cadmium | 7440-43-9 | 1 | mg/kg | 8 | 9 | 4 | 4 | ---- |
| Chromium | 7440-47-3 | 2 | mg/kg | 38 | 18 | 16 | 61 | ---- |
| Cobalt | 7440-48-4 | 2 | mg/kg | 8 | 7 | 6 | 6 | ---- |
| Copper | 7440-50-8 | 5 | mg/kg | 262 | 253 | 665 | 335 | ---- |
| Iron | 7439-89-6 | 50 | mg/kg | 25300 | 25700 | 16900 | 17200 | ---- |
| Lead | 7439-92-1 | 5 | mg/kg | 65 | 72 | 64 | 62 | ---- |
| Manganese | 7439-96-5 | 5 | mg/kg | 1300 | 1300 | 1120 | 1090 | ---- |
| Molybdenum | 7439-98-7 | 2 | mg/kg | <2 | <2 | <2 | <2 | ---- |
| Nickel | 7440-02-0 | 2 | mg/kg | 6 | 5 | 9 | 8 | ---- |
| Selenium | 7782-49-2 | 5 | mg/kg | <5 | <5 | <5 | <5 | ---- |
| Zinc | 7440-66-6 | 5 | mg/kg | 1440 | 1740 | 843 | 750 | ---- |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1447785** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| E-mail | : alan@rgsenv.com | E-mail | : ALSEnviro.Brisbane@alsglobal.com |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Facsimile | : +61 07 3344 1222 | Facsimile | : +61-7-3243 7218 |
| Project | : 201417 Mt Rawdon Tailings Project | QC Level | : NEPM 2013 Schedule B(3) and ALS QCS3 requirement |
| Order number | : ---- | Date Samples Received | : 04-Dec-2014 18:45 |
| C-O-C number | : ---- | Date Analysis Commenced | : 08-Dec-2014 |
| Sampler | : MANDIE MATHESON | Issue Date | : 11-Dec-2014 16:41 |
| Site | : ---- | | |
| | | No. of samples received | : 4 |
| Quote number | : ---- | No. of samples analysed | : 4 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Andrew Epps | Senior Inorganic Chemist | Brisbane Inorganics |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics |

## General Comments

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | Mt Rawdon Tailings (1) | Mt Rawdon Tailings (2) | Mt Rawdon Tailings (3) | Mt Rawdon Tailings (4) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [04-Dec-2014] | [04-Dec-2014] | [04-Dec-2014] | [04-Dec-2014] | ---- |
| Compound | CAS Number | LOR | Unit | | EB1447785-001 | EB1447785-002 | EB1447785-003 | EB1447785-004 | -------- |
| | | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | | 6.96 | 6.36 | 7.36 | 7.38 | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | | 8320 | 8050 | 9210 | 8910 | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | | <1 | <1 | <1 | <1 | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | | <1 | <1 | <1 | <1 | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | | 244 | 237 | 28 | 28 | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | | 244 | 237 | 28 | 28 | ---- |
| **ED038A: Acidity** | | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | | 22 | 22 | 5 | 6 | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | | |
| Silicon | 7440-21-3 | 0.05 | mg/L | | 3.65 | 3.41 | 2.85 | 2.93 | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | | 2970 | 2930 | 3590 | 3570 | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | | 576 | 559 | 701 | 671 | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | | 534 | 499 | 499 | 519 | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | | 73 | 71 | 74 | 72 | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | | 1360 | 1310 | 1580 | 1530 | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | | 370 | 356 | 409 | 411 | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | | <0.01 | 0.02 | <0.01 | <0.01 | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | | 0.003 | 0.003 | 0.003 | 0.003 | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | | 0.002 | 0.002 | 0.003 | 0.004 | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | | 0.0729 | 0.0619 | 0.0099 | 0.0096 | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | | 0.035 | 0.036 | 0.010 | 0.012 | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | | 0.010 | 0.010 | 0.011 | 0.010 | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | | 0.002 | 0.003 | <0.001 | <0.001 | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | | 0.010 | <0.001 | <0.001 | <0.001 | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | | 2.61 | 2.24 | 0.215 | 0.220 | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | | 2.28 | 2.06 | 0.046 | 0.053 | ---- |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | | 0.143 | 0.136 | 0.180 | 0.167 | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | Mt Rawdon Tailings (1) | Mt Rawdon Tailings (2) | Mt Rawdon Tailings (3) | Mt Rawdon Tailings (4) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [04-Dec-2014] | [04-Dec-2014] | [04-Dec-2014] | [04-Dec-2014] | ---- |
| Compound | CAS Number | LOR | Unit | | EB1447785-001 | EB1447785-002 | EB1447785-003 | EB1447785-004 | -------- |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.12** | **0.12** | **0.08** | **0.11** | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | ---- |
| **EG052F: Dissolved Silica by ICPAES** | | | | | | | | | |
| ^ **Silicon as SiO2** | 14464-46-1 | 0.1 | mg/L | | **7.8** | **7.3** | **6.1** | **6.3** | ---- |
| **EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser** | | | | | | | | | |
| **Weak Acid Dissociable Cyanide** | ---- | 0.004 | mg/L | | <0.004 | <0.004 | <0.004 | <0.004 | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.5** | **0.6** | **0.6** | **0.6** | ---- |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1513989** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| E-mail | : alan@rgsenv.com | E-mail | : ALSEnviro.Brisbane@alsglobal.com |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Facsimile | : +61 07 3344 1222 | Facsimile | : +61-7-3243 7218 |
| Project | : 201417 Mt Rawdon Tailings Project | QC Level | : NEPM 2013 Schedule B(3) and ALS QCS3 requirement |
| Order number | : ---- | Date Samples Received | : 03-Mar-2015 18:30 |
| C-O-C number | : ---- | Date Analysis Commenced | : 04-Mar-2015 |
| Sampler | : MANDIE MATHESON | Issue Date | : 12-Mar-2015 17:07 |
| Site | : ---- | | |
| | | No. of samples received | : 4 |
| Quote number | : ---- | No. of samples analysed | : 4 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

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- Analytical Results

NATA Accredited Laboratory 825

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|---|---|---|
| Andrew Epps | Senior Inorganic Chemist | Brisbane Inorganics |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics |

## General Comments

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- The presence of high SO4 may bias the EC low.

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | Mt Rawdon Tailings (1) | Mt Rawdon Tailings (2) | Mt Rawdon Tailings (3) | Mt Rawdon Tailings (4) | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [03-Mar-2015] | [03-Mar-2015] | [03-Mar-2015] | [03-Mar-2015] | ---- |
| Compound | CAS Number | LOR | Unit | EB1513989-001 | EB1513989-002 | EB1513989-003 | EB1513989-004 | -------- |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.52 | 7.55 | 7.29 | 7.25 | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 2860 | 2990 | 5610 | 4600 | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 112 | 161 | 68 | 32 | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 112 | 161 | 68 | 32 | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 15 | 23 | 9 | 3 | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon | 7440-21-3 | 0.05 | mg/L | 5.80 | 6.29 | 3.04 | 2.99 | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 1530 | 1500 | 2790 | 2040 | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | 45 | 60 | 307 | 209 | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 529 | 503 | 493 | 477 | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | 24 | 28 | 34 | 27 | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | 149 | 192 | 744 | 549 | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | 86 | 95 | 223 | 169 | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | 0.003 | 0.002 | 0.004 | 0.004 | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | 0.002 | 0.003 | 0.003 | 0.003 | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | 0.0282 | 0.0303 | 0.0090 | 0.0079 | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | 0.010 | 0.012 | 0.022 | 0.021 | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | 0.001 | 0.003 | 0.006 | 0.004 | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | 0.002 | 0.004 | <0.001 | <0.001 | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | 0.001 | <0.001 | <0.001 | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | 3.47 | 4.76 | 0.166 | 0.156 | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | 2.17 | 5.44 | 0.030 | 0.030 | ---- |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | 0.071 | 0.063 | 0.109 | 0.083 | ---- |

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | | Client sample ID | Mt Rawdon Tailings (1) | Mt Rawdon Tailings (2) | Mt Rawdon Tailings (3) | Mt Rawdon Tailings (4) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [03-Mar-2015] | [03-Mar-2015] | [03-Mar-2015] | [03-Mar-2015] | ---- |
| Compound | CAS Number | LOR | Unit | | EB1513989-001 | EB1513989-002 | EB1513989-003 | EB1513989-004 | -------- |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.13** | **0.15** | **0.11** | **0.11** | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | ---- |
| **EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser** | | | | | | | | | |
| **Weak Acid Dissociable Cyanide** | ---- | 0.004 | mg/L | | <0.004 | <0.004 | <0.004 | <0.004 | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.3** | **0.3** | **0.6** | **0.6** | ---- |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1520149** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| E-mail | : alan@rgsenv.com | E-mail | : carsten.emrich@alsenviro.com |
| Telephone | : +61 07 3344 1222 | Telephone | : +61 7 3243 7123 |
| Facsimile | : +61 07 3344 1222 | Facsimile | : +61-7-3243 7218 |
| Project | : 201417 Mt Rawdon Tailings Project | QC Level | : NEPM 2013 Schedule B(3) and ALS QCS3 requirement |
| Order number | : ---- | Date Samples Received | : 02-Jun-2015 14:10 |
| C-O-C number | : ---- | Date Analysis Commenced | : 04-Jun-2015 |
| Sampler | : VERONICA CANALES | Issue Date | : 10-Jun-2015 13:07 |
| Site | : ---- | | |
| | | No. of samples received | : 4 |
| Quote number | : ---- | No. of samples analysed | : 4 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics |

## General Comments

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | Mt Rawdon Tailings (1) | Mt Rawdon Tailings (2) | Mt Rawdon Tailings (3) | Mt Rawdon Tailings (4) | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [02-Jun-2015] | [02-Jun-2015] | [02-Jun-2015] | [02-Jun-2015] | ---- |
| Compound | CAS Number | LOR | Unit | EB1520149-001 | EB1520149-002 | EB1520149-003 | EB1520149-004 | -------- |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.55 | 7.47 | 7.51 | 7.50 | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 2530 | 2610 | 3810 | 3310 | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 114 | 121 | 34 | 33 | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 114 | 121 | 34 | 33 | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 8 | 12 | 3 | 2 | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Sulfate as SO4 2- | 14808-79-8 | 1 | mg/L | 1460 | 1420 | 1800 | 1610 | ---- |
| ^ Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | 11.3 | 12.5 | 6.4 | 6.0 | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 1570 | 1550 | 1970 | 1760 | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | 24 | 36 | 124 | 93 | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 506 | 378 | 395 | 386 | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | 13 | 12 | 26 | 22 | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | 76 | 94 | 382 | 300 | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | 52 | 51 | 128 | 111 | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | 0.002 | 0.002 | 0.003 | 0.003 | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | 0.001 | 0.001 | 0.002 | 0.002 | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | 0.0350 | 0.0201 | 0.0088 | 0.0087 | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | 0.010 | 0.013 | 0.016 | 0.018 | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | 0.002 | 0.005 | 0.004 | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | 0.002 | 0.001 | <0.001 | <0.001 | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | 4.23 | 3.09 | 0.273 | 0.266 | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | 0.805 | 1.96 | 0.052 | 0.037 | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | Mt Rawdon Tailings (1) | Mt Rawdon Tailings (2) | Mt Rawdon Tailings (3) | Mt Rawdon Tailings (4) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [02-Jun-2015] | [02-Jun-2015] | [02-Jun-2015] | [02-Jun-2015] | ---- |
| Compound | CAS Number | LOR | Unit | | EB1520149-001 | EB1520149-002 | EB1520149-003 | EB1520149-004 | -------- |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.035** | **0.031** | **0.081** | **0.071** | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.11** | **0.14** | **0.09** | **0.06** | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | ---- |
| **EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser** | | | | | | | | | |
| **Weak Acid Dissociable Cyanide** | ---- | 0.004 | mg/L | | <0.004 | <0.004 | <0.004 | <0.004 | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.2** | **0.4** | **0.4** | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1528976** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| E-mail | : alan@rgsenv.com | E-mail | : carsten.emrich@alsenviro.com |
| Telephone | : +61 07 3344 1222 | Telephone | : +61 7 3243 7123 |
| Facsimile | : +61 07 3344 1222 | Facsimile | : +61-7-3243 7218 |
| Project | : 201417 Mt Rawdon Tailings Project | QC Level | : NEPM 2013 Schedule B(3) and ALS QCS3 requirement |
| Order number | : ---- | Date Samples Received | : 15-Sep-2015 15:00 |
| C-O-C number | : ---- | Date Analysis Commenced | : 18-Sep-2015 |
| Sampler | : VERONICA CANALES | Issue Date | : 22-Sep-2015 15:29 |
| Site | : ---- | | |
| | | No. of samples received | : 4 |
| Quote number | : ---- | No. of samples analysed | : 4 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics |

## General Comments

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: LIQUID (Matrix: WATER) | | | Client sample ID | Mt Rawdon Tailings (1) Leachate | Mt Rawdon Tailings (2) Leachate | Mt Rawdon Tailings (3) Leachate | Mt Rawdon Tailings (4) Leachate | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [15-Sep-2015] | [15-Sep-2015] | [15-Sep-2015] | [15-Sep-2015] | ---- |
| Compound | CAS Number | LOR | Unit | EB1528976-001 | EB1528976-002 | EB1528976-003 | EB1528976-004 | -------- |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.44** | **7.59** | **7.49** | **7.53** | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2300** | **1490** | **2420** | **2010** | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **115** | **74** | **39** | **37** | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **115** | **74** | **39** | **37** | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **10** | **1** | **2** | **2** | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Sulfate as SO4 2- | 14808-79-8 | 1 | mg/L | **1380** | **754** | **1330** | **1090** | ---- |
| ^ Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | **10.3** | **7.3** | **5.9** | **5.6** | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1410** | **741** | **1310** | **1090** | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **15** | **18** | **31** | **20** | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **510** | **251** | **367** | **325** | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **11** | **7** | **22** | **18** | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **61** | **58** | **165** | **115** | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **42** | **33** | **93** | **76** | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.002** | **0.001** | **0.004** | **0.003** | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.001** | <0.001 | **0.001** | **0.001** | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0305** | **0.0126** | **0.0086** | **0.0068** | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | **0.002** | **0.002** | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.009** | **0.008** | **0.012** | **0.017** | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | **0.002** | **0.002** | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | **0.002** | <0.001 | <0.001 | <0.001 | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **3.89** | **1.28** | **0.307** | **0.264** | ---- |

## Analytical Results

| Sub-Matrix: LIQUID (Matrix: WATER) | | | | Client sample ID | Mt Rawdon Tailings (1) Leachate | Mt Rawdon Tailings (2) Leachate | Mt Rawdon Tailings (3) Leachate | Mt Rawdon Tailings (4) Leachate | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [15-Sep-2015] | [15-Sep-2015] | [15-Sep-2015] | [15-Sep-2015] | ---- |
| Compound | CAS Number | LOR | Unit | | EB1528976-001 | EB1528976-002 | EB1528976-003 | EB1528976-004 | -------- |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.306** | **0.231** | **0.031** | **0.030** | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.018** | **0.016** | **0.038** | **0.033** | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.10** | <0.05 | **0.06** | **0.06** | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | ---- |
| **EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser** | | | | | | | | | |
| **Weak Acid Dissociable Cyanide** | ---- | 0.004 | mg/L | | <0.004 | <0.004 | <0.004 | <0.004 | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.2** | **0.4** | **0.3** | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1528976** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| E-mail | : alan@rgsenv.com | E-mail | : carsten.emrich@alsenviro.com |
| Telephone | : +61 07 3344 1222 | Telephone | : +61 7 3243 7123 |
| Facsimile | : +61 07 3344 1222 | Facsimile | : +61-7-3243 7218 |
| Project | : 201417 Mt Rawdon Tailings Project | QC Level | : NEPM 2013 Schedule B(3) and ALS QCS3 requirement |
| Order number | : ---- | Date Samples Received | : 15-Sep-2015 15:00 |
| C-O-C number | : ---- | Date Analysis Commenced | : 18-Sep-2015 |
| Sampler | : VERONICA CANALES | Issue Date | : 22-Sep-2015 15:29 |
| Site | : ---- | | |
| | | No. of samples received | : 4 |
| Quote number | : ---- | No. of samples analysed | : 4 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics |

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

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

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

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

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

## Analytical Results

| Sub-Matrix: LIQUID (Matrix: WATER) | | | Client sample ID | Mt Rawdon Tailings (1) Leachate | Mt Rawdon Tailings (2) Leachate | Mt Rawdon Tailings (3) Leachate | Mt Rawdon Tailings (4) Leachate | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [15-Sep-2015] | [15-Sep-2015] | [15-Sep-2015] | [15-Sep-2015] | ---- |
| Compound | CAS Number | LOR | Unit | EB1528976-001 | EB1528976-002 | EB1528976-003 | EB1528976-004 | -------- |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.44** | **7.59** | **7.49** | **7.53** | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2300** | **1490** | **2420** | **2010** | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **115** | **74** | **39** | **37** | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **115** | **74** | **39** | **37** | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **10** | **1** | **2** | **2** | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Sulfate as SO4 2- | 14808-79-8 | 1 | mg/L | **1380** | **754** | **1330** | **1090** | ---- |
| ^ Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | **10.3** | **7.3** | **5.9** | **5.6** | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1410** | **741** | **1310** | **1090** | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **15** | **18** | **31** | **20** | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **510** | **251** | **367** | **325** | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **11** | **7** | **22** | **18** | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **61** | **58** | **165** | **115** | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **42** | **33** | **93** | **76** | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.002** | **0.001** | **0.004** | **0.003** | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.001** | <0.001 | **0.001** | **0.001** | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0305** | **0.0126** | **0.0086** | **0.0068** | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | **0.002** | **0.002** | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.009** | **0.008** | **0.012** | **0.017** | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | **0.002** | **0.002** | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | **0.002** | <0.001 | <0.001 | <0.001 | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **3.89** | **1.28** | **0.307** | **0.264** | ---- |

## Analytical Results

| Sub-Matrix: LIQUID (Matrix: WATER) | | | | Client sample ID | Mt Rawdon Tailings (1) Leachate | Mt Rawdon Tailings (2) Leachate | Mt Rawdon Tailings (3) Leachate | Mt Rawdon Tailings (4) Leachate | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [15-Sep-2015] | [15-Sep-2015] | [15-Sep-2015] | [15-Sep-2015] | ---- |
| Compound | CAS Number | LOR | Unit | | EB1528976-001 | EB1528976-002 | EB1528976-003 | EB1528976-004 | -------- |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.306** | **0.231** | **0.031** | **0.030** | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.018** | **0.016** | **0.038** | **0.033** | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.10** | <0.05 | **0.06** | **0.06** | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | ---- |
| **EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser** | | | | | | | | | |
| **Weak Acid Dissociable Cyanide** | ---- | 0.004 | mg/L | | <0.004 | <0.004 | <0.004 | <0.004 | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.2** | **0.4** | **0.3** | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1536536** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| E-mail | : alan@rgsenv.com | E-mail | : ALSEnviro.Brisbane@alsglobal.com |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Facsimile | : +61 07 3344 1222 | Facsimile | : +61-7-3243 7218 |
| Project | : 201417 Mt Rawdon Tailings Project | QC Level | : NEPM 2013 B3 & ALS QC Standard |
| Order number | : ---- | Date Samples Received | : 01-Dec-2015 13:30 |
| C-O-C number | : ---- | Date Analysis Commenced | : 07-Dec-2015 |
| Sampler | : VERONICA CANALES | Issue Date | : 11-Dec-2015 07:16 |
| Site | : ---- | | |
| | | No. of samples received | : 4 |
| Quote number | : ---- | No. of samples analysed | : 4 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Andrew Epps | Senior Inorganic Chemist | Brisbane Inorganics |
| Ankit Joshi | Inorganic Chemist | Sydney Inorganics |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics |

## General Comments

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

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

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

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

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

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

- EK028SF:Poor spike recovery for (Weak Acid Dissociable Cyanide) due to matrix interferences(confirmed by re-analysis).

## Analytical Results

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

| | | | | Client sample ID | Mt Rawdon Tailings (1) -KLC 1 Leachate | Mt Rawdon Tailings (2) -KLC 2 Leachate | Mt Rawdon Tailings (3) -KLC 3 Leachate | Mt Rawdon Tailings (4) -KLC 4 Leachate | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [01-Dec-2015] | [01-Dec-2015] | [01-Dec-2015] | [01-Dec-2015] | ---- |
| *Compound* | *CAS Number* | *LOR* | *Unit* | | **EB1536536-001** | **EB1536536-002** | **EB1536536-003** | **EB1536536-004** | -------- |
| | | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | | |
| **pH Value** | ---- | 0.01 | pH Unit | | **7.62** | **7.74** | **7.41** | **7.42** | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | | **1740** | **1260** | **2080** | **1760** | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | | |
| **Hydroxide Alkalinity as CaCO3** | DMO-210-001 | 1 | mg/L | | <1 | <1 | <1 | <1 | ---- |
| **Carbonate Alkalinity as CaCO3** | 3812-32-6 | 1 | mg/L | | <1 | <1 | <1 | <1 | ---- |
| **Bicarbonate Alkalinity as CaCO3** | 71-52-3 | 1 | mg/L | | **88** | **86** | **37** | **34** | ---- |
| **Total Alkalinity as CaCO3** | ---- | 1 | mg/L | | **88** | **86** | **37** | **34** | ---- |
| **ED038A: Acidity** | | | | | | | | | |
| **Acidity as CaCO3** | ---- | 1 | mg/L | | **12** | **7** | **6** | **4** | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | | |
| **Sulfate as SO4 2-** | 14808-79-8 | 1 | mg/L | | **864** | **538** | **1100** | **859** | ---- |
| **Silicon as SiO2** | 14464-46-1 | 0.1 | mg/L | | **9.3** | **8.2** | **7.5** | **6.9** | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | | |
| **Sulfate as SO4 - Turbidimetric** | 14808-79-8 | 1 | mg/L | | **852** | **529** | **1120** | **903** | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | | |
| **Chloride** | 16887-00-6 | 1 | mg/L | | **14** | **11** | **8** | **7** | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | | |
| **Calcium** | 7440-70-2 | 1 | mg/L | | **332** | **194** | **318** | **274** | ---- |
| **Magnesium** | 7439-95-4 | 1 | mg/L | | **8** | **5** | **16** | **13** | ---- |
| **Sodium** | 7440-23-5 | 1 | mg/L | | **48** | **38** | **60** | **41** | ---- |
| **Potassium** | 7440-09-7 | 1 | mg/L | | **36** | **26** | **74** | **58** | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| **Aluminium** | 7429-90-5 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | | **0.002** | **0.001** | **0.003** | **0.003** | ---- |
| **Arsenic** | 7440-38-2 | 0.001 | mg/L | | **0.004** | **0.001** | **0.002** | **0.002** | ---- |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | **0.0175** | **0.0111** | **0.0072** | **0.0062** | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | **0.002** | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | **0.015** | **0.008** | **0.012** | **0.012** | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | **0.003** | **0.001** | **0.002** | **0.002** | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | | **0.002** | <0.001 | <0.001 | <0.001 | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Client sample ID | Mt Rawdon Tailings (1) -KLC 1 Leachate | Mt Rawdon Tailings (2) -KLC 2 Leachate | Mt Rawdon Tailings (3) -KLC 3 Leachate | Mt Rawdon Tailings (4) -KLC 4 Leachate | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [01-Dec-2015] | [01-Dec-2015] | [01-Dec-2015] | [01-Dec-2015] | ---- |
| | | | | | **EB1536536-001** | **EB1536536-002** | **EB1536536-003** | **EB1536536-004** | -------- |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | | **1.92** | **1.10** | **0.208** | **0.173** | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **2.34** | **0.452** | **0.026** | **0.028** | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.028** | **0.024** | **0.046** | **0.040** | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.09** | **0.08** | **0.10** | **0.08** | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | **0.34** | <0.05 | <0.05 | <0.05 | ---- |
| **EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser** | | | | | | | | | |
| **Weak Acid Dissociable Cyanide** | ---- | 0.004 | mg/L | | <0.004 | <0.004 | <0.004 | <0.004 | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.2** | **0.3** | **0.3** | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1615076** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61 7 3243 7222 |
| Project | : 201417 Mt Rawdon Tailings Project | Date Samples Received | : 08-Jun-2016 11:40 |
| Order number | : ---- | Date Analysis Commenced | : 08-Jun-2016 |
| C-O-C number | : 201417 | Issue Date | : 15-Jun-2016 17:37 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : ---- | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

NATA
WORLD RECOGNISED ACCREDITATION

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Andrew Epps | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | Mt Rawdon Tailings (1) | Mt Rawdon Tailings (2) | Mt Rawdon Tailings (3) | Mt Rawdon Tailings (4) | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [07-Jun-2016] | [07-Jun-2016] | [07-Jun-2016] | [07-Jun-2016] | ---- |
| Compound | CAS Number | LOR | Unit | EB1615076-001 | EB1615076-002 | EB1615076-003 | EB1615076-004 | -------- |
| | | | | Result | Result | Result | Result | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.65** | **7.74** | **7.55** | **7.55** | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **1400** | **974** | **1700** | **1440** | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **94** | **104** | **56** | **46** | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **94** | **104** | **56** | **46** | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **4** | **2** | **2** | **2** | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Sulfate as SO4 2- | 14808-79-8 | 1 | mg/L | **716** | **408** | **940** | **753** | ---- |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | **10.3** | **9.9** | **6.0** | **5.8** | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **662** | **397** | **911** | **739** | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **11** | **8** | **6** | **6** | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **248** | **163** | **311** | **261** | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **7** | **4** | **16** | **12** | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **37** | **28** | **30** | **23** | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **31** | **23** | **56** | **45** | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | <0.001 | **0.001** | **0.002** | **0.002** | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.002** | **0.002** | **0.001** | **0.001** | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0066** | **0.0078** | **0.0078** | **0.0066** | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | **0.002** | **0.003** | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.004** | **0.006** | **0.019** | **0.020** | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | **0.004** | <0.001 | **0.002** | **0.002** | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | **0.002** | <0.001 | <0.001 | <0.001 | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **1.02** | **0.815** | **0.267** | **0.223** | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | **2.56** | **0.821** | **0.033** | **0.034** | ---- |

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | | Client sample ID | Mt Rawdon Tailings (1) | Mt Rawdon Tailings (2) | Mt Rawdon Tailings (3) | Mt Rawdon Tailings (4) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [07-Jun-2016] | [07-Jun-2016] | [07-Jun-2016] | [07-Jun-2016] | ---- |
| Compound | CAS Number | LOR | Unit | | EB1615076-001 | EB1615076-002 | EB1615076-003 | EB1615076-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.034** | **0.031** | **0.031** | **0.027** | **----** |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | **----** |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | **----** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | **0.13** | <0.05 | <0.05 | <0.05 | **----** |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.2** | **0.3** | **0.2** | **----** |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **16.0** | **10.6** | **20.2** | **16.5** | **----** |
| **Total Cations** | ---- | 0.01 | meq/L | | **15.4** | **10.3** | **19.6** | **16.2** | **----** |
| **Ionic Balance** | ---- | 0.01 | % | | **1.92** | **1.39** | **1.66** | **0.90** | **----** |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1628822** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 201417 Mt Rawdon Tailings Project | Date Samples Received | : 06-Dec-2016 16:25 |
| Order number | : ---- | Date Analysis Commenced | : 07-Dec-2016 |
| C-O-C number | : ---- | Issue Date | : 13-Dec-2016 09:45 |
| Sampler | : MINGRUI YUAN | | |
| Site | : ---- | | |
| Quote number | : BNBQ/218/16 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

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Accreditation No. 825
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | Mt Rawdon Tailings (1) | Mt Rawdon Tailings (2) | Mt Rawdon Tailings (3) | Mt Rawdon Tailings (4) | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 06-Dec-2016 00:00 | 06-Dec-2016 00:00 | 06-Dec-2016 00:00 | 06-Dec-2016 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | EB1628822-001 | EB1628822-002 | EB1628822-003 | EB1628822-004 | -------- |
| | | | | Result | Result | Result | Result | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.69 | 7.94 | 7.55 | 7.51 | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 1050 | 836 | 1570 | 1300 | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 92 | 108 | 35 | 36 | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 92 | 108 | 35 | 36 | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | <1 | <1 | 2 | 2 | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Sulfate as SO4 2- | 14808-79-8 | 1 | mg/L | 476 | 345 | 886 | 663 | ---- |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | 9.6 | 10.0 | 7.9 | 7.8 | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 455 | 317 | 822 | 656 | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | 9 | 6 | 4 | 4 | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 178 | 142 | 295 | 249 | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | 4 | 3 | 11 | 8 | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | 21 | 17 | 13 | 8 | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | 22 | 19 | 53 | 35 | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | <0.001 | 0.001 | 0.003 | 0.002 | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | 0.002 | 0.002 | 0.002 | 0.001 | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | 0.0031 | 0.0088 | 0.0072 | 0.0045 | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | 0.005 | 0.005 | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | 0.003 | 0.006 | 0.016 | 0.011 | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | 0.002 | <0.001 | 0.001 | 0.001 | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | 0.001 | <0.001 | 0.002 | <0.001 | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | 0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | 0.537 | 0.636 | 0.194 | 0.066 | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | 1.18 | 0.679 | 0.038 | 0.030 | ---- |

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | | Client sample ID | Mt Rawdon Tailings (1) | Mt Rawdon Tailings (2) | Mt Rawdon Tailings (3) | Mt Rawdon Tailings (4) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 06-Dec-2016 00:00 | 06-Dec-2016 00:00 | 06-Dec-2016 00:00 | 06-Dec-2016 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | EB1628822-001 | EB1628822-002 | EB1628822-003 | EB1628822-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.031** | **0.035** | **0.038** | **0.031** | **----** |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | **----** |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.07** | **0.06** | **0.07** | <0.05 | **----** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | **0.06** | <0.05 | <0.05 | <0.05 | **----** |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.2** | **0.3** | **0.2** | **----** |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1717132** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 201417 Mt Rawdon Tailings Project | Date Samples Received | : 22-Aug-2017 15:35 |
| Order number | : ---- | Date Analysis Commenced | : 22-Aug-2017 |
| C-O-C number | : ---- | Issue Date | : 29-Aug-2017 13:13 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : BNBQ/218/16 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | Client sample ID | KLC 1 | KLC 3 | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [22-Aug-2017] | [22-Aug-2017] | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1717132-001 | EB1717132-002 | -------- | -------- | -------- |
| | | | | Result | Result | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **8.14** | **7.73** | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **952** | **1530** | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | ---- | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | ---- | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **101** | **54** | ---- | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **101** | **54** | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **7** | **2** | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | **9.8** | **6.6** | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **389** | **750** | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **6** | **3** | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **155** | **316** | ---- | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **4** | **13** | ---- | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **15** | **9** | ---- | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **17** | **42** | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | ---- | ---- | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.001** | **0.002** | ---- | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.002** | **0.001** | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0067** | **0.0094** | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | **0.002** | ---- | ---- | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.003** | **0.022** | ---- | ---- | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | **0.002** | <0.001 | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | <0.001 | ---- | ---- | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **0.390** | **0.338** | ---- | ---- | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | **0.701** | **0.046** | ---- | ---- | ---- |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | **0.029** | **0.027** | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: LEACHATE (Matrix: WATER) | | | | Client sample ID | KLC 1 | KLC 3 | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [22-Aug-2017] | [22-Aug-2017] | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1717132-001 | EB1717132-002 | -------- | -------- | -------- |
| | | | | | Result | Result | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.08** | **0.08** | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.2** | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **10.3** | **16.8** | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **9.15** | **18.3** | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **5.84** | **4.35** | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1804711** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 201417 Mt Rawdon Tailings Project | Date Samples Received | : 20-Feb-2018 17:35 |
| Order number | : ---- | Date Analysis Commenced | : 21-Feb-2018 |
| C-O-C number | : ---- | Issue Date | : 01-Mar-2018 15:28 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : EN/222/17 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

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

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- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Greg Vogel | Laboratory Manager | Brisbane Inorganics, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |
| Tom Maloney | Nutrients Section Supervisor | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | KLC 1 | KLC 3 | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 20-Feb-2018 00:00 | 20-Feb-2018 00:00 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1804711-001 | EB1804711-002 | -------- | -------- | -------- |
| | | | | Result | Result | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.93** | **7.35** | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **619** | **1460** | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | ---- | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | ---- | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **121** | **48** | ---- | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **121** | **48** | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **6** | **3** | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon as SiO2 | 14464-46-1 | 0.1 | mg/L | **9.8** | **8.4** | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **172** | **730** | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **2** | **1** | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **115** | **295** | ---- | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **2** | **9** | ---- | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **7** | **7** | ---- | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **12** | **36** | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | ---- | ---- | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | <0.001 | **0.002** | ---- | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.004** | **0.001** | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0045** | **0.0072** | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | **0.002** | ---- | ---- | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.005** | **0.018** | ---- | ---- | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | **0.002** | **0.002** | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | <0.001 | ---- | ---- | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **0.285** | **0.183** | ---- | ---- | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | **0.625** | **0.042** | ---- | ---- | ---- |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | **0.035** | **0.042** | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | KLC 1 | KLC 3 | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 20-Feb-2018 00:00 | 20-Feb-2018 00:00 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1804711-001 | EB1804711-002 | -------- | -------- | -------- |
| | | | | | Result | Result | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | <0.05 | **0.10** | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.1** | **0.2** | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **6.06** | **16.2** | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **6.51** | **16.7** | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **3.66** | **1.52** | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1820822** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 201417 Mt Rawdon Tailings Project | Date Samples Received | : 28-Aug-2018 16:15 |
| Order number | : ---- | Date Analysis Commenced | : 28-Aug-2018 |
| C-O-C number | : ---- | Issue Date | : 03-Sep-2018 15:42 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

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- Analytical Results

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## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | KLC 1 | KLC 3 | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 28-Aug-2018 00:00 | 28-Aug-2018 00:00 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1820822-001 | EB1820822-002 | -------- | -------- | -------- |
| | | | | | Result | Result | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | | |
| **pH Value** | ---- | 0.01 | pH Unit | | **7.79** | **7.64** | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | | **736** | **1300** | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | | |
| **Hydroxide Alkalinity as CaCO3** | DMO-210-001 | 1 | mg/L | | <1 | <1 | ---- | ---- | ---- |
| **Carbonate Alkalinity as CaCO3** | 3812-32-6 | 1 | mg/L | | <1 | <1 | ---- | ---- | ---- |
| **Bicarbonate Alkalinity as CaCO3** | 71-52-3 | 1 | mg/L | | **97** | **44** | ---- | ---- | ---- |
| **Total Alkalinity as CaCO3** | ---- | 1 | mg/L | | **97** | **44** | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | | |
| **Acidity as CaCO3** | ---- | 1 | mg/L | | **1** | **2** | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | | |
| **Silicon** | 7440-21-3 | 0.05 | mg/L | | **3.94** | **3.33** | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | | |
| **Sulfate as SO4 - Turbidimetric** | 14808-79-8 | 1 | mg/L | | **274** | **658** | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | | |
| **Chloride** | 16887-00-6 | 1 | mg/L | | **2** | **1** | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | | |
| **Calcium** | 7440-70-2 | 1 | mg/L | | **150** | **282** | ---- | ---- | ---- |
| **Magnesium** | 7439-95-4 | 1 | mg/L | | **3** | **9** | ---- | ---- | ---- |
| **Sodium** | 7440-23-5 | 1 | mg/L | | **8** | **7** | ---- | ---- | ---- |
| **Potassium** | 7440-09-7 | 1 | mg/L | | **10** | **28** | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| **Aluminium** | 7429-90-5 | 0.01 | mg/L | | <0.01 | <0.01 | ---- | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | | **0.001** | **0.002** | ---- | ---- | ---- |
| **Arsenic** | 7440-38-2 | 0.001 | mg/L | | **0.001** | **0.001** | ---- | ---- | ---- |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | **0.0062** | **0.0069** | ---- | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | ---- | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | **0.008** | **0.015** | ---- | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | **0.002** | <0.001 | ---- | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | | <0.001 | <0.001 | ---- | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | ---- | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | | **1.02** | **0.242** | ---- | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.463** | **0.028** | ---- | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.021** | **0.026** | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | KLC 1 | KLC 3 | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 28-Aug-2018 00:00 | 28-Aug-2018 00:00 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1820822-001 | EB1820822-002 | -------- | -------- | -------- |
| | | | | | Result | Result | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.10** | **0.10** | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.1** | **0.2** | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **7.70** | **17.3** | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **8.34** | **15.8** | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **3.97** | **4.39** | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2124089** | Page | : 1 of 10 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4107 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2021066 MRO KLC cont | Date Samples Received | : 24-Aug-2021 16:30 |
| Order number | : ---- | Date Analysis Commenced | : 31-Aug-2021 |
| C-O-C number | : ---- | Issue Date | : 07-Sep-2021 16:18 |
| Sampler | : ASITHA JAYASINGHE | | |
| Site | : ---- | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 13 | | |
| No. of samples analysed | : 13 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ben Felgendrejeris | Senior Acid Sulfate Soil Chemist | Brisbane Acid Sulphate Soils, Stafford, QLD |
| Ben Felgendrejeris | Senior Acid Sulfate Soil Chemist | Brisbane Inorganics, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |
| Satishkumar Trivedi | Senior Acid Sulfate Soil Chemist | Brisbane Acid Sulphate Soils, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- EA150H: Soil particle density results fell outside the scope of AS1289.3.6.3. Results should be scrutinised accordingly.
- ED038 (Acidity): NATA accreditation does not cover the performance of this service.
- Samples xxx have been crushed prior to preparation and analysis.
- EG020-T (Total Metals by ICP-MS): Sample 2021066_0012 (EB2124089-011) shows poor duplicate results due to sample heterogeneity. Confirmed by visual inspection.
- EG020-T (Total Metals by ICP-MS): Sample 2021066_0003 (EB2124089-002) shows poor matrix spike recovery due to sample heterogeneity. Confirmed by visual inspection.
- EG005T (Total Metals by ICP-AES): 2021066_0012 (EB2124089-011) shows poor duplicate results due to sample heterogeneity. Confirmed by visual inspection.
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Sample ID | 2021066_0002 | 2021066_0003 | 2021066_0004 | 2021066_0005 | 2021066_0006 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 |
| Compound | CAS Number | LOR | Unit | EB2124089-001 | EB2124089-002 | EB2124089-003 | EB2124089-004 | EB2124089-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA002: pH 1:5 (Soils)** | | | | | | | | |
| pH Value | ---- | 0.1 | pH Unit | 8.3 | 9.4 | 9.6 | 9.4 | 8.0 |
| **EA009: Net Acid Production Potential** | | | | | | | | |
| Net Acid Production Potential | ---- | 0.5 | kg H2SO4/t | -6.8 | -78.2 | -62.4 | 1.4 | 4.1 |
| **EA010: Conductivity (1:5)** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 641 | 210 | 51 | 75 | 456 |
| **EA013: Acid Neutralising Capacity** | | | | | | | | |
| ANC as H2SO4 | ---- | 0.5 | kg H2SO4 equiv./t | 38.6 | 85.6 | 78.3 | 52.8 | 47.0 |
| ANC as CaCO3 | ---- | 0.1 | % CaCO3 | 3.9 | 8.7 | 8.0 | 5.4 | 4.8 |
| Fizz Rating | ---- | 0 | Fizz Unit | 2 | 2 | 2 | 2 | 2 |
| **EA026 : Chromium Reducible Sulfur** | | | | | | | | |
| Chromium Reducible Sulphur | ---- | 0.005 | % | 0.793 | 0.224 | 0.513 | 1.74 | 1.51 |
| **EA055: Moisture Content (Dried @ 105-110°C)** | | | | | | | | |
| Moisture Content | ---- | 1.0 | % | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| **EA150: Particle Sizing** | | | | | | | | |
| ø +2µm | ---- | 1 | % | 84 | ---- | 97 | ---- | 100 |
| ø +5µm | ---- | 1 | % | 78 | ---- | 96 | ---- | 100 |
| ø +10µm | ---- | 1 | % | 72 | ---- | 96 | ---- | 98 |
| ø +15.6µm | ---- | 1 | % | 69 | ---- | 95 | ---- | 98 |
| ø +20µm | ---- | 1 | % | 66 | ---- | 95 | ---- | 98 |
| ø +30µm | ---- | 1 | % | 60 | ---- | 94 | ---- | 98 |
| ø +40µm | ---- | 1 | % | 55 | ---- | 94 | ---- | 98 |
| ø +50µm | ---- | 1 | % | 52 | ---- | 94 | ---- | 98 |
| ø +60µm | ---- | 1 | % | 49 | ---- | 94 | ---- | 98 |
| +75µm | ---- | 1 | % | 47 | ---- | 93 | ---- | 97 |
| +150µm | ---- | 1 | % | 21 | ---- | 93 | ---- | 96 |
| +300µm | ---- | 1 | % | 4 | ---- | 92 | ---- | 96 |
| +425µm | ---- | 1 | % | <1 | ---- | 91 | ---- | 96 |
| +600µm | ---- | 1 | % | <1 | ---- | 90 | ---- | 96 |
| +1180µm | ---- | 1 | % | <1 | ---- | 88 | ---- | 96 |
| +2.36mm | ---- | 1 | % | <1 | ---- | 81 | ---- | 96 |
| +4.75mm | ---- | 1 | % | <1 | ---- | 65 | ---- | 94 |
| +9.5mm | ---- | 1 | % | <1 | ---- | 30 | ---- | 60 |
| +19.0mm | ---- | 1 | % | <1 | ---- | <1 | ---- | <1 |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Sample ID | 2021066_0002 | 2021066_0003 | 2021066_0004 | 2021066_0005 | 2021066_0006 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2124089-001 | EB2124089-002 | EB2124089-003 | EB2124089-004 | EB2124089-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EA150: Particle Sizing - Continued** | | | | | | | | | |
| +37.5mm | ---- | 1 | % | | <1 | ---- | <1 | ---- | <1 |
| +75.0mm | ---- | 1 | % | | <1 | ---- | <1 | ---- | <1 |
| **EA150: Soil Classification based on Particle Size** | | | | | | | | | |
| Clay (<2 µm) | ---- | 1 | % | | 16 | ---- | 3 | ---- | <1 |
| Silt (2-60 µm) | ---- | 1 | % | | 35 | ---- | 3 | ---- | 2 |
| Sand (0.06-2.00 mm) | ---- | 1 | % | | 49 | ---- | 11 | ---- | 2 |
| Gravel (>2mm) | ---- | 1 | % | | <1 | ---- | 83 | ---- | 96 |
| Cobbles (>6cm) | ---- | 1 | % | | <1 | ---- | <1 | ---- | <1 |
| **EA152: Soil Particle Density** | | | | | | | | | |
| Soil Particle Density (Clay/Silt/Sand) | ---- | 0.01 | g/cm3 | | 2.75 | ---- | 2.79 | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | | |
| Acidity | ---- | 5 | mg/kg | | 30 | <5 | <5 | <5 | 8 |
| **ED042T: Total Sulfur by LECO** | | | | | | | | | |
| Sulfur - Total as S (LECO) | ---- | 0.01 | % | | 1.04 | 0.24 | 0.52 | 1.77 | 1.67 |
| **ED093T: Total Major Cations** | | | | | | | | | |
| Sodium | 7440-23-5 | 50 | mg/kg | | 220 | 260 | 60 | 60 | <50 |
| Potassium | 7440-09-7 | 50 | mg/kg | | 1790 | 250 | 130 | 350 | 70 |
| Calcium | 7440-70-2 | 50 | mg/kg | | 12800 | 25200 | 16100 | 17700 | 8610 |
| Magnesium | 7439-95-4 | 50 | mg/kg | | 3160 | 5250 | 2670 | 2830 | 950 |
| **EG005(ED093)T: Total Metals by ICP-AES** | | | | | | | | | |
| Aluminium | 7429-90-5 | 50 | mg/kg | | 6120 | 7460 | 4010 | 3360 | 990 |
| Boron | 7440-42-8 | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| Iron | 7439-89-6 | 50 | mg/kg | | 20000 | 16100 | 8070 | 18500 | 3980 |
| **EG020T: Total Metals by ICP-MS** | | | | | | | | | |
| Arsenic | 7440-38-2 | 0.1 | mg/kg | | 74.2 | 3.8 | 3.5 | 20.5 | 4.8 |
| Selenium | 7782-49-2 | 1 | mg/kg | | <1 | <1 | <1 | <1 | <1 |
| Silver | 7440-22-4 | 0.1 | mg/kg | | 1.8 | 0.1 | <0.1 | 0.3 | 0.2 |
| Barium | 7440-39-3 | 0.1 | mg/kg | | 43.1 | 6.2 | 3.8 | 5.0 | 1.0 |
| Thallium | 7440-28-0 | 0.1 | mg/kg | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Beryllium | 7440-41-7 | 0.1 | mg/kg | | 0.4 | 0.3 | 0.2 | 0.2 | 0.1 |
| Cadmium | 7440-43-9 | 0.1 | mg/kg | | 5.2 | <0.1 | <0.1 | 0.2 | <0.1 |
| Bismuth | 7440-69-9 | 0.1 | mg/kg | | 13.2 | 0.2 | 0.1 | 1.2 | 0.5 |
| Cobalt | 7440-48-4 | 0.1 | mg/kg | | 5.1 | 6.4 | 3.6 | 7.0 | 1.2 |
| Chromium | 7440-47-3 | 0.1 | mg/kg | | 9.3 | 3.2 | 1.6 | 5.4 | 1.4 |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Sample ID | 2021066_0002 | 2021066_0003 | 2021066_0004 | 2021066_0005 | 2021066_0006 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 |
| Compound | CAS Number | LOR | Unit | EB2124089-001 | EB2124089-002 | EB2124089-003 | EB2124089-004 | EB2124089-005 |
| | | | | Result | Result | Result | Result | Result |
| **EG020T: Total Metals by ICP-MS - Continued** | | | | | | | | |
| **Copper** | 7440-50-8 | 0.1 | mg/kg | **256** | **5.3** | **22.1** | **2.8** | **0.4** |
| **Thorium** | 7440-29-1 | 0.1 | mg/kg | **3.0** | **0.7** | **0.5** | **1.2** | **0.6** |
| **Manganese** | 7439-96-5 | 0.1 | mg/kg | **915** | **852** | **689** | **705** | **392** |
| **Strontium** | 7440-24-6 | 0.1 | mg/kg | **64.6** | **63.4** | **34.0** | **56.4** | **33.4** |
| **Molybdenum** | 7439-98-7 | 0.1 | mg/kg | **1.4** | **1.2** | **0.4** | **1.0** | **1.3** |
| **Nickel** | 7440-02-0 | 0.1 | mg/kg | **5.4** | **4.4** | **2.7** | **8.7** | **2.4** |
| **Lead** | 7439-92-1 | 0.1 | mg/kg | **53.0** | **3.3** | **3.4** | **22.8** | **12.9** |
| **Antimony** | 7440-36-0 | 0.1 | mg/kg | **0.7** | **0.1** | **0.2** | **0.3** | **0.1** |
| **Uranium** | 7440-61-1 | 0.1 | mg/kg | **0.5** | <0.1 | <0.1 | **0.2** | **0.2** |
| **Zinc** | 7440-66-6 | 0.5 | mg/kg | **940** | **44.7** | **35.7** | **47.8** | **18.3** |
| **Lithium** | 7439-93-2 | 0.1 | mg/kg | **10.1** | **15.2** | **8.8** | **8.2** | **2.8** |
| **Vanadium** | 7440-62-2 | 1 | mg/kg | **8** | **19** | **10** | **4** | <1 |
| **Tin** | 7440-31-5 | 0.1 | mg/kg | **0.2** | <0.1 | <0.1 | <0.1 | <0.1 |
| **EG035T: Total Recoverable Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.1 | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Sample ID | 2021066_0007 | 2021066_0008 | 2021066_0009 | 2021066_0010 | 2021066_0011 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 |
| Compound | CAS Number | LOR | Unit | EB2124089-006 | EB2124089-007 | EB2124089-008 | EB2124089-009 | EB2124089-010 |
| | | | | Result | Result | Result | Result | Result |
| **EA002: pH 1:5 (Soils)** | | | | | | | | |
| pH Value | ---- | 0.1 | pH Unit | 8.8 | 8.0 | 8.2 | 8.6 | 8.8 |
| **EA009: Net Acid Production Potential** | | | | | | | | |
| Net Acid Production Potential | ---- | 0.5 | kg H2SO4/t | 145 | 127 | 18.6 | 37.5 | 115 |
| **EA010: Conductivity (1:5)** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 230 | 699 | 917 | 2660 | 197 |
| **EA013: Acid Neutralising Capacity** | | | | | | | | |
| ANC as H2SO4 | ---- | 0.5 | kg H2SO4 equiv./t | 34.0 | 36.6 | 32.2 | 31.0 | 43.2 |
| ANC as CaCO3 | ---- | 0.1 | % CaCO3 | 3.5 | 3.7 | 3.3 | 3.2 | 4.4 |
| Fizz Rating | ---- | 0 | Fizz Unit | 2 | 2 | 2 | 2 | 2 |
| **EA026 : Chromium Reducible Sulfur** | | | | | | | | |
| Chromium Reducible Sulphur | ---- | 0.005 | % | 5.26 | 4.91 | 1.30 | 0.999 | 4.30 |
| **EA055: Moisture Content (Dried @ 105-110°C)** | | | | | | | | |
| Moisture Content | ---- | 1.0 | % | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| **EA150: Particle Sizing** | | | | | | | | |
| ø +2µm | ---- | 1 | % | ---- | 98 | 87 | ---- | ---- |
| ø +5µm | ---- | 1 | % | ---- | 96 | 80 | ---- | ---- |
| ø +10µm | ---- | 1 | % | ---- | 95 | 75 | ---- | ---- |
| ø +15.6µm | ---- | 1 | % | ---- | 94 | 70 | ---- | ---- |
| ø +20µm | ---- | 1 | % | ---- | 94 | 66 | ---- | ---- |
| ø +30µm | ---- | 1 | % | ---- | 94 | 63 | ---- | ---- |
| ø +40µm | ---- | 1 | % | ---- | 94 | 60 | ---- | ---- |
| ø +50µm | ---- | 1 | % | ---- | 94 | 58 | ---- | ---- |
| ø +60µm | ---- | 1 | % | ---- | 93 | 57 | ---- | ---- |
| +75µm | ---- | 1 | % | ---- | 93 | 55 | ---- | ---- |
| +150µm | ---- | 1 | % | ---- | 92 | 32 | ---- | ---- |
| +300µm | ---- | 1 | % | ---- | 92 | 11 | ---- | ---- |
| +425µm | ---- | 1 | % | ---- | 92 | 4 | ---- | ---- |
| +600µm | ---- | 1 | % | ---- | 91 | <1 | ---- | ---- |
| +1180µm | ---- | 1 | % | ---- | 90 | <1 | ---- | ---- |
| +2.36mm | ---- | 1 | % | ---- | 86 | <1 | ---- | ---- |
| +4.75mm | ---- | 1 | % | ---- | 75 | <1 | ---- | ---- |
| +9.5mm | ---- | 1 | % | ---- | 42 | <1 | ---- | ---- |
| +19.0mm | ---- | 1 | % | ---- | <1 | <1 | ---- | ---- |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Sample ID | 2021066_0007 | 2021066_0008 | 2021066_0009 | 2021066_0010 | 2021066_0011 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2124089-006 | EB2124089-007 | EB2124089-008 | EB2124089-009 | EB2124089-010 |
| | | | | | Result | Result | Result | Result | Result |
| **EA150: Particle Sizing - Continued** | | | | | | | | | |
| +37.5mm | ---- | 1 | % | | ---- | <1 | <1 | ---- | ---- |
| +75.0mm | ---- | 1 | % | | ---- | <1 | <1 | ---- | ---- |
| **EA150: Soil Classification based on Particle Size** | | | | | | | | | |
| Clay (<2 µm) | ---- | 1 | % | | ---- | 2 | 13 | ---- | ---- |
| Silt (2-60 µm) | ---- | 1 | % | | ---- | 5 | 30 | ---- | ---- |
| Sand (0.06-2.00 mm) | ---- | 1 | % | | ---- | 6 | 57 | ---- | ---- |
| Gravel (>2mm) | ---- | 1 | % | | ---- | 87 | <1 | ---- | ---- |
| Cobbles (>6cm) | ---- | 1 | % | | ---- | <1 | <1 | ---- | ---- |
| **EA152: Soil Particle Density** | | | | | | | | | |
| Soil Particle Density (Clay/Silt/Sand) | ---- | 0.01 | g/cm3 | | ---- | 3.11 | 2.73 | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | | |
| Acidity | ---- | 5 | mg/kg | | <5 | 13 | 26 | <5 | <5 |
| **ED042T: Total Sulfur by LECO** | | | | | | | | | |
| Sulfur - Total as S (LECO) | ---- | 0.01 | % | | 5.86 | 5.34 | 1.66 | 2.24 | 5.17 |
| **ED093T: Total Major Cations** | | | | | | | | | |
| Sodium | 7440-23-5 | 50 | mg/kg | | 90 | <50 | 70 | 660 | <50 |
| Potassium | 7440-09-7 | 50 | mg/kg | | 370 | 240 | 750 | 1030 | 280 |
| Calcium | 7440-70-2 | 50 | mg/kg | | 9160 | 11100 | 11100 | 16000 | 17000 |
| Magnesium | 7439-95-4 | 50 | mg/kg | | 2240 | 2310 | 3220 | 3460 | 3050 |
| **EG005(ED093)T: Total Metals by ICP-AES** | | | | | | | | | |
| Aluminium | 7429-90-5 | 50 | mg/kg | | 2650 | 2620 | 4770 | 4950 | 3370 |
| Boron | 7440-42-8 | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| Iron | 7439-89-6 | 50 | mg/kg | | 48600 | 85800 | 24000 | 24700 | 42000 |
| **EG020T: Total Metals by ICP-MS** | | | | | | | | | |
| Arsenic | 7440-38-2 | 0.1 | mg/kg | | 51.8 | 65.7 | 124 | 119 | 44.3 |
| Selenium | 7782-49-2 | 1 | mg/kg | | <1 | <1 | <1 | <1 | <1 |
| Silver | 7440-22-4 | 0.1 | mg/kg | | 2.6 | 5.0 | 1.3 | 1.2 | 4.9 |
| Barium | 7440-39-3 | 0.1 | mg/kg | | 3.6 | 2.3 | 13.9 | 14.4 | 3.7 |
| Thallium | 7440-28-0 | 0.1 | mg/kg | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Beryllium | 7440-41-7 | 0.1 | mg/kg | | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 |
| Cadmium | 7440-43-9 | 0.1 | mg/kg | | 7.3 | 2.7 | 7.8 | 7.5 | 8.0 |
| Bismuth | 7440-69-9 | 0.1 | mg/kg | | 9.6 | 17.5 | 17.8 | 18.7 | 17.1 |
| Cobalt | 7440-48-4 | 0.1 | mg/kg | | 11.3 | 12.7 | 5.9 | 5.7 | 12.7 |
| Chromium | 7440-47-3 | 0.1 | mg/kg | | 2.3 | 2.4 | 11.3 | 11.8 | 4.5 |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Sample ID | 2021066_0007 | 2021066_0008 | 2021066_0009 | 2021066_0010 | 2021066_0011 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2124089-006 | EB2124089-007 | EB2124089-008 | EB2124089-009 | EB2124089-010 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020T: Total Metals by ICP-MS - Continued** | | | | | | | | | |
| **Copper** | 7440-50-8 | 0.1 | mg/kg | | **80.4** | **95.7** | **298** | **278** | **124** |
| **Thorium** | 7440-29-1 | 0.1 | mg/kg | | **0.9** | **1.1** | **2.6** | **2.8** | **1.3** |
| **Manganese** | 7439-96-5 | 0.1 | mg/kg | | **731** | **831** | **855** | **855** | **1650** |
| **Strontium** | 7440-24-6 | 0.1 | mg/kg | | **33.5** | **38.5** | **54.0** | **74.8** | **71.2** |
| **Molybdenum** | 7439-98-7 | 0.1 | mg/kg | | **0.5** | **0.8** | **1.6** | **2.0** | **0.8** |
| **Nickel** | 7440-02-0 | 0.1 | mg/kg | | **8.2** | **9.6** | **9.2** | **9.0** | **11.1** |
| **Lead** | 7439-92-1 | 0.1 | mg/kg | | **116** | **200** | **41.7** | **42.3** | **186** |
| **Antimony** | 7440-36-0 | 0.1 | mg/kg | | **0.4** | **0.8** | **0.4** | **0.4** | **1.3** |
| **Uranium** | 7440-61-1 | 0.1 | mg/kg | | <0.1 | <0.1 | **0.4** | **0.4** | **0.1** |
| **Zinc** | 7440-66-6 | 0.5 | mg/kg | | **1190** | **452** | **1260** | **1190** | **1360** |
| **Lithium** | 7439-93-2 | 0.1 | mg/kg | | **5.9** | **5.5** | **6.4** | **6.4** | **8.0** |
| **Vanadium** | 7440-62-2 | 1 | mg/kg | | **3** | **3** | **6** | **5** | **6** |
| **Tin** | 7440-31-5 | 0.1 | mg/kg | | **0.1** | <0.1 | <0.1 | **0.1** | **0.2** |
| **EG035T: Total Recoverable Mercury by FIMS** | | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.1 | mg/kg | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Sample ID | 2021066_0012 | 2021066_0013 | pH and EC of DI water | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2124089-011 | EB2124089-012 | EB2124089-013 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EA002: pH 1:5 (Soils)** | | | | | | | | |
| pH Value | ---- | 0.1 | pH Unit | 8.5 | 8.4 | 5.7 | ---- | ---- |
| **EA009: Net Acid Production Potential** | | | | | | | | |
| Net Acid Production Potential | ---- | 0.5 | kg H2SO4/t | 170 | 167 | ---- | ---- | ---- |
| **EA010: Conductivity (1:5)** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 2220 | 1500 | <1 | ---- | ---- |
| **EA013: Acid Neutralising Capacity** | | | | | | | | |
| ANC as H2SO4 | ---- | 0.5 | kg H2SO4 equiv./t | 36.5 | 34.9 | ---- | ---- | ---- |
| ANC as CaCO3 | ---- | 0.1 | % CaCO3 | 3.7 | 3.6 | ---- | ---- | ---- |
| Fizz Rating | ---- | 0 | Fizz Unit | 2 | 2 | ---- | ---- | ---- |
| **EA026 : Chromium Reducible Sulfur** | | | | | | | | |
| Chromium Reducible Sulphur | ---- | 0.005 | % | 4.77 | 5.79 | ---- | ---- | ---- |
| **EA055: Moisture Content (Dried @ 105-110°C)** | | | | | | | | |
| Moisture Content | ---- | 1.0 | % | <1.0 | <1.0 | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity | ---- | 5 | mg/kg | 13 | 13 | ---- | ---- | ---- |
| **ED042T: Total Sulfur by LECO** | | | | | | | | |
| Sulfur - Total as S (LECO) | ---- | 0.01 | % | 6.75 | 6.59 | ---- | ---- | ---- |
| **ED093T: Total Major Cations** | | | | | | | | |
| Sodium | 7440-23-5 | 50 | mg/kg | 590 | 180 | ---- | ---- | ---- |
| Potassium | 7440-09-7 | 50 | mg/kg | 850 | 690 | ---- | ---- | ---- |
| Calcium | 7440-70-2 | 50 | mg/kg | 7840 | 16700 | ---- | ---- | ---- |
| Magnesium | 7439-95-4 | 50 | mg/kg | 1180 | 2920 | ---- | ---- | ---- |
| **EG005(ED093)T: Total Metals by ICP-AES** | | | | | | | | |
| Aluminium | 7429-90-5 | 50 | mg/kg | 1280 | 4020 | ---- | ---- | ---- |
| Boron | 7440-42-8 | 50 | mg/kg | <50 | <50 | ---- | ---- | ---- |
| Iron | 7439-89-6 | 50 | mg/kg | 41600 | 40300 | ---- | ---- | ---- |
| **EG020T: Total Metals by ICP-MS** | | | | | | | | |
| Arsenic | 7440-38-2 | 0.1 | mg/kg | 52.2 | 290 | ---- | ---- | ---- |
| Selenium | 7782-49-2 | 1 | mg/kg | <1 | 1 | ---- | ---- | ---- |
| Silver | 7440-22-4 | 0.1 | mg/kg | 4.4 | 10.6 | ---- | ---- | ---- |
| Barium | 7440-39-3 | 0.1 | mg/kg | 3.4 | 32.1 | ---- | ---- | ---- |
| Thallium | 7440-28-0 | 0.1 | mg/kg | <0.1 | <0.1 | ---- | ---- | ---- |
| Beryllium | 7440-41-7 | 0.1 | mg/kg | 0.2 | 0.7 | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Sample ID | 2021066_0012 | 2021066_0013 | pH and EC of DI water | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | 24-Aug-2021 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2124089-011 | EB2124089-012 | EB2124089-013 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG020T: Total Metals by ICP-MS - Continued** | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.1 | mg/kg | **2.1** | **124** | ---- | ---- | ---- |
| **Bismuth** | 7440-69-9 | 0.1 | mg/kg | **17.9** | **62.4** | ---- | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.1 | mg/kg | **8.0** | **27.1** | ---- | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.1 | mg/kg | **1.9** | **24.9** | ---- | ---- | ---- |
| **Copper** | 7440-50-8 | 0.1 | mg/kg | **136** | **1040** | ---- | ---- | ---- |
| **Thorium** | 7440-29-1 | 0.1 | mg/kg | **1.4** | **6.1** | ---- | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.1 | mg/kg | **522** | **3260** | ---- | ---- | ---- |
| **Strontium** | 7440-24-6 | 0.1 | mg/kg | **83.5** | **195** | ---- | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.1 | mg/kg | **2.2** | **4.9** | ---- | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.1 | mg/kg | **7.3** | **29.1** | ---- | ---- | ---- |
| **Lead** | 7439-92-1 | 0.1 | mg/kg | **231** | **631** | ---- | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.1 | mg/kg | **0.8** | **2.1** | ---- | ---- | ---- |
| **Uranium** | 7440-61-1 | 0.1 | mg/kg | **0.1** | **0.8** | ---- | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.5 | mg/kg | **312** | **8840** | ---- | ---- | ---- |
| **Lithium** | 7439-93-2 | 0.1 | mg/kg | **4.0** | **17.7** | ---- | ---- | ---- |
| **Vanadium** | 7440-62-2 | 1 | mg/kg | **2** | **16** | ---- | ---- | ---- |
| **Tin** | 7440-31-5 | 0.1 | mg/kg | **0.2** | **0.8** | ---- | ---- | ---- |
| **EG035T: Total Recoverable Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.1 | mg/kg | <0.1 | <0.1 | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1830124** | Page | : 1 of 4 |
| Client | : **RGS ENVIRONMENTAL PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO Box 3091<br>SUNNYBANK SOUTH QLD, AUSTRALIA 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : +61 07 3344 1222 | Telephone | : +61-7-3243 7222 : |
| Project | : 201417 Mt Rawdon Tailings Project | Date Samples Received | 18-Dec-2018 15:15 : |
| Order number | : ---- | Date Analysis Commenced | 18-Dec-2018 |
| C-O-C number | : ---- | Issue Date | : 23-Dec-2018 15:40 |
| Sampler | : VERONICA CANALES | | |
| Site | : ---- | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Client sample ID | KLC 1 | KLC 3 | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 23-Dec-2018 00:00 | 23-Dec-2018 00:00 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1830124-001 | EB1830124-002 | -------- | -------- | -------- |
| | | | | Result | Result | ---- | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.60** | **7.54** | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **700** | **1210** | ---- | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | ---- | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | ---- | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **90** | **40** | ---- | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **90** | **40** | ---- | ---- | ---- |
| **ED038A: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **1** | **1** | ---- | ---- | ---- |
| **ED040F: Dissolved Major Anions** | | | | | | | | |
| Silicon | 7440-21-3 | 0.05 | mg/L | **3.70** | **8.30** | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **260** | **600** | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **1** | **1** | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **140** | **262** | ---- | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **3** | **8** | ---- | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **7** | **7** | ---- | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **9** | **25** | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | ---- | ---- | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.001** | **0.001** | ---- | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.001** | **0.001** | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | **0.0052** | **0.0059** | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | ---- | ---- | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | **0.007** | **0.012** | ---- | ---- | ---- |
| Cobalt | 7440-48-4 | 0.001 | mg/L | **0.001** | <0.001 | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | <0.001 | ---- | ---- | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | **0.981** | **0.232** | ---- | ---- | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | **0.422** | **0.022** | ---- | ---- | ---- |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | **0.020** | **0.023** | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Client sample ID | KLC 1 | KLC 3 | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 23-Dec-2018 00:00 | 23-Dec-2018 00:00 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB1830124-001 | EB1830124-002 | -------- | -------- | -------- |
| | | | | | Result | Result | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | ---- | ---- | ---- |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.05** | **0.05** | ---- | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | ---- | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.1** | **0.1** | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| **Total Anions** | ---- | 0.01 | meq/L | | **7.70** | **17.3** | ---- | ---- | ---- |
| **Total Cations** | ---- | 0.01 | meq/L | | **8.34** | **15.8** | ---- | ---- | ---- |
| **Ionic Balance** | ---- | 0.01 | % | | **3.97** | **4.39** | ---- | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2123896** | Page | : 1 of 8 |
| **Amendment** | : **1** | | |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : PO BOX 3091<br>SUNNYBANK SOUTH 4109 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2021066_MRO KLC | Date Samples Received | : 25-Aug-2021 15:17 |
| Order number | : ---- | Date Analysis Commenced | : 28-Aug-2021 |
| C-O-C number | : 26786 | Issue Date | : 03-Sep-2021 11:36 |
| Sampler | : ---- | | |
| Site | : 2021066_MRO KLC L1 | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 8 | | |
| No. of samples analysed | : 8 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |
| Vincent Muller | | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Amendment (03/09/2021): This report has been amended to alter the site details, project reference code or order number. All analysis results are as per the previous report.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC-1 | KLC-2 | KLC-3 | KLC-4 | KLC-5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 25-Aug-2021 09:59 | 25-Aug-2021 10:00 | 25-Aug-2021 10:02 | 25-Aug-2021 10:02 | 25-Aug-2021 10:03 |
| Compound | CAS Number | LOR | Unit | EB2123896-001 | EB2123896-002 | EB2123896-003 | EB2123896-004 | EB2123896-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.69 | 7.46 | 7.14 | 7.67 | 7.86 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 348 | 590 | 907 | 1950 | 703 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 35 | 22 | 14 | 54 | 33 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 35 | 22 | 14 | 54 | 33 |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 5 | 4 | 9 | 7 | 1 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 134 | 289 | 510 | 1080 | 320 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | <1 | 2 | 5 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 40 | 110 | 171 | 454 | 75 |
| Magnesium | 7439-95-4 | 1 | mg/L | 7 | 5 | 14 | 14 | 10 |
| Sodium | 7440-23-5 | 1 | mg/L | 29 | 21 | 25 | 34 | 60 |
| Potassium | 7440-09-7 | 1 | mg/L | 2 | 3 | 3 | 49 | 20 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | 0.04 | 0.04 | <0.01 | <0.01 | 0.01 |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | 0.005 | <0.001 |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | 0.35 | 0.35 | 0.45 | 0.46 | 0.27 |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | 7440-24-6 | 0.001 | mg/L | 0.353 | 0.278 | 0.701 | 1.95 | 0.384 |
| Barium | 7440-39-3 | 0.001 | mg/L | 0.006 | 0.004 | 0.008 | 0.016 | 0.005 |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | 0.002 | <0.001 | <0.001 |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | KLC-1 | KLC-2 | KLC-3 | KLC-4 | KLC-5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 25-Aug-2021 09:59 | 25-Aug-2021 10:00 | 25-Aug-2021 10:02 | 25-Aug-2021 10:02 | 25-Aug-2021 10:03 |
| Compound | CAS Number | LOR | Unit | | EB2123896-001 | EB2123896-002 | EB2123896-003 | EB2123896-004 | EB2123896-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | **0.0002** | **0.0438** | **0.0138** | **0.0029** |
| Hafnium | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tellurium | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | | <0.001 | **0.003** | **0.029** | **0.002** | <0.001 |
| Holmium | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | 7440-61-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Caesium | 7440-46-2 | 0.001 | mg/L | | **0.001** | **0.001** | **0.002** | **0.001** | **0.001** |
| Chromium | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | | **0.003** | **0.002** | **0.199** | **0.013** | **0.007** |
| Lanthanum | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.019** | <0.001 | <0.001 |
| Rubidium | 7440-17-7 | 0.001 | mg/L | | **0.003** | **0.004** | **0.004** | **0.028** | **0.015** |
| Lithium | 7439-93-2 | 0.001 | mg/L | | **0.032** | **0.029** | **0.033** | **0.046** | **0.021** |
| Lutetium | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thorium | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cerium | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.040** | <0.001 | <0.001 |
| Manganese | 7439-96-5 | 0.001 | mg/L | | **0.016** | **0.214** | **3.04** | **0.779** | **0.207** |
| Neodymium | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.016** | <0.001 | <0.001 |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | | **0.005** | **0.004** | <0.001 | **0.038** | **0.009** |
| Praseodymium | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.004** | <0.001 | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | | <0.001 | **0.005** | **0.020** | **0.007** | <0.001 |
| Samarium | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | <0.001 | <0.001 |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.028** | <0.001 | <0.001 |
| Terbium | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony | 7440-36-0 | 0.001 | mg/L | | **0.025** | **0.024** | **0.017** | **0.039** | **0.006** |
| Thulium | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | 7440-31-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Yttrium | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | **0.005** | <0.001 | <0.001 |
| Thallium | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Zirconium | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Vanadium | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Zinc | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.013** | **3.89** | **0.394** | **0.045** |
| Iron | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | KLC-1 | KLC-2 | KLC-3 | KLC-4 | KLC-5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 25-Aug-2021 09:59 | 25-Aug-2021 10:00 | 25-Aug-2021 10:02 | 25-Aug-2021 10:02 | 25-Aug-2021 10:03 |
| Compound | CAS Number | LOR | Unit | | EB2123896-001 | EB2123896-002 | EB2123896-003 | EB2123896-004 | EB2123896-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.2** | **0.1** | **0.3** | **0.2** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC-6 | KLC-1A | KLC-3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 25-Aug-2021 10:04 | 25-Aug-2021 10:04 | 25-Aug-2021 10:05 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2123896-006 | EB2123896-007 | EB2123896-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.82** | **7.97** | **7.79** | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2670** | **1050** | **1080** | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **67** | **111** | **69** | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **67** | **111** | **69** | ---- | ---- |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **8** | **6** | **3** | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1560** | **516** | **529** | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **8** | **2** | **2** | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **538** | **246** | **240** | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **51** | **4** | **6** | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **146** | **9** | **7** | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **50** | **11** | **30** | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.03** | <0.01 | <0.01 | ---- | ---- |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.008** | **0.002** | **0.001** | ---- | ---- |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Boron | 7440-42-8 | 0.05 | mg/L | **1.28** | **0.18** | **0.10** | ---- | ---- |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Strontium | 7440-24-6 | 0.001 | mg/L | **3.43** | **1.80** | **1.23** | ---- | ---- |
| Barium | 7440-39-3 | 0.001 | mg/L | **0.018** | **0.021** | **0.014** | ---- | ---- |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC-6 | KLC-1A | KLC-3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 25-Aug-2021 10:04 | 25-Aug-2021 10:04 | 25-Aug-2021 10:05 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2123896-006 | EB2123896-007 | EB2123896-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0343** | **0.0118** | **0.0073** | ---- | ---- |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | **0.007** | **0.002** | **0.001** | ---- | ---- |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | <0.001 | **0.002** | <0.001 | ---- | ---- |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | **0.004** | <0.001 | **0.001** | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | **0.002** | ---- | ---- |
| **Indium** | 7440-74-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **0.038** | **0.011** | **0.048** | ---- | ---- |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | **0.035** | **0.009** | **0.020** | ---- | ---- |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | **0.087** | **0.015** | **0.037** | ---- | ---- |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.619** | **0.433** | **0.060** | ---- | ---- |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.010** | **0.016** | **0.024** | ---- | ---- |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.371** | **0.001** | <0.001 | ---- | ---- |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.103** | **0.002** | **0.003** | ---- | ---- |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Tin** | 7440-31-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **1.38** | **1.07** | **0.285** | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | ---- | ---- |

## Analytical Results

| Sub-Matrix: **WATER** (Matrix: **WATER**) | | | | Sample ID | **KLC-6** | **KLC-1A** | **KLC-3A** | **----** | **----** |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 25-Aug-2021 10:04 | 25-Aug-2021 10:04 | 25-Aug-2021 10:05 | ---- | ---- |
| *Compound* | *CAS Number* | *LOR* | *Unit* | | **EB2123896-006** | **EB2123896-007** | **EB2123896-008** | **--------** | **--------** |
| | | | | | Result | Result | Result | ---- | ---- |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | **----** | **----** |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.4** | <0.1 | **0.2** | **----** | **----** |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2134162** | Page | : 1 of 8 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4107 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61 7 3552 8616 |
| Project | : 2021066 MRO KLC | Date Samples Received | : 25-Nov-2021 16:27 |
| Order number | : | Date Analysis Commenced | : 01-Dec-2021 |
| C-O-C number | : 30717 | Issue Date | : 06-Dec-2021 17:12 |
| Sampler | : ALAN ROBERTSON, RGS LABORATORY | | |
| Site | : 2021066 MRO KLC L2 | | |
| Quote number | : BN/1234/19 | | |
| No. of samples received | : 8 | | |
| No. of samples analysed | : 8 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC-1 | KLC-2 | KLC-3 | KLC-4 | KLC-5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 25-Nov-2021 13:51 | 25-Nov-2021 13:52 | 25-Nov-2021 13:52 | 25-Nov-2021 13:53 | 25-Nov-2021 13:53 |
| Compound | CAS Number | LOR | Unit | EB2134162-001 | EB2134162-002 | EB2134162-003 | EB2134162-004 | EB2134162-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.41 | 7.24 | 7.06 | 7.64 | 7.67 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 226 | 574 | 506 | 2050 | 659 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 26 | 15 | 10 | 50 | 37 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 26 | 15 | 10 | 50 | 37 |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 6 | 4 | 4 | 6 | 2 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 76 | 270 | 235 | 1250 | 282 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | 1 | 4 | 3 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 26 | 104 | 91 | 491 | 52 |
| Magnesium | 7439-95-4 | 1 | mg/L | 4 | 5 | 6 | 17 | 8 |
| Sodium | 7440-23-5 | 1 | mg/L | 10 | 9 | 6 | 33 | 57 |
| Potassium | 7440-09-7 | 1 | mg/L | 2 | 2 | 2 | 43 | 16 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | 0.005 | <0.001 | 0.017 | 0.002 |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | 0.26 | 0.39 | 0.26 | 0.56 | 0.20 |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | 7440-24-6 | 0.001 | mg/L | 0.196 | 0.260 | 0.308 | 2.46 | 0.317 |
| Barium | 7440-39-3 | 0.001 | mg/L | 0.004 | 0.004 | 0.004 | 0.022 | 0.006 |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | KLC-1 | KLC-2 | KLC-3 | KLC-4 | KLC-5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 25-Nov-2021 13:51 | 25-Nov-2021 13:52 | 25-Nov-2021 13:52 | 25-Nov-2021 13:53 | 25-Nov-2021 13:53 |
| Compound | CAS Number | LOR | Unit | | EB2134162-001 | EB2134162-002 | EB2134162-003 | EB2134162-004 | EB2134162-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | **0.0064** | **0.0149** | **0.0013** |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | **0.002** | <0.001 |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.001** | <0.001 |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.002** | **0.002** |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | **0.006** | <0.001 |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.001** | <0.001 | <0.001 |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | **0.001** | **0.003** | **0.002** | **0.030** | **0.010** |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.025** | **0.031** | **0.028** | **0.060** | **0.016** |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.020** | **0.035** | **0.532** | **0.997** | **0.080** |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.004** | **0.008** | <0.001 | **0.057** | **0.008** |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.001** | **0.004** | <0.001 |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Lead** | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.003** | <0.001 | <0.001 |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | | **0.032** | **0.030** | **0.020** | **0.065** | **0.009** |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Tin** | 7440-31-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.002** | <0.001 |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.007** | **0.254** | **0.323** | **0.012** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | KLC-1 | KLC-2 | KLC-3 | KLC-4 | KLC-5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 25-Nov-2021 13:51 | 25-Nov-2021 13:52 | 25-Nov-2021 13:52 | 25-Nov-2021 13:53 | 25-Nov-2021 13:53 |
| Compound | CAS Number | LOR | Unit | | EB2134162-001 | EB2134162-002 | EB2134162-003 | EB2134162-004 | EB2134162-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.3** | **0.1** | **0.4** | **0.2** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC-6 | KLC - 1A | KLC - 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 25-Nov-2021 13:54 | 25-Nov-2021 13:54 | 25-Nov-2021 13:55 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2134162-006 | EB2134162-007 | EB2134162-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.50** | **8.03** | **7.77** | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2360** | **886** | **1000** | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **32** | **117** | **59** | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **32** | **117** | **59** | ---- | ---- |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **6** | **7** | **7** | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1430** | **395** | **500** | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **22** | **2** | **2** | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **436** | **189** | **214** | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **43** | **3** | **5** | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **123** | **6** | **4** | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **54** | **10** | **25** | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.007** | **0.001** | **0.002** | ---- | ---- |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.74** | **0.18** | **0.14** | ---- | ---- |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Strontium | 7440-24-6 | 0.001 | mg/L | **3.19** | **1.39** | **1.17** | ---- | ---- |
| Barium | 7440-39-3 | 0.001 | mg/L | **0.022** | **0.019** | **0.018** | ---- | ---- |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC-6 | KLC - 1A | KLC - 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 25-Nov-2021 13:54 | 25-Nov-2021 13:54 | 25-Nov-2021 13:55 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2134162-006 | EB2134162-007 | EB2134162-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0173** | **0.0128** | **0.0048** | ---- | ---- |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | <0.001 | **0.002** | <0.001 | ---- | ---- |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | <0.001 | **0.002** | <0.001 | ---- | ---- |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | **0.007** | **0.001** | **0.002** | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | **0.002** | ---- | ---- |
| **Indium** | 7440-74-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **0.002** | **0.016** | **0.014** | ---- | ---- |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | **0.038** | **0.008** | **0.019** | ---- | ---- |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | **0.090** | **0.015** | **0.036** | ---- | ---- |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.021** | **0.178** | **0.039** | ---- | ---- |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.010** | **0.014** | **0.036** | ---- | ---- |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.017** | **0.001** | <0.001 | ---- | ---- |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.049** | **0.002** | **0.003** | ---- | ---- |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Tin** | 7440-31-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.420** | **1.29** | **0.136** | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC-6 | KLC - 1A | KLC - 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 25-Nov-2021 13:54 | 25-Nov-2021 13:54 | 25-Nov-2021 13:55 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2134162-006 | EB2134162-007 | EB2134162-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | **----** | **----** |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.5** | <0.1 | **0.2** | **----** | **----** |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2204864** | Page | : 1 of 8 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Customer Services EB |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4107 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61-7-3243 7222 |
| Project | : 2021066 MRO KLC | Date Samples Received | : 22-Feb-2022 16:21 |
| Order number | : RGSENVCON | Date Analysis Commenced | : 23-Feb-2022 |
| C-O-C number | : ---- | Issue Date | : 02-Mar-2022 15:16 |
| Sampler | : LEXI NG | | |
| Site | : ---- | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 8 | | |
| No. of samples analysed | : 8 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC1 L3 | KLC2 L3 | KLC3 L3 | KLC4 L3 | KLC5 L3 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 |
| Compound | CAS Number | LOR | Unit | EB2204864-001 | EB2204864-002 | EB2204864-003 | EB2204864-004 | EB2204864-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.01 | 6.50 | 6.37 | 7.03 | 6.45 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 331 | 457 | 380 | 2080 | 729 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 22 | 13 | 8 | 45 | 18 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 22 | 13 | 8 | 45 | 18 |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 4 | 4 | 4 | 7 | 3 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 122 | 197 | 162 | 1140 | 314 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | <1 | <1 | 2 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 38 | 76 | 63 | 476 | 65 |
| Magnesium | 7439-95-4 | 1 | mg/L | 6 | 3 | 4 | 14 | 12 |
| Sodium | 7440-23-5 | 1 | mg/L | 16 | 8 | 5 | 26 | 60 |
| Potassium | 7440-09-7 | 1 | mg/L | 2 | 2 | 1 | 38 | 20 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | 0.02 | 0.01 | <0.01 | <0.01 | <0.01 |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | 0.001 | 0.005 | <0.001 | 0.015 | 0.002 |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | 0.26 | 0.39 | 0.21 | 0.61 | 0.23 |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | 7440-24-6 | 0.001 | mg/L | 0.317 | 0.193 | 0.217 | 2.14 | 0.400 |
| Barium | 7440-39-3 | 0.001 | mg/L | 0.007 | 0.003 | 0.003 | 0.022 | 0.008 |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

## Analytical Results

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

| Compound | CAS Number | LOR | Unit | Sample ID | KLC1 L3 | KLC2 L3 | KLC3 L3 | KLC4 L3 | KLC5 L3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 |
| | | | | | EB2204864-001 | EB2204864-002 | EB2204864-003 | EB2204864-004 | EB2204864-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | **0.0039** | **0.0125** | **0.0017** |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | <0.001 | **0.001** | **0.002** | <0.001 |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.001** | <0.001 |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.001** | **0.002** |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.007** | **0.008** | **0.004** |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | **0.002** | **0.002** | **0.002** | **0.026** | **0.012** |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.033** | **0.026** | **0.020** | **0.061** | **0.020** |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.022** | **0.022** | **0.191** | **0.800** | **0.092** |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.009** | **0.008** | <0.001 | **0.054** | **0.010** |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.004** | <0.001 |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Lead** | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | <0.001 | <0.001 |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | | **0.036** | **0.033** | **0.020** | **0.080** | **0.009** |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Tin** | 7440-31-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.002** | <0.001 |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | | <0.005 | <0.005 | **0.225** | **0.201** | **0.012** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | KLC1 L3 | KLC2 L3 | KLC3 L3 | KLC4 L3 | KLC5 L3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2204864-001 | EB2204864-002 | EB2204864-003 | EB2204864-004 | EB2204864-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.2** | <0.1 | **0.3** | **0.1** |
| **EN055: Ionic Balance** | | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | | **2.98** | **4.36** | **3.53** | **24.6** | **6.95** |
| ø **Total Cations** | ---- | 0.01 | meq/L | | **3.14** | **4.44** | **3.72** | **27.0** | **7.35** |
| ø **Ionic Balance** | ---- | 0.01 | % | | **----** | **0.88** | **2.53** | **4.60** | **2.79** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC6 L3 | KLC1A L3 | KLC3A L3 | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2204864-006 | EB2204864-007 | EB2204864-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **6.78** | **7.63** | **7.02** | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2530** | **874** | **858** | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **31** | **109** | **54** | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **31** | **109** | **54** | ---- | ---- |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **6** | **4** | **4** | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1400** | **362** | **367** | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **10** | **1** | <1 | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **448** | **184** | **169** | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **38** | **3** | **4** | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **91** | **6** | **3** | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **46** | **9** | **20** | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.03** | <0.01 | <0.01 | ---- | ---- |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.009** | **0.002** | **0.002** | ---- | ---- |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Boron | 7440-42-8 | 0.05 | mg/L | **1.02** | **0.22** | **0.14** | ---- | ---- |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Strontium | 7440-24-6 | 0.001 | mg/L | **2.77** | **1.32** | **0.929** | ---- | ---- |
| Barium | 7440-39-3 | 0.001 | mg/L | **0.021** | **0.020** | **0.014** | ---- | ---- |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | KLC6 L3 | KLC1A L3 | KLC3A L3 | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB2204864-006 | EB2204864-007 | EB2204864-008 | -------- | -------- |
| | | | | | Result | Result | Result | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | **0.0167** | **0.0105** | **0.0032** | ---- | ---- |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | **0.001** | <0.001 | ---- | ---- |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | <0.001 | **0.002** | <0.001 | ---- | ---- |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | **0.005** | <0.001 | <0.001 | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | ---- | ---- |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | **0.005** | **0.015** | **0.013** | ---- | ---- |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | **0.031** | **0.008** | **0.013** | ---- | ---- |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.088** | **0.015** | **0.029** | ---- | ---- |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.022** | **0.124** | **0.026** | ---- | ---- |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.016** | **0.015** | **0.032** | ---- | ---- |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | | **0.023** | <0.001 | <0.001 | ---- | ---- |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | | **0.086** | **0.001** | **0.002** | ---- | ---- |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Tin** | 7440-31-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | | **0.460** | **0.982** | **0.108** | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC6 L3 | KLC1A L3 | KLC3A L3 | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | 22-Feb-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2204864-006 | EB2204864-007 | EB2204864-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | **----** | **----** |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | **----** | **----** |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.5** | <0.1 | **0.1** | **----** | **----** |
| **EN055: Ionic Balance** | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | **30.0** | **9.74** | **8.72** | **----** | **----** |
| ø **Total Cations** | ---- | 0.01 | meq/L | **30.6** | **9.92** | **9.40** | **----** | **----** |
| ø **Ionic Balance** | ---- | 0.01 | % | **0.94** | **0.90** | **3.78** | **----** | **----** |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2214553** | Page | : 1 of 8 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4107 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61 7 3552 8616 |
| Project | : 2021066 MRO KLC | Date Samples Received | : 24-May-2022 15:02 |
| Order number | : ---- | Date Analysis Commenced | : 25-May-2022 |
| C-O-C number | : ---- | Issue Date | : 02-Jun-2022 19:22 |
| Sampler | : LE XI NG | | |
| Site | : | | |
| Quote number | : BN/1234/19 | | |
| No. of samples received | : 8 | | |
| No. of samples analysed | : 8 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |
| Mark Hallas | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- EG020-F (Dissolved Metals by ICP-MS): The high failing laboratory control standard for Thallium is deemed acceptable as all results are less than the limit of reporting.
- EG020-F (Dissolved Metals by ICP-MS): The high failing laboratory control standard for Zirconium is deemed acceptable as all results are less than the limit of reporting.
- Ionic Balance out of acceptable limits due to analytes not quantified in this report.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 4 | KLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 |
| Compound | CAS Number | LOR | Unit | EB2214553-001 | EB2214553-002 | EB2214553-003 | EB2214553-004 | EB2214553-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.57 | 6.62 | 6.44 | 7.23 | 6.76 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 160 | 553 | 375 | 1750 | 838 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 22 | 10 | 6 | 38 | 15 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 22 | 10 | 6 | 38 | 15 |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 2 | 2 | 2 | 4 | 2 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 47 | 252 | 160 | 972 | 371 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | <1 | <1 | 4 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 18 | 105 | 66 | 365 | 71 |
| Magnesium | 7439-95-4 | 1 | mg/L | 3 | 4 | 4 | 9 | 12 |
| Sodium | 7440-23-5 | 1 | mg/L | 8 | 9 | 5 | 13 | 80 |
| Potassium | 7440-09-7 | 1 | mg/L | <1 | 2 | 1 | 24 | 27 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | 0.04 | <0.01 | <0.01 | <0.01 | <0.01 |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | 0.006 | <0.001 | 0.011 | 0.002 |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | 0.20 | 0.43 | 0.20 | 0.31 | 0.18 |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | 7440-24-6 | 0.001 | mg/L | 0.121 | 0.246 | 0.203 | 1.71 | 0.428 |
| Barium | 7440-39-3 | 0.001 | mg/L | 0.002 | 0.004 | 0.003 | 0.018 | 0.009 |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 4 | KLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 |
| Compound | CAS Number | LOR | Unit | EB2214553-001 | EB2214553-002 | EB2214553-003 | EB2214553-004 | EB2214553-005 |
| | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | **0.0044** | **0.0148** | **0.0019** |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **0.001** | **0.002** |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Indium** | 7440-74-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper** | 7440-50-8 | 0.001 | mg/L | <0.001 | <0.001 | **0.009** | **0.005** | **0.005** |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | <0.001 | <0.001 | **0.001** | <0.001 | <0.001 |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | **0.001** | **0.002** | **0.001** | **0.019** | **0.013** |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | **0.020** | **0.037** | **0.022** | **0.038** | **0.022** |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | <0.001 | <0.001 | **0.001** | <0.001 | <0.001 |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.018** | **0.021** | **0.147** | **0.598** | **0.094** |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.004** | **0.011** | **0.001** | **0.039** | **0.011** |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **0.002** | <0.001 |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | **0.004** | <0.001 | <0.001 |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.040** | **0.044** | **0.022** | **0.041** | **0.010** |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Tin** | 7440-31-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | <0.005 | <0.005 | **0.244** | **0.250** | <0.005 |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC 1 | KLC 2 | KLC 3 | KLC 4 | KLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 |
| Compound | CAS Number | LOR | Unit | EB2214553-001 | EB2214553-002 | EB2214553-003 | EB2214553-004 | EB2214553-005 |
| | | | | Result | Result | Result | Result | Result |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.2** | **0.2** | <0.1 | **0.3** | **0.1** |
| **EN055: Ionic Balance** | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | **1.42** | **5.45** | **3.45** | **21.0** | **8.14** |
| ø **Total Cations** | ---- | 0.01 | meq/L | **1.49** | **6.01** | **3.86** | **20.1** | **8.70** |
| ø **Ionic Balance** | ---- | 0.01 | % | **----** | **4.93** | **5.66** | **2.10** | **3.35** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC 6 | KLC 1A | KLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2214553-006 | EB2214553-007 | EB2214553-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.07** | **7.87** | **7.45** | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2020** | **548** | **722** | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **30** | **90** | **48** | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **30** | **90** | **48** | ---- | ---- |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **4** | **2** | **2** | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1170** | **173** | **287** | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **7** | <1 | <1 | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **420** | **113** | **151** | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **30** | **2** | **3** | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **62** | **3** | **3** | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **42** | **6** | **17** | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.02** | <0.01 | <0.01 | ---- | ---- |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.009** | **0.002** | **0.002** | ---- | ---- |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.58** | **0.11** | **0.13** | ---- | ---- |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Strontium | 7440-24-6 | 0.001 | mg/L | **2.38** | **0.802** | **0.751** | ---- | ---- |
| Barium | 7440-39-3 | 0.001 | mg/L | **0.016** | **0.016** | **0.017** | ---- | ---- |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC 6 | KLC 1A | KLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2214553-006 | EB2214553-007 | EB2214553-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0162** | **0.0071** | **0.0026** | ---- | ---- |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | **0.004** | <0.001 | <0.001 | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | **0.002** | ---- | ---- |
| **Indium** | 7440-74-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **0.004** | **0.015** | **0.012** | ---- | ---- |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | **0.026** | **0.005** | **0.010** | ---- | ---- |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | **0.094** | **0.010** | **0.027** | ---- | ---- |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.019** | **0.059** | **0.020** | ---- | ---- |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.014** | **0.014** | **0.038** | ---- | ---- |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.019** | <0.001 | <0.001 | ---- | ---- |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.066** | **0.002** | **0.003** | ---- | ---- |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Tin** | 7440-31-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.431** | **0.620** | **0.066** | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | KLC 6 | KLC 1A | KLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-May-2022 00:00 | 24-May-2022 00:00 | 24-May-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2214553-006 | EB2214553-007 | EB2214553-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.4** | <0.1 | **0.1** | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | **25.2** | **5.40** | **6.93** | ---- | ---- |
| ø **Total Cations** | ---- | 0.01 | meq/L | **27.2** | **6.09** | **8.35** | ---- | ---- |
| ø **Ionic Balance** | ---- | 0.01 | % | **3.90** | **5.98** | **9.24** | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2224653** | Page | : 1 of 8 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4108 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61 7 3552 8616 |
| Project | : 2021066 MRO KLC | Date Samples Received | : 23-Aug-2022 14:56 |
| Order number | : ---- | Date Analysis Commenced | : 24-Aug-2022 |
| C-O-C number | : ---- | Issue Date | : 29-Aug-2022 14:15 |
| Sampler | : Le Xi K ng | | |
| Site | : ---- | | |
| Quote number | : BN/1234/19 | | |
| No. of samples received | : 8 | | |
| No. of samples analysed | : 8 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

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

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 |
| Compound | CAS Number | LOR | Unit | EB2224653-001 | EB2224653-002 | EB2224653-003 | EB2224653-004 | EB2224653-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.70** | **7.27** | **6.83** | **7.72** | **7.55** |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **177** | **535** | **344** | **1500** | **722** |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **21** | **9** | **4** | **41** | **15** |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **21** | **9** | **4** | **41** | **15** |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | <1 | **2** | **2** | **3** | **1** |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **56** | **231** | **140** | **761** | **292** |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | <1 | <1 | **3** |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **19** | **87** | **51** | **295** | **54** |
| Magnesium | 7439-95-4 | 1 | mg/L | **3** | **4** | **4** | **6** | **10** |
| Sodium | 7440-23-5 | 1 | mg/L | **11** | **12** | **4** | **9** | **58** |
| Potassium | 7440-09-7 | 1 | mg/L | **1** | **2** | <1 | **20** | **18** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.03** | <0.01 | **0.01** | <0.01 | <0.01 |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.001** | **0.006** | <0.001 | **0.005** | **0.001** |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.27** | **0.44** | **0.13** | **0.23** | **0.15** |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | 7440-24-6 | 0.001 | mg/L | **0.140** | **0.227** | **0.184** | **1.30** | **0.344** |
| Barium | 7440-39-3 | 0.001 | mg/L | **0.003** | **0.004** | **0.002** | **0.014** | **0.007** |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2224653-001 | EB2224653-002 | EB2224653-003 | EB2224653-004 | EB2224653-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | **0.0034** | **0.0201** | **0.0016** |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | **0.002** |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.008** | **0.005** | **0.004** |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | <0.001 | **0.002** | **0.001** | **0.014** | **0.011** |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.016** | **0.023** | **0.013** | **0.036** | **0.015** |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.018** | **0.019** | **0.090** | **0.539** | **0.075** |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.006** | **0.010** | <0.001 | **0.036** | **0.010** |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.002** | <0.001 |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Lead** | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.004** | <0.001 | <0.001 |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | | **0.046** | **0.054** | **0.021** | **0.036** | **0.009** |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Tin** | 7440-31-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.010** | **0.218** | **0.516** | **0.012** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 |
| Compound | CAS Number | LOR | Unit | EB2224653-001 | EB2224653-002 | EB2224653-003 | EB2224653-004 | EB2224653-005 |
| | | | | Result | Result | Result | Result | Result |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.2** | **0.2** | <0.1 | **0.2** | **0.1** |
| **EN055: Ionic Balance** | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | **1.58** | **4.99** | **2.99** | **16.7** | **6.46** |
| ø **Total Cations** | ---- | 0.01 | meq/L | **1.70** | **5.24** | **3.05** | **16.1** | **6.50** |
| ø **Ionic Balance** | ---- | 0.01 | % | **----** | **2.48** | **----** | **1.66** | **0.28** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2224653-006 | EB2224653-007 | EB2224653-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.53** | **8.01** | **7.84** | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2130** | **422** | **637** | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **28** | **91** | **56** | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **28** | **91** | **56** | ---- | ---- |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **4** | **3** | **2** | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1130** | **104** | **223** | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **6** | <1 | <1 | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **379** | **74** | **109** | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **32** | **1** | **2** | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **67** | **2** | **2** | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **40** | **4** | **12** | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.01** | <0.01 | <0.01 | ---- | ---- |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.008** | **0.001** | **0.002** | ---- | ---- |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.50** | **0.06** | **0.10** | ---- | ---- |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Strontium | 7440-24-6 | 0.001 | mg/L | **2.25** | **0.624** | **0.680** | ---- | ---- |
| Barium | 7440-39-3 | 0.001 | mg/L | **0.015** | **0.020** | **0.016** | ---- | ---- |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2224653-006 | EB2224653-007 | EB2224653-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0197** | **0.0063** | **0.0022** | ---- | ---- |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | **0.004** | <0.001 | <0.001 | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Indium** | 7440-74-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **0.003** | **0.011** | **0.010** | ---- | ---- |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | **0.025** | **0.004** | **0.007** | ---- | ---- |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | **0.065** | **0.005** | **0.018** | ---- | ---- |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.015** | **0.030** | **0.017** | ---- | ---- |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.010** | **0.015** | **0.025** | ---- | ---- |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.020** | <0.001 | <0.001 | ---- | ---- |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.061** | **0.001** | **0.001** | ---- | ---- |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Tin** | 7440-31-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.582** | **0.530** | **0.087** | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | 23-Aug-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2224653-006 | EB2224653-007 | EB2224653-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.4** | <0.1 | **0.1** | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | **24.2** | **3.98** | **5.76** | ---- | ---- |
| ø **Total Cations** | ---- | 0.01 | meq/L | **25.5** | **3.96** | **6.00** | ---- | ---- |
| ø **Ionic Balance** | ---- | 0.01 | % | **2.47** | **0.24** | **2.00** | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2235214** | Page | : 1 of 8 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4108 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61 7 3552 8616 |
| Project | : 2021066 MRO KLC | Date Samples Received | : 24-Nov-2022 16:11 |
| Order number | : ---- | Date Analysis Commenced | : 25-Nov-2022 |
| C-O-C number | : ---- | Issue Date | : 02-Dec-2022 12:25 |
| Sampler | : Le Xi K ng | | |
| Site | : | | |
| Quote number | : BN/1234/19 | | |
| No. of samples received | : 8 | | |
| No. of samples analysed | : 8 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Ionic Balance out of acceptable limits for some samples due to analytes not quantified in this report.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 |
| Compound | CAS Number | LOR | Unit | EB2235214-001 | EB2235214-002 | EB2235214-003 | EB2235214-004 | EB2235214-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.27 | 6.96 | 6.51 | 7.53 | 7.17 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 146 | 545 | 506 | 1340 | 964 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 26 | 18 | 8 | 48 | 18 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 26 | 18 | 8 | 48 | 18 |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 3 | 6 | 6 | 9 | 5 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 43 | 262 | 244 | 994 | 454 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | <1 | <1 | 6 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 15 | 99 | 84 | 420 | 72 |
| Magnesium | 7439-95-4 | 1 | mg/L | 2 | 4 | 7 | 8 | 18 |
| Sodium | 7440-23-5 | 1 | mg/L | 8 | 8 | 6 | 20 | 92 |
| Potassium | 7440-09-7 | 1 | mg/L | 1 | 2 | 1 | 25 | 30 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | 0.04 | <0.01 | <0.01 | <0.01 | <0.01 |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | 0.001 | 0.006 | <0.001 | 0.008 | 0.002 |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | 0.21 | 0.39 | 0.22 | 0.64 | 0.14 |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | 7440-24-6 | 0.001 | mg/L | 0.104 | 0.211 | 0.248 | 1.66 | 0.472 |
| Barium | 7440-39-3 | 0.001 | mg/L | 0.003 | 0.004 | 0.005 | 0.020 | 0.009 |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 |
| Compound | CAS Number | LOR | Unit | EB2235214-001 | EB2235214-002 | EB2235214-003 | EB2235214-004 | EB2235214-005 |
| | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | **0.0057** | **0.0126** | **0.0019** |
| Hafnium | 7440-58-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tellurium | 22541-49-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Holmium | 7440-60-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | 7440-61-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Caesium | 7440-46-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **0.001** | **0.003** |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | 7440-74-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | <0.001 | **0.007** | **0.006** | **0.008** |
| Lanthanum | 7439-91-0 | 0.001 | mg/L | <0.001 | <0.001 | **0.001** | <0.001 | <0.001 |
| Rubidium | 7440-17-7 | 0.001 | mg/L | **0.001** | **0.002** | **0.002** | **0.018** | **0.017** |
| Lithium | 7439-93-2 | 0.001 | mg/L | **0.015** | **0.024** | **0.020** | **0.044** | **0.026** |
| Lutetium | 7439-94-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thorium | 7440-29-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cerium | 7440-45-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Manganese | 7439-96-5 | 0.001 | mg/L | **0.017** | **0.014** | **0.129** | **0.232** | **0.085** |
| Neodymium | 7440-00-8 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | **0.004** | **0.011** | <0.001 | **0.043** | **0.015** |
| Praseodymium | 7440-10-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | <0.001 | **0.001** | **0.001** | <0.001 |
| Samarium | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | **0.003** | <0.001 | <0.001 |
| Terbium | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.040** | **0.054** | **0.024** | **0.094** | **0.009** |
| Thulium | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | 7440-31-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Yttrium | 7440-65-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Zirconium | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Vanadium | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | **0.009** | **0.290** | **0.205** | **0.014** |
| Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 |
| Compound | CAS Number | LOR | Unit | EB2235214-001 | EB2235214-002 | EB2235214-003 | EB2235214-004 | EB2235214-005 |
| | | | | Result | Result | Result | Result | Result |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.1** | **0.2** | **0.1** | **0.3** | **0.2** |
| **EN055: Ionic Balance** | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | **1.41** | **5.81** | **5.24** | **21.6** | **9.98** |
| ø **Total Cations** | ---- | 0.01 | meq/L | **1.29** | **5.67** | **5.05** | **23.1** | **9.84** |
| ø **Ionic Balance** | ---- | 0.01 | % | **----** | **1.27** | **1.80** | **3.28** | **0.70** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2235214-006 | EB2235214-007 | EB2235214-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.60** | **7.83** | **7.66** | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2170** | **298** | **535** | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **36** | **106** | **69** | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **36** | **106** | **69** | ---- | ---- |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **7** | **7** | **6** | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1260** | **62** | **198** | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **6** | <1 | <1 | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **395** | **63** | **113** | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **30** | <1 | **2** | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **55** | **3** | **2** | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **40** | **4** | **12** | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.02** | <0.01 | <0.01 | ---- | ---- |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.008** | **0.001** | **0.002** | ---- | ---- |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.57** | **0.06** | **0.16** | ---- | ---- |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Strontium | 7440-24-6 | 0.001 | mg/L | **2.27** | **0.434** | **0.564** | ---- | ---- |
| Barium | 7440-39-3 | 0.001 | mg/L | **0.017** | **0.027** | **0.020** | ---- | ---- |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2235214-006 | EB2235214-007 | EB2235214-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0194** | **0.0078** | **0.0020** | ---- | ---- |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | **0.005** | <0.001 | <0.001 | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Indium** | 7440-74-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **0.006** | **0.012** | **0.010** | ---- | ---- |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | **0.025** | **0.003** | **0.006** | ---- | ---- |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | **0.070** | **0.004** | **0.016** | ---- | ---- |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.061** | **0.019** | **0.013** | ---- | ---- |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.013** | **0.015** | **0.027** | ---- | ---- |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.032** | <0.001 | <0.001 | ---- | ---- |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.080** | **0.002** | **0.002** | ---- | ---- |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Tin** | 7440-31-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.491** | **0.499** | **0.063** | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | 24-Nov-2022 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2235214-006 | EB2235214-007 | EB2235214-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.4** | <0.1 | **0.1** | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | **27.1** | **3.41** | **5.50** | ---- | ---- |
| ø **Total Cations** | ---- | 0.01 | meq/L | **25.6** | **3.38** | **6.20** | ---- | ---- |
| ø **Ionic Balance** | ---- | 0.01 | % | **2.90** | **0.48** | **5.95** | ---- | ---- |

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2305995** | Page | : 1 of 8 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4108 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61 7 3552 8616 |
| Project | : 2021066 MRO KLC | Date Samples Received | : 28-Feb-2023 14:35 |
| Order number | : ---- | Date Analysis Commenced | : 01-Mar-2023 |
| C-O-C number | : ---- | Issue Date | : 09-Mar-2023 13:35 |
| Sampler | : PRIYA RAJENDRAN | | |
| Site | : | | |
| Quote number | : BN/1234/19 | | |
| No. of samples received | : 8 | | |
| No. of samples analysed | : 8 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Ionic Balance out of acceptable limits due to analytes not quantified in this report.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 |
| Compound | CAS Number | LOR | Unit | EB2305995-001 | EB2305995-002 | EB2305995-003 | EB2305995-004 | EB2305995-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | 7.28 | 6.86 | 6.48 | 7.46 | 7.24 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | 180 | 481 | 579 | 1630 | 763 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | 21 | 10 | 5 | 52 | 21 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 21 | 10 | 5 | 52 | 21 |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | 1 | 2 | 4 | 4 | <1 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 62 | 224 | 290 | 936 | 354 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | <1 | <1 | 1 |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 21 | 88 | 99 | 322 | 73 |
| Magnesium | 7439-95-4 | 1 | mg/L | 4 | 3 | 9 | 6 | 14 |
| Sodium | 7440-23-5 | 1 | mg/L | 11 | 8 | 8 | 12 | 47 |
| Potassium | 7440-09-7 | 1 | mg/L | 2 | 2 | 2 | 22 | 21 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | 0.06 | 0.01 | <0.01 | <0.01 | <0.01 |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | 0.001 | 0.007 | <0.001 | 0.007 | 0.002 |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | 0.34 | 0.40 | 0.33 | 0.43 | 0.26 |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | 7440-24-6 | 0.001 | mg/L | 0.152 | 0.204 | 0.336 | 1.62 | 0.446 |
| Barium | 7440-39-3 | 0.001 | mg/L | 0.005 | 0.004 | 0.005 | 0.019 | 0.008 |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2305995-001 | EB2305995-002 | EB2305995-003 | EB2305995-004 | EB2305995-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | **0.0127** | **0.0198** | **0.0023** |
| Hafnium | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tellurium | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | <0.001 | <0.001 |
| Holmium | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | 7440-61-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.001** | <0.001 |
| Caesium | 7440-46-2 | 0.001 | mg/L | | <0.001 | <0.001 | **0.001** | **0.001** | **0.002** |
| Chromium | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | | <0.001 | **0.001** | **0.032** | **0.006** | **0.010** |
| Lanthanum | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.003** | <0.001 | <0.001 |
| Rubidium | 7440-17-7 | 0.001 | mg/L | | **0.001** | **0.003** | **0.002** | **0.018** | **0.013** |
| Lithium | 7439-93-2 | 0.001 | mg/L | | **0.024** | **0.028** | **0.030** | **0.048** | **0.030** |
| Lutetium | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thorium | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cerium | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.003** | <0.001 | <0.001 |
| Manganese | 7439-96-5 | 0.001 | mg/L | | **0.020** | **0.018** | **0.319** | **0.244** | **0.109** |
| Neodymium | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.001** | <0.001 | <0.001 |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | | **0.007** | **0.011** | <0.001 | **0.034** | **0.009** |
| Praseodymium | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | **0.002** | <0.001 |
| Samarium | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.006** | <0.001 | <0.001 |
| Terbium | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony | 7440-36-0 | 0.001 | mg/L | | **0.046** | **0.041** | **0.030** | **0.075** | **0.011** |
| Thulium | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | 7440-31-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Yttrium | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Zirconium | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Vanadium | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Zinc | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.005** | **0.721** | **0.486** | **0.018** |
| Iron | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2305995-001 | EB2305995-002 | EB2305995-003 | EB2305995-004 | EB2305995-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.2** | **0.1** | **0.2** | **0.2** |
| **EN055: Ionic Balance** | | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | | **1.71** | **4.86** | **6.14** | **20.5** | **7.82** |
| ø **Total Cations** | ---- | 0.01 | meq/L | | **1.91** | **5.04** | **6.08** | **17.6** | **7.38** |
| ø **Ionic Balance** | ---- | 0.01 | % | | **----** | **1.75** | **0.47** | **7.54** | **2.91** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2305995-006 | EB2305995-007 | EB2305995-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.32** | **7.95** | **7.78** | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2160** | **343** | **455** | ---- | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | ---- | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **37** | **97** | **65** | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **37** | **97** | **65** | ---- | ---- |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **4** | **2** | **2** | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1210** | **77** | **139** | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **4** | <1 | <1 | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **401** | **75** | **89** | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **29** | <1 | **2** | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **53** | **2** | **2** | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **39** | **4** | **11** | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.03** | <0.01 | <0.01 | ---- | ---- |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.011** | **0.001** | **0.002** | ---- | ---- |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Boron | 7440-42-8 | 0.05 | mg/L | **1.04** | **0.06** | **0.08** | ---- | ---- |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Strontium | 7440-24-6 | 0.001 | mg/L | **2.77** | **0.574** | **0.537** | ---- | ---- |
| Barium | 7440-39-3 | 0.001 | mg/L | **0.019** | **0.042** | **0.020** | ---- | ---- |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2305995-006 | EB2305995-007 | EB2305995-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0215** | **0.0102** | **0.0014** | ---- | ---- |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | **0.002** | <0.001 | <0.001 | ---- | ---- |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | **0.005** | <0.001 | <0.001 | ---- | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | **0.002** | ---- | ---- |
| **Indium** | 7440-74-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **0.011** | **0.014** | **0.010** | ---- | ---- |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | **0.030** | **0.004** | **0.007** | ---- | ---- |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | **0.085** | **0.005** | **0.017** | ---- | ---- |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.162** | **0.009** | **0.011** | ---- | ---- |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.016** | **0.016** | **0.028** | ---- | ---- |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.056** | <0.001 | <0.001 | ---- | ---- |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.127** | **0.002** | **0.002** | ---- | ---- |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Tin** | 7440-31-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | ---- | ---- |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | ---- | ---- |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | ---- | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.685** | **0.562** | **0.049** | ---- | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | 28-Feb-2023 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2305995-006 | EB2305995-007 | EB2305995-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | ---- | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.6** | <0.1 | <0.1 | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | **26.0** | **3.54** | **4.19** | ---- | ---- |
| ø **Total Cations** | ---- | 0.01 | meq/L | **25.7** | **3.93** | **4.97** | ---- | ---- |
| ø **Ionic Balance** | ---- | 0.01 | % | **0.67** | **5.23** | **8.52** | ---- | ---- |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2315518** | Page | : 1 of 8 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4108 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61 7 3552 8616 |
| Project | : 2021066 MRO KLC | Date Samples Received | : 23-May-2023 15:08 |
| Order number | : ---- | Date Analysis Commenced | : 24-May-2023 |
| C-O-C number | : ---- | Issue Date | : 30-May-2023 17:31 |
| Sampler | : PRIYA RAJENDRAN | | |
| Site | : | | |
| Quote number | : BN/1234/19 | | |
| No. of samples received | : 8 | | |
| No. of samples analysed | : 8 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Beatriz Llarinas | Senior Chemist - Inorganics | Brisbane Inorganics, Stafford, QLD |
| Vincent Muller | | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Ionic Balance out of acceptable limits due to analytes not quantified in this report.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 |
| Compound | CAS Number | LOR | Unit | EB2315518-001 | EB2315518-002 | EB2315518-003 | EB2315518-004 | EB2315518-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.68** | **7.24** | **6.77** | **7.75** | **7.49** |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **160** | **483** | **545** | **1500** | **520** |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **24** | **12** | **5** | **54** | **21** |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **24** | **12** | **5** | **54** | **21** |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **3** | **2** | **3** | **5** | **1** |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **46** | **220** | **261** | **797** | **219** |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | <1 | <1 | **1** |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **14** | **80** | **79** | **274** | **50** |
| Magnesium | 7439-95-4 | 1 | mg/L | **2** | **3** | **7** | **5** | **6** |
| Sodium | 7440-23-5 | 1 | mg/L | **9** | **8** | **6** | **11** | **25** |
| Potassium | 7440-09-7 | 1 | mg/L | **1** | **2** | **2** | **18** | **13** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.10** | **0.01** | <0.01 | <0.01 | **0.01** |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | **0.005** | <0.001 | **0.005** | **0.002** |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.24** | **0.39** | **0.25** | **0.42** | **0.15** |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | 7440-24-6 | 0.001 | mg/L | **0.115** | **0.202** | **0.286** | **1.40** | **0.313** |
| Barium | 7440-39-3 | 0.001 | mg/L | **0.004** | **0.003** | **0.003** | **0.015** | **0.007** |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2315518-001 | EB2315518-002 | EB2315518-003 | EB2315518-004 | EB2315518-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | **0.0082** | **0.0149** | **0.0019** |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | <0.001 | **0.001** | <0.001 | <0.001 |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | **0.001** |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | **0.001** | <0.001 | **0.020** | **0.006** | **0.006** |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | <0.001 | <0.001 |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | **0.001** | **0.002** | **0.002** | **0.014** | **0.008** |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.017** | **0.024** | **0.022** | **0.035** | **0.017** |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | <0.001 | <0.001 |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.025** | **0.020** | **0.171** | **0.122** | **0.094** |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.001** | <0.001 | <0.001 |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.004** | **0.010** | <0.001 | **0.027** | **0.006** |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.001** | **0.001** | <0.001 |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Lead** | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.004** | <0.001 | <0.001 |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | | **0.051** | **0.053** | **0.033** | **0.089** | **0.008** |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Tin** | 7440-31-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.006** | **0.468** | **0.355** | **0.014** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 4 | WKLC 5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2315518-001 | EB2315518-002 | EB2315518-003 | EB2315518-004 | EB2315518-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.2** | **0.2** | **0.1** | **0.2** | **0.1** |
| **EN055: Ionic Balance** | | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | | **1.44** | **4.82** | **5.53** | **17.7** | **5.01** |
| ø **Total Cations** | ---- | 0.01 | meq/L | | **1.28** | **4.64** | **4.83** | **15.0** | **4.41** |
| ø **Ionic Balance** | ---- | 0.01 | % | | **----** | **1.93** | **6.79** | **8.10** | **6.36** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2315518-006 | EB2315518-007 | EB2315518-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.62** | **8.07** | **7.87** | **----** | **----** |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2050** | **326** | **413** | **----** | **----** |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | **----** | **----** |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | **----** | **----** |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **38** | **94** | **73** | **----** | **----** |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **38** | **94** | **73** | **----** | **----** |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **5** | **3** | **2** | **----** | **----** |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1160** | **72** | **109** | **----** | **----** |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **5** | <1 | <1 | **----** | **----** |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **342** | **56** | **68** | **----** | **----** |
| Magnesium | 7439-95-4 | 1 | mg/L | **25** | <1 | **1** | **----** | **----** |
| Sodium | 7440-23-5 | 1 | mg/L | **46** | **1** | **2** | **----** | **----** |
| Potassium | 7440-09-7 | 1 | mg/L | **33** | **3** | **8** | **----** | **----** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.03** | <0.01 | <0.01 | **----** | **----** |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.009** | <0.001 | **0.001** | **----** | **----** |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.82** | **0.08** | **0.10** | **----** | **----** |
| Europium | 7440-53-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| Strontium | 7440-24-6 | 0.001 | mg/L | **2.34** | **0.484** | **0.476** | **----** | **----** |
| Barium | 7440-39-3 | 0.001 | mg/L | **0.015** | **0.032** | **0.017** | **----** | **----** |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| Titanium | 7440-32-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | **----** | **----** |
| Beryllium | 7440-41-7 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| Gallium | 7440-55-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2315518-006 | EB2315518-007 | EB2315518-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | **0.0216** | **0.0056** | **0.0012** | **----** | **----** |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | **----** | **----** |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | **----** | **----** |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | **0.002** | <0.001 | <0.001 | **----** | **----** |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | **0.004** | <0.001 | <0.001 | **----** | **----** |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Indium** | 7440-74-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Copper** | 7440-50-8 | 0.001 | mg/L | **0.012** | **0.010** | **0.008** | **----** | **----** |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | **0.024** | **0.002** | **0.005** | **----** | **----** |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | **0.070** | **0.004** | **0.012** | **----** | **----** |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | **0.245** | **0.004** | **0.011** | **----** | **----** |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | **0.012** | **0.012** | **0.021** | **----** | **----** |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.052** | <0.001 | <0.001 | **----** | **----** |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.107** | **0.001** | **0.003** | **----** | **----** |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | **----** | **----** |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Tin** | 7440-31-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | **----** | **----** |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | **----** | **----** |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | **----** | **----** |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.677** | **0.329** | **0.049** | **----** | **----** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 6 | WKLC 1A | WKLC 3A | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 23-May-2023 00:00 | 23-May-2023 00:00 | 23-May-2023 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB2315518-006 | EB2315518-007 | EB2315518-008 | -------- | -------- |
| | | | | Result | Result | Result | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | **----** | **----** |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | **----** | **----** |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.5** | <0.1 | <0.1 | **----** | **----** |
| **EN055: Ionic Balance** | | | | | | | | |
| ø **Total Anions** | ---- | 0.01 | meq/L | **25.0** | **3.38** | **3.73** | **----** | **----** |
| ø **Total Cations** | ---- | 0.01 | meq/L | **22.0** | **2.91** | **3.77** | **----** | **----** |
| ø **Ionic Balance** | ---- | 0.01 | % | **6.56** | **7.35** | **0.52** | **----** | **----** |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2338376** | Page | : 1 of 2 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4108 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61 7 3552 8616 |
| Project | : 2023062 MRO_KLC | Date Samples Received | : 04-Dec-2023 16:55 |
| Order number | : ---- | Date Analysis Commenced | : 18-Dec-2023 |
| C-O-C number | : ---- | Issue Date | : 28-Dec-2023 15:39 |
| Sampler | : CHANDIMA NIKAGOLLA | | |
| Site | : ---- | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 8 | | |
| No. of samples analysed | : 2 | | |

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Aleksandar Vujkovic | Laboratory Technician | Newcastle - Inorganics, Mayfield West, NSW |

## General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
~ = Indicates an estimated value.

- EA153: ALS does not hold NATA accreditation for Laser Particle Sizing.

## Analytical Results

| Sub-Matrix: ROCK (Matrix: SOIL) | | | | Sample ID | 2023062_HIGHPAF_MID | 2023062_TALLING_MID | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 04-Dec-2023 00:00 | 04-Dec-2023 00:00 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EB2338376-004 | EB2338376-008 | -------- | -------- | -------- |
| | | | | | Result | Result | ---- | ---- | ---- |
| **EA153: Laser Particle Size Analysis of Soils and Solids** | | | | | | | | | |
| +1000µm | ---- | 1 | % | | See Attached | See Attached | ---- | ---- | ---- |
| +2000µm | ---- | 1 | % | | See Attached | See Attached | ---- | ---- | ---- |

## Inter-Laboratory Testing

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

(SOIL) EA153: Laser Particle Size Analysis of Soils and Solids

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2407152** | Page | : 1 of 8 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4108 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61 7 3552 8616 |
| Project | : 2023062 MRO KLC | Date Samples Received | : 01-Mar-2024 13:45 |
| Order number | : ---- | Date Analysis Commenced | : 02-Mar-2024 |
| C-O-C number | : ---- | Issue Date | : 08-Mar-2024 19:28 |
| Sampler | : LAURA LONG | | |
| Site | : | | |
| Quote number | : BN/1234/19 | | |
| No. of samples received | : 10 | | |
| No. of samples analysed | : 10 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Beatriz Llarinas | Senior Chemist - Inorganics | Brisbane Inorganics, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Ionic Balance out of acceptable limits for some samples due to analytes not quantified in this report.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 1 L9 | WKLC 2 L9 | WKLC 3 L9 | WKLC 3 AW L1 | WKLC 4 L9 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 |
| Compound | CAS Number | LOR | Unit | EB2407152-001 | EB2407152-002 | EB2407152-003 | EB2407152-004 | EB2407152-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.98** | **7.47** | **7.04** | **6.91** | **7.66** |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **415** | **1670** | **2500** | **2420** | **1680** |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **48** | **47** | **71** | **65** | **89** |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **48** | **47** | **71** | **65** | **89** |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **4** | **4** | **10** | **11** | **4** |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **177** | **1000** | **1590** | **1600** | **936** |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | <1 | <1 | **2** | **4** | **1** |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **46** | **372** | **516** | **502** | **352** |
| Magnesium | 7439-95-4 | 1 | mg/L | **8** | **8** | **37** | **40** | **6** |
| Sodium | 7440-23-5 | 1 | mg/L | **21** | **14** | **16** | **17** | **15** |
| Potassium | 7440-09-7 | 1 | mg/L | **3** | **5** | **7** | **7** | **22** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.002** | **0.011** | <0.001 | <0.001 | **0.015** |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.66** | **0.64** | **0.40** | **0.32** | **0.52** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 1 L9 | WKLC 2 L9 | WKLC 3 L9 | WKLC 3 AW L1 | WKLC 4 L9 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2407152-001 | EB2407152-002 | EB2407152-003 | EB2407152-004 | EB2407152-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Europium** | 7440-53-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Strontium** | 7440-24-6 | 0.001 | mg/L | | **0.411** | **0.923** | **2.25** | **2.55** | **1.80** |
| **Barium** | 7440-39-3 | 0.001 | mg/L | | **0.018** | **0.012** | **0.022** | **0.022** | **0.022** |
| **Gadolinium** | 7440-54-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.001** | <0.001 |
| **Titanium** | 7440-32-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Beryllium** | 7440-41-7 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Gallium** | 7440-55-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | **0.0008** | **0.108** | **0.122** | **0.0154** |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | <0.001 | **0.006** | **0.009** | <0.001 |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | <0.001 | **0.004** | <0.001 | <0.001 | **0.001** |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | **0.001** | **0.002** | **0.006** | **0.007** | **0.001** |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.021** | **0.032** | **0.010** |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.014** | **0.023** | <0.001 |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | **0.003** | **0.008** | **0.014** | **0.017** | **0.020** |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.046** | **0.064** | **0.083** | **0.091** | **0.037** |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.009** | **0.015** | <0.001 |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | <0.001 | **0.129** | **4.58** | **5.17** | **0.178** |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.005** | **0.008** | <0.001 |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.012** | **0.024** | **0.001** | <0.001 | **0.028** |

## Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

| Compound | CAS Number | LOR | Unit | Sample ID | WKLC 1 L9 | WKLC 2 L9 | WKLC 3 L9 | WKLC 3 AW L1 | WKLC 4 L9 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 |
| | | | | | EB2407152-001 | EB2407152-002 | EB2407152-003 | EB2407152-004 | EB2407152-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| Praseodymium | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.001** | **0.002** | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | | <0.001 | **0.005** | **0.018** | **0.020** | **0.006** |
| Samarium | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.001** | <0.001 |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.015** | **0.025** | <0.001 |
| Terbium | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony | 7440-36-0 | 0.001 | mg/L | | **0.187** | **0.119** | **0.033** | **0.012** | **0.127** |
| Thulium | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | 7440-31-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Yttrium | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | **0.003** | **0.004** | <0.001 |
| Thallium | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Zirconium | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Vanadium | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Zinc | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.090** | **4.63** | **5.76** | **0.531** |
| Iron | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| Mercury | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| Fluoride | 16984-48-8 | 0.1 | mg/L | | **0.4** | **0.4** | **0.3** | **0.3** | **0.3** |
| **EN055: Ionic Balance** | | | | | | | | | |
| ø Total Anions | ---- | 0.01 | meq/L | | **4.64** | **21.8** | **34.6** | **34.7** | **21.3** |
| ø Total Cations | ---- | 0.01 | meq/L | | **3.94** | **20.0** | **29.7** | **29.3** | **19.3** |
| ø Ionic Balance | ---- | 0.01 | % | | **8.15** | **4.32** | **7.64** | **8.54** | **4.98** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 5 L9 | WKLC 6 L9 | WKLC 1A L9 | WKLC 3A L9 | HCl Blank Blank |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 |
| Compound | CAS Number | LOR | Unit | EB2407152-006 | EB2407152-007 | EB2407152-008 | EB2407152-009 | EB2407152-010 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.61** | **7.59** | **8.09** | **8.20** | **4.32** |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2160** | **2360** | **406** | **469** | **28** |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **78** | **56** | **115** | **107** | **2** |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **78** | **56** | **115** | **107** | **2** |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **5** | **4** | **2** | **2** | **5** |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1290** | **1490** | **113** | **104** | <1 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **3** | **5** | <1 | **1** | **3** |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **406** | **468** | **71** | **79** | <1 |
| Magnesium | 7439-95-4 | 1 | mg/L | **22** | **25** | <1 | **1** | <1 |
| Sodium | 7440-23-5 | 1 | mg/L | **51** | **42** | **2** | **2** | <1 |
| Potassium | 7440-09-7 | 1 | mg/L | **27** | **35** | **4** | **10** | <1 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | **0.02** | <0.01 | <0.01 | <0.01 |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.007** | **0.009** | **0.001** | **0.002** | <0.001 |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.66** | **0.72** | **0.08** | **0.12** | <0.05 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 5 L9 | WKLC 6 L9 | WKLC 1A L9 | WKLC 3A L9 | HCl Blank Blank |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2407152-006 | EB2407152-007 | EB2407152-008 | EB2407152-009 | EB2407152-010 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Europium** | 7440-53-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Strontium** | 7440-24-6 | 0.001 | mg/L | | **1.93** | **3.33** | **0.663** | **0.588** | <0.001 |
| **Barium** | 7440-39-3 | 0.001 | mg/L | | **0.034** | **0.020** | **0.041** | **0.025** | <0.001 |
| **Gadolinium** | 7440-54-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Titanium** | 7440-32-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Beryllium** | 7440-41-7 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Gallium** | 7440-55-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | **0.0471** | **0.0350** | **0.0073** | **0.0017** | <0.0001 |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | **0.002** | **0.003** | <0.001 | <0.001 | <0.001 |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | **0.001** | <0.001 | <0.001 | <0.001 | <0.001 |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | **0.006** | **0.004** | <0.001 | <0.001 | <0.001 |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.002** | <0.001 |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | **0.012** | **0.011** | **0.010** | **0.014** | <0.001 |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | **0.024** | **0.031** | **0.004** | **0.007** | <0.001 |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.051** | **0.070** | **0.004** | **0.014** | <0.001 |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **1.62** | **0.673** | **0.004** | **0.013** | <0.001 |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.009** | **0.025** | **0.017** | **0.023** | <0.001 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 5 L9 | WKLC 6 L9 | WKLC 1A L9 | WKLC 3A L9 | HCl Blank Blank |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 | 01-Mar-2024 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2407152-006 | EB2407152-007 | EB2407152-008 | EB2407152-009 | EB2407152-010 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| Praseodymium | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | | **0.005** | **0.037** | <0.001 | <0.001 | <0.001 |
| Samarium | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | 7439-92-1 | 0.001 | mg/L | | **0.002** | <0.001 | <0.001 | <0.001 | <0.001 |
| Terbium | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony | 7440-36-0 | 0.001 | mg/L | | **0.054** | **0.087** | **0.002** | **0.002** | <0.001 |
| Thulium | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | 7440-31-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Yttrium | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thallium | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Zirconium | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Vanadium | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Zinc | 7440-66-6 | 0.005 | mg/L | | **1.40** | **0.878** | **0.428** | **0.069** | <0.005 |
| Iron | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | **0.06** | <0.05 |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| Mercury | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| Fluoride | 16984-48-8 | 0.1 | mg/L | | **0.3** | **0.5** | <0.1 | <0.1 | <0.1 |
| **EN055: Ionic Balance** | | | | | | | | | |
| ø Total Anions | ---- | 0.01 | meq/L | | **28.5** | **32.3** | **4.65** | **4.33** | **0.12** |
| ø Total Cations | ---- | 0.01 | meq/L | | **25.0** | **28.1** | **3.73** | **4.37** | <0.01 |
| ø Ionic Balance | ---- | 0.01 | % | | **6.58** | **6.87** | **11.0** | **0.41** | **----** |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2418286** | Page | : 1 of 8 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4108 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61 7 3552 8616 |
| Project | : 2023062 MRO KLC | Date Samples Received | : 29-May-2024 14:50 |
| Order number | : ---- | Date Analysis Commenced | : 30-May-2024 |
| C-O-C number | : ---- | Issue Date | : 04-Jun-2024 20:59 |
| Sampler | : LAURA LONG | | |
| Site | : | | |
| Quote number | : BN/1234/19 | | |
| No. of samples received | : 9 | | |
| No. of samples analysed | : 9 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Beatriz Llarinas | Senior Chemist - Inorganics | Brisbane Inorganics, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Ionic Balance out of acceptable limits due to analytes not quantified in this report.
- EG035F (Dissolved Mercury by FIMS): The high failing laboratory control standard is deemed acceptable as all results are less than the limit of reporting.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 3 AW | WKLC 4 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 |
| Compound | CAS Number | LOR | Unit | EB2418286-001 | EB2418286-002 | EB2418286-003 | EB2418286-004 | EB2418286-005 |
| | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.93** | **6.92** | **7.01** | **6.73** | **7.28** |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **256** | **1390** | **2380** | **2250** | **1700** |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **40** | **29** | **48** | **36** | **55** |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **40** | **29** | **48** | **36** | **55** |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **4** | **5** | **10** | **6** | **4** |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **93** | **817** | **1390** | **1400** | **945** |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **1** | <1 | <1 | **3** | **1** |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **32** | **256** | **536** | **542** | **389** |
| Magnesium | 7439-95-4 | 1 | mg/L | **6** | **8** | **29** | **30** | **7** |
| Sodium | 7440-23-5 | 1 | mg/L | **17** | **11** | **9** | **8** | **18** |
| Potassium | 7440-09-7 | 1 | mg/L | **2** | **4** | **5** | **5** | **22** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | **0.01** | <0.01 | <0.01 | <0.01 | <0.01 |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.003** | **0.010** | <0.001 | <0.001 | **0.008** |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.63** | **0.54** | **0.34** | **0.26** | **0.55** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 3 AW | WKLC 4 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2418286-001 | EB2418286-002 | EB2418286-003 | EB2418286-004 | EB2418286-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| Europium | 7440-53-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Strontium | 7440-24-6 | 0.001 | mg/L | | **0.241** | **0.599** | **1.73** | **1.84** | **1.82** |
| Barium | 7440-39-3 | 0.001 | mg/L | | **0.007** | **0.007** | **0.014** | **0.013** | **0.020** |
| Gadolinium | 7440-54-2 | 0.001 | mg/L | | <0.001 | <0.001 | **0.001** | <0.001 | <0.001 |
| Titanium | 7440-32-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Beryllium | 7440-41-7 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Gallium | 7440-55-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | **0.0002** | **0.0966** | **0.0770** | **0.0080** |
| Hafnium | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tellurium | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Cobalt | 7440-48-4 | 0.001 | mg/L | | <0.001 | <0.001 | **0.008** | **0.005** | <0.001 |
| Holmium | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Uranium | 7440-61-1 | 0.001 | mg/L | | <0.001 | **0.002** | <0.001 | <0.001 | <0.001 |
| Caesium | 7440-46-2 | 0.001 | mg/L | | <0.001 | **0.001** | **0.003** | **0.004** | **0.001** |
| Chromium | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indium | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.025** | **0.019** | **0.007** |
| Lanthanum | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.023** | **0.021** | <0.001 |
| Rubidium | 7440-17-7 | 0.001 | mg/L | | **0.002** | **0.004** | **0.007** | **0.008** | **0.019** |
| Lithium | 7439-93-2 | 0.001 | mg/L | | **0.034** | **0.036** | **0.045** | **0.045** | **0.034** |
| Lutetium | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Thorium | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cerium | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.014** | **0.012** | <0.001 |
| Manganese | 7439-96-5 | 0.001 | mg/L | | **0.002** | <0.001 | **4.12** | **2.68** | **0.086** |
| Neodymium | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.008** | **0.007** | <0.001 |
| Molybdenum | 7439-98-7 | 0.001 | mg/L | | **0.009** | **0.022** | **0.001** | **0.001** | **0.033** |
| Praseodymium | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | **0.002** | <0.001 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 3 AW | WKLC 4 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2418286-001 | EB2418286-002 | EB2418286-003 | EB2418286-004 | EB2418286-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.016** | **0.010** | **0.003** |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Lead** | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.017** | **0.021** | <0.001 |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | | **0.127** | **0.083** | **0.018** | **0.005** | **0.086** |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Tin** | 7440-31-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | **0.001** |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | **0.004** | **0.003** | <0.001 |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.023** | **4.49** | **3.36** | **0.162** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | | **0.4** | **0.4** | **0.3** | **0.2** | **0.3** |
| **EN055: Ionic Balance** | | | | | | | | | |
| **ø Total Anions** | ---- | 0.01 | meq/L | | **2.76** | **17.6** | **29.9** | **30.0** | **20.8** |
| **ø Total Cations** | ---- | 0.01 | meq/L | | **2.88** | **14.0** | **29.6** | **30.0** | **21.3** |
| **ø Ionic Balance** | ---- | 0.01 | % | | **----** | **11.3** | **0.41** | **0.06** | **1.26** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 5 | WKLC 6 | WKLC 1A | WKLC 3A | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | EB2418286-006 | EB2418286-007 | EB2418286-008 | EB2418286-009 | -------- |
| | | | | Result | Result | Result | Result | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.13** | **7.08** | **7.44** | **7.51** | **----** |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **1960** | **2030** | **328** | **337** | **----** |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | **----** |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | **----** |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **42** | **37** | **77** | **69** | **----** |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **42** | **37** | **77** | **69** | **----** |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **4** | **4** | **2** | **2** | **----** |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **1100** | **1150** | **85** | **76** | **----** |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **2** | **6** | **1** | **2** | **----** |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **385** | **417** | **68** | **69** | **----** |
| Magnesium | 7439-95-4 | 1 | mg/L | **23** | **28** | <1 | **1** | **----** |
| Sodium | 7440-23-5 | 1 | mg/L | **53** | **52** | **2** | **2** | **----** |
| Potassium | 7440-09-7 | 1 | mg/L | **23** | **33** | **3** | **8** | **----** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | **0.05** | <0.01 | **0.01** | **----** |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.003** | **0.010** | **0.001** | **0.002** | **----** |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.47** | **0.95** | **0.08** | **0.10** | **----** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 5 | WKLC 6 | WKLC 1A | WKLC 3A | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | EB2418286-006 | EB2418286-007 | EB2418286-008 | EB2418286-009 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Europium** | 7440-53-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Strontium** | 7440-24-6 | 0.001 | mg/L | | **1.57** | **2.70** | **0.520** | **0.419** | ---- |
| **Barium** | 7440-39-3 | 0.001 | mg/L | | **0.025** | **0.017** | **0.029** | **0.018** | ---- |
| **Gadolinium** | 7440-54-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Titanium** | 7440-32-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Beryllium** | 7440-41-7 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Gallium** | 7440-55-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | **0.0265** | **0.0298** | **0.0031** | **0.0010** | ---- |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | **0.003** | <0.001 | <0.001 | ---- |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | **0.004** | **0.004** | <0.001 | <0.001 | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.002** | ---- |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | **0.006** | **0.032** | **0.008** | **0.010** | ---- |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | **0.002** | <0.001 | <0.001 | ---- |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | **0.016** | **0.024** | **0.003** | **0.004** | ---- |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.040** | **0.066** | **0.004** | **0.009** | ---- |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | **0.002** | <0.001 | <0.001 | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.526** | **0.524** | **0.003** | **0.010** | ---- |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.010** | **0.010** | **0.018** | **0.026** | ---- |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 5 | WKLC 6 | WKLC 1A | WKLC 3A | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | 29-May-2024 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | EB2418286-006 | EB2418286-007 | EB2418286-008 | EB2418286-009 | -------- |
| | | | | Result | Result | Result | Result | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | **0.001** | **0.068** | <0.001 | <0.001 | **----** |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.030** | **0.108** | **0.001** | **0.002** | **----** |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | **----** |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| **Tin** | 7440-31-5 | 0.001 | mg/L | <0.001 | **0.001** | <0.001 | <0.001 | **----** |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | <0.005 | **----** |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | **----** |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.507** | **1.06** | **0.187** | **0.046** | **----** |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | <0.05 | **----** |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | <0.0001 | **----** |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.3** | **0.6** | <0.1 | <0.1 | **----** |
| **EN055: Ionic Balance** | | | | | | | | |
| **ø Total Anions** | ---- | 0.01 | meq/L | **23.8** | **24.8** | **3.34** | **3.02** | **----** |
| **ø Total Cations** | ---- | 0.01 | meq/L | **24.0** | **26.2** | **3.56** | **3.82** | **----** |
| **ø Ionic Balance** | ---- | 0.01 | % | **0.42** | **2.68** | **3.20** | **11.7** | **----** |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2429597** | Page | : 1 of 8 |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4108 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61 7 3552 8616 |
| Project | : 2023062 MRO KLC | Date Samples Received | : 28-Aug-2024 15:41 |
| Order number | : ---- | Date Analysis Commenced | : 29-Aug-2024 |
| C-O-C number | : ---- | Issue Date | : 03-Sep-2024 22:34 |
| Sampler | : LAURA LONG, PAUL HILTON | | |
| Site | : | | |
| Quote number | : BN/1234/19 | | |
| No. of samples received | : 9 | | |
| No. of samples analysed | : 9 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Beatriz Llarinas | Senior Chemist - Inorganics | Brisbane Inorganics, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

## Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

| Compound | CAS Number | LOR | Unit | Sample ID | WKLC 1 L3 | WKLC 2 L3 | WKLC 3 L3 | WKLC 3 AW L3 | WKLC 4 L3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 |
| | | | | | EB2429597-001 | EB2429597-002 | EB2429597-003 | EB2429597-004 | EB2429597-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | | |
| **pH Value** | ---- | 0.01 | pH Unit | | **7.92** | **7.28** | **7.19** | **7.09** | **7.40** |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | | |
| **Electrical Conductivity @ 25°C** | ---- | 1 | µS/cm | | **485** | **1770** | **2160** | **2180** | **2020** |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | | |
| **Hydroxide Alkalinity as CaCO3** | DMO-210-001 | 1 | mg/L | | <1 | <1 | <1 | <1 | <1 |
| **Carbonate Alkalinity as CaCO3** | 3812-32-6 | 1 | mg/L | | <1 | <1 | <1 | <1 | <1 |
| **Bicarbonate Alkalinity as CaCO3** | 71-52-3 | 1 | mg/L | | **38** | **30** | **33** | **34** | **40** |
| **Total Alkalinity as CaCO3** | ---- | 1 | mg/L | | **38** | **30** | **33** | **34** | **40** |
| **ED038: Acidity** | | | | | | | | | |
| **Acidity as CaCO3** | ---- | 1 | mg/L | | **3** | **4** | **7** | **7** | **4** |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | | |
| **Sulfate as SO4 - Turbidimetric** | 14808-79-8 | 1 | mg/L | | **181** | **975** | **1220** | **1240** | **1090** |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | | |
| **Chloride** | 16887-00-6 | 1 | mg/L | | **2** | <1 | <1 | **3** | <1 |
| **ED093F: Dissolved Major Cations** | | | | | | | | | |
| **Calcium** | 7440-70-2 | 1 | mg/L | | **55** | **421** | **532** | **541** | **468** |
| **Magnesium** | 7439-95-4 | 1 | mg/L | | **10** | **10** | **16** | **19** | **8** |
| **Sodium** | 7440-23-5 | 1 | mg/L | | **19** | **11** | **4** | **3** | **17** |
| **Potassium** | 7440-09-7 | 1 | mg/L | | **2** | **4** | **3** | **4** | **20** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| **Aluminium** | 7429-90-5 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Dysprosium** | 7429-91-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Silver** | 7440-22-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Arsenic** | 7440-38-2 | 0.001 | mg/L | | **0.003** | **0.010** | <0.001 | <0.001 | **0.009** |
| **Bismuth** | 7440-69-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Erbium** | 7440-52-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Boron** | 7440-42-8 | 0.05 | mg/L | | **0.56** | **0.59** | **0.23** | **0.20** | **0.66** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 1 L3 | WKLC 2 L3 | WKLC 3 L3 | WKLC 3 AW L3 | WKLC 4 L3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2429597-001 | EB2429597-002 | EB2429597-003 | EB2429597-004 | EB2429597-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Europium** | 7440-53-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Strontium** | 7440-24-6 | 0.001 | mg/L | | **0.518** | **0.940** | **1.45** | **1.50** | **2.13** |
| **Barium** | 7440-39-3 | 0.001 | mg/L | | **0.014** | **0.010** | **0.010** | **0.011** | **0.021** |
| **Gadolinium** | 7440-54-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Titanium** | 7440-32-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Beryllium** | 7440-41-7 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Gallium** | 7440-55-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | **0.0003** | **0.0585** | **0.0656** | **0.0075** |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | **0.004** | <0.001 |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | <0.001 | **0.003** | <0.001 | <0.001 | <0.001 |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | <0.001 | **0.001** | **0.002** | **0.003** | <0.001 |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.017** | **0.019** | **0.007** |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.013** | **0.017** | <0.001 |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | **0.003** | **0.005** | **0.004** | **0.005** | **0.018** |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.046** | **0.053** | **0.026** | **0.028** | **0.037** |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.009** | **0.011** | <0.001 |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | <0.001 | <0.001 | **1.40** | **2.06** | **0.095** |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.005** | **0.006** | <0.001 |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.017** | **0.023** | <0.001 | <0.001 | **0.046** |

## Analytical Results

Sub-Matrix: WATER
(Matrix: WATER)

| Compound | CAS Number | LOR | Unit | Sample ID | WKLC 1 L3 | WKLC 2 L3 | WKLC 3 L3 | WKLC 3 AW L3 | WKLC 4 L3 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 |
| | | | | | EB2429597-001 | EB2429597-002 | EB2429597-003 | EB2429597-004 | EB2429597-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| Praseodymium | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.001** | **0.002** | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.007** | **0.008** | **0.007** |
| Samarium | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.011** | **0.018** | <0.001 |
| Terbium | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony | 7440-36-0 | 0.001 | mg/L | | **0.108** | **0.069** | **0.011** | **0.006** | **0.095** |
| Thulium | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | 7440-31-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.002** | <0.001 |
| Yttrium | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | **0.003** | <0.001 |
| Thallium | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Zirconium | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Vanadium | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Zinc | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.052** | **2.53** | **2.97** | **0.150** |
| Iron | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| Mercury | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| Fluoride | 16984-48-8 | 0.1 | mg/L | | **0.4** | **0.4** | **0.3** | **0.2** | **0.3** |
| **EN055: Ionic Balance** | | | | | | | | | |
| ø Total Anions | ---- | 0.01 | meq/L | | **4.58** | **20.9** | **26.1** | **26.6** | **23.5** |
| ø Total Cations | ---- | 0.01 | meq/L | | **4.44** | **22.4** | **28.1** | **28.8** | **25.3** |
| ø Ionic Balance | ---- | 0.01 | % | | **1.54** | **3.49** | **3.79** | **3.99** | **3.63** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 5 L3 | WKLC 6 L3 | WKLC 1A L3 | WKLC 3A L3 | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | EB2429597-006 | EB2429597-007 | EB2429597-008 | EB2429597-009 | -------- |
| | | | | Result | Result | Result | Result | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.45** | **7.40** | **7.93** | **7.75** | **----** |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **1890** | **2390** | **299** | **287** | **----** |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | **----** |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | **----** |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **42** | **40** | **105** | **66** | **----** |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **42** | **40** | **105** | **66** | **----** |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **4** | **5** | **3** | **2** | **----** |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **926** | **1310** | **46** | **56** | **----** |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **6** | **5** | <1 | <1 | **----** |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **322** | **508** | **54** | **46** | **----** |
| Magnesium | 7439-95-4 | 1 | mg/L | **19** | **29** | <1 | <1 | **----** |
| Sodium | 7440-23-5 | 1 | mg/L | **86** | **40** | **2** | **2** | **----** |
| Potassium | 7440-09-7 | 1 | mg/L | **34** | **32** | **3** | **7** | **----** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | **0.02** | <0.01 | **0.01** | **----** |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.004** | **0.008** | **0.001** | **0.003** | **----** |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.42** | **0.55** | <0.05 | **0.08** | **----** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 5 L3 | WKLC 6 L3 | WKLC 1A L3 | WKLC 3A L3 | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | EB2429597-006 | EB2429597-007 | EB2429597-008 | EB2429597-009 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Europium** | 7440-53-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Strontium** | 7440-24-6 | 0.001 | mg/L | | **1.49** | **3.34** | **0.464** | **0.353** | ---- |
| **Barium** | 7440-39-3 | 0.001 | mg/L | | **0.028** | **0.018** | **0.033** | **0.016** | ---- |
| **Gadolinium** | 7440-54-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Titanium** | 7440-32-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Beryllium** | 7440-41-7 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Gallium** | 7440-55-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | **0.0162** | **0.0394** | **0.0042** | **0.0007** | ---- |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | **0.003** | <0.001 | <0.001 | ---- |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | **0.006** | **0.003** | <0.001 | <0.001 | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.002** | ---- |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | **0.007** | **0.028** | **0.006** | **0.008** | ---- |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | **0.002** | <0.001 | <0.001 | ---- |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | **0.022** | **0.024** | **0.003** | **0.004** | ---- |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.042** | **0.073** | **0.003** | **0.008** | ---- |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | **0.002** | <0.001 | <0.001 | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.199** | **0.546** | **0.004** | **0.007** | ---- |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.014** | **0.007** | **0.021** | **0.027** | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 5 L3 | WKLC 6 L3 | WKLC 1A L3 | WKLC 3A L3 | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | 28-Aug-2024 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | EB2429597-006 | EB2429597-007 | EB2429597-008 | EB2429597-009 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| Praseodymium | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | | **0.001** | **0.065** | **0.001** | <0.001 | ---- |
| Samarium | 7440-19-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | **0.001** | <0.001 | <0.001 | ---- |
| Terbium | 7440-27-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Antimony | 7440-36-0 | 0.001 | mg/L | | **0.030** | **0.053** | **0.001** | **0.002** | ---- |
| Thulium | 7440-30-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Selenium | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| Ytterbium | 7440-64-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Tin | 7440-31-5 | 0.001 | mg/L | | **0.002** | <0.001 | **0.002** | <0.001 | ---- |
| Yttrium | 7440-65-5 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Thallium | 7440-28-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Zirconium | 7440-67-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | ---- |
| Vanadium | 7440-62-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | | **0.288** | **1.35** | **0.207** | **0.029** | ---- |
| Iron | 7439-89-6 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | **0.08** | ---- |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| Mercury | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | | |
| Fluoride | 16984-48-8 | 0.1 | mg/L | | **0.4** | **0.4** | <0.1 | <0.1 | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| ø Total Anions | ---- | 0.01 | meq/L | | **20.3** | **28.2** | **3.06** | **2.48** | ---- |
| ø Total Cations | ---- | 0.01 | meq/L | | **22.2** | **30.3** | **2.86** | **2.56** | ---- |
| ø Ionic Balance | ---- | 0.01 | % | | **4.59** | **3.55** | **3.34** | ---- | ---- |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB2441569** | Page | : 1 of 8 |
| **Amendment** | : **1** | | |
| Client | : **RGS ENVIRONMENTAL CONSULTANTS PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : ALAN ROBERTSON | Contact | : Carsten Emrich |
| Address | : 3/30 LENSWORTH STREET<br>COOPERS PLAINS 4108 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : 07 3344 1222 | Telephone | : +61 7 3552 8616 |
| Project | : 2023062 MRO KLC | Date Samples Received | : 28-Nov-2024 15:27 |
| Order number | : ---- | Date Analysis Commenced | : 29-Nov-2024 |
| C-O-C number | : ---- | Issue Date | : 05-Dec-2024 12:08 |
| Sampler | : VERONICA HARMAN | | |
| Site | : ---- | | |
| Quote number | : EB24RGSENVCON0002_V2 | | |
| No. of samples received | : 9 | | |
| No. of samples analysed | : 9 | | |

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Beatriz Llarinas | Senior Chemist - Inorganics | Brisbane Inorganics, Stafford, QLD |

## General Comments

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

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

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

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

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

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

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

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Amendment (5/12/2024): This report has been amended as a result of a request to correct sample identification numbers (IDs) received from Veronica Harman on 5/11/24 for samples ALS #003 & 009. All analysis results are as per the previous report.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 3 A | WKLC 4 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2441569-001 | EB2441569-002 | EB2441569-003 | EB2441569-004 | EB2441569-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EA005P: pH by PC Titrator** | | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | | 7.37 | 7.31 | 7.11 | 7.70 | 7.49 |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | | 334 | 1600 | 1750 | 270 | 1700 |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | | <1 | <1 | <1 | <1 | <1 |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | | <1 | <1 | <1 | <1 | <1 |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | | 36 | 28 | 32 | 65 | 42 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | | 36 | 28 | 32 | 65 | 42 |
| **ED038: Acidity** | | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | | 4 | 4 | 8 | 2 | 4 |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | | 117 | 928 | 976 | 53 | 963 |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | | 1 | <1 | <1 | <1 | <1 |
| **ED093F: Dissolved Major Cations** | | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | | 42 | 387 | 428 | 51 | 404 |
| Magnesium | 7439-95-4 | 1 | mg/L | | 7 | 10 | 14 | <1 | 6 |
| Sodium | 7440-23-5 | 1 | mg/L | | 17 | 12 | 5 | 2 | 16 |
| Potassium | 7440-09-7 | 1 | mg/L | | 2 | 4 | 3 | 6 | 18 |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | | 0.01 | <0.01 | <0.01 | 0.02 | <0.01 |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Silver | 7440-22-4 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | | 0.003 | 0.012 | <0.001 | 0.002 | 0.008 |
| Bismuth | 7440-69-9 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Erbium | 7440-52-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Boron | 7440-42-8 | 0.05 | mg/L | | 0.65 | 0.58 | 0.25 | 0.12 | 0.58 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 3 A | WKLC 4 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 |
| Compound | CAS Number | LOR | Unit | | EB2441569-001 | EB2441569-002 | EB2441569-003 | EB2441569-004 | EB2441569-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Europium** | 7440-53-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Strontium** | 7440-24-6 | 0.001 | mg/L | | **0.301** | **0.801** | **1.09** | **0.310** | **1.67** |
| **Barium** | 7440-39-3 | 0.001 | mg/L | | **0.008** | **0.009** | **0.009** | **0.018** | **0.016** |
| **Gadolinium** | 7440-54-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Titanium** | 7440-32-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Beryllium** | 7440-41-7 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Gallium** | 7440-55-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | **0.0003** | **0.0657** | **0.0006** | **0.0070** |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | <0.001 | **0.003** | <0.001 | <0.001 |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | <0.001 | **0.002** | <0.001 | <0.001 | <0.001 |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | <0.001 | **0.001** | **0.002** | <0.001 | <0.001 |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.002** | <0.001 |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.020** | **0.007** | **0.005** |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.014** | <0.001 | <0.001 |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | **0.002** | **0.004** | **0.004** | **0.004** | **0.016** |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.037** | **0.048** | **0.024** | **0.009** | **0.031** |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | <0.001 | **0.009** | <0.001 | <0.001 |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.007** | **0.002** | **1.76** | **0.006** | **0.046** |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.006** | <0.001 | <0.001 |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.014** | **0.025** | <0.001 | **0.027** | **0.041** |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | <0.001 | <0.001 |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 1 | WKLC 2 | WKLC 3 | WKLC 3 A | WKLC 4 |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 |
| Compound | CAS Number | LOR | Unit | EB2441569-001 | EB2441569-002 | EB2441569-003 | EB2441569-004 | EB2441569-005 |
| | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| Nickel | 7440-02-0 | 0.001 | mg/L | **0.001** | <0.001 | **0.008** | <0.001 | **0.002** |
| Samarium | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | **0.013** | <0.001 | <0.001 |
| Terbium | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Antimony | 7440-36-0 | 0.001 | mg/L | **0.147** | **0.118** | **0.012** | **0.002** | **0.107** |
| Thulium | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ytterbium | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tin | 7440-31-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Yttrium | 7440-65-5 | 0.001 | mg/L | <0.001 | <0.001 | **0.002** | <0.001 | <0.001 |
| Thallium | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Zirconium | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Vanadium | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Zinc | 7440-66-6 | 0.005 | mg/L | **0.010** | **0.048** | **3.16** | **0.026** | **0.129** |
| Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| Mercury | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| Fluoride | 16984-48-8 | 0.1 | mg/L | **0.4** | **0.4** | **0.3** | <0.1 | **0.3** |
| **EN055: Ionic Balance** | | | | | | | | |
| ø Total Anions | ---- | 0.01 | meq/L | **3.18** | **19.9** | **21.0** | **2.40** | **20.9** |
| ø Total Cations | ---- | 0.01 | meq/L | **3.46** | **20.8** | **22.8** | **2.78** | **21.8** |
| ø Ionic Balance | ---- | 0.01 | % | **4.20** | **2.16** | **4.21** | **----** | **2.16** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 5 | WKLC 6 | WKLC 1A | WKLC 3AW | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | EB2441569-006 | EB2441569-007 | EB2441569-008 | EB2441569-009 | -------- |
| | | | | Result | Result | Result | Result | ---- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.49** | **7.37** | **7.92** | **7.10** | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **1220** | **2070** | **298** | **1660** | ---- |
| **ED037P: Alkalinity by PC Titrator** | | | | | | | | |
| Hydroxide Alkalinity as CaCO3 | DMO-210-001 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Carbonate Alkalinity as CaCO3 | 3812-32-6 | 1 | mg/L | <1 | <1 | <1 | <1 | ---- |
| Bicarbonate Alkalinity as CaCO3 | 71-52-3 | 1 | mg/L | **39** | **33** | **102** | **32** | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **39** | **33** | **102** | **32** | ---- |
| **ED038: Acidity** | | | | | | | | |
| Acidity as CaCO3 | ---- | 1 | mg/L | **3** | **5** | **2** | **7** | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **658** | **1160** | **52** | **973** | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **2** | **4** | <1 | **3** | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **223** | **455** | **62** | **406** | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **13** | **25** | <1 | **14** | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **30** | **37** | **1** | **3** | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **16** | **31** | **3** | **3** | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | **0.04** | <0.01 | <0.01 | ---- |
| Dysprosium | 7429-91-6 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Silver | 7440-22-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.004** | **0.008** | <0.001 | <0.001 | ---- |
| Bismuth | 7440-69-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Erbium | 7440-52-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Boron | 7440-42-8 | 0.05 | mg/L | **0.38** | **0.52** | <0.05 | **0.19** | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | WKLC 5 | WKLC 6 | WKLC 1A | WKLC 3AW | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | EB2441569-006 | EB2441569-007 | EB2441569-008 | EB2441569-009 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| **Europium** | 7440-53-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Strontium** | 7440-24-6 | 0.001 | mg/L | | **0.913** | **2.78** | **0.441** | **1.08** | ---- |
| **Barium** | 7440-39-3 | 0.001 | mg/L | | **0.016** | **0.016** | **0.030** | **0.009** | ---- |
| **Gadolinium** | 7440-54-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Titanium** | 7440-32-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Beryllium** | 7440-41-7 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Gallium** | 7440-55-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Cadmium** | 7440-43-9 | 0.0001 | mg/L | | **0.0107** | **0.0357** | **0.0036** | **0.0559** | ---- |
| **Hafnium** | 7440-58-6 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Tellurium** | 22541-49-7 | 0.005 | mg/L | | <0.005 | <0.005 | <0.005 | <0.005 | ---- |
| **Cobalt** | 7440-48-4 | 0.001 | mg/L | | <0.001 | **0.004** | <0.001 | **0.003** | ---- |
| **Holmium** | 7440-60-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Uranium** | 7440-61-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Caesium** | 7440-46-2 | 0.001 | mg/L | | **0.002** | **0.003** | <0.001 | **0.002** | ---- |
| **Chromium** | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Indium** | 7440-74-6 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Copper** | 7440-50-8 | 0.001 | mg/L | | **0.005** | **0.070** | **0.005** | **0.016** | ---- |
| **Lanthanum** | 7439-91-0 | 0.001 | mg/L | | <0.001 | **0.005** | <0.001 | **0.012** | ---- |
| **Rubidium** | 7440-17-7 | 0.001 | mg/L | | **0.011** | **0.022** | **0.002** | **0.004** | ---- |
| **Lithium** | 7439-93-2 | 0.001 | mg/L | | **0.028** | **0.067** | **0.003** | **0.022** | ---- |
| **Lutetium** | 7439-94-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Thorium** | 7440-29-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Cerium** | 7440-45-1 | 0.001 | mg/L | | <0.001 | **0.006** | <0.001 | **0.007** | ---- |
| **Manganese** | 7439-96-5 | 0.001 | mg/L | | **0.139** | **0.666** | **0.005** | **1.56** | ---- |
| **Neodymium** | 7440-00-8 | 0.001 | mg/L | | <0.001 | **0.003** | <0.001 | **0.005** | ---- |
| **Molybdenum** | 7439-98-7 | 0.001 | mg/L | | **0.010** | **0.008** | **0.016** | <0.001 | ---- |
| **Praseodymium** | 7440-10-0 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.001** | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | WKLC 5 | WKLC 6 | WKLC 1A | WKLC 3AW | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | 28-Nov-2024 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | EB2441569-006 | EB2441569-007 | EB2441569-008 | EB2441569-009 | -------- |
| | | | | Result | Result | Result | Result | ---- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | |
| **Nickel** | 7440-02-0 | 0.001 | mg/L | <0.001 | **0.067** | <0.001 | **0.006** | ---- |
| **Samarium** | 7440-19-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Lead** | 7439-92-1 | 0.001 | mg/L | <0.001 | **0.003** | <0.001 | **0.014** | ---- |
| **Terbium** | 7440-27-9 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Antimony** | 7440-36-0 | 0.001 | mg/L | **0.036** | **0.065** | **0.001** | **0.006** | ---- |
| **Thulium** | 7440-30-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Selenium** | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Ytterbium** | 7440-64-4 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Tin** | 7440-31-5 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Yttrium** | 7440-65-5 | 0.001 | mg/L | <0.001 | **0.002** | <0.001 | **0.002** | ---- |
| **Thallium** | 7440-28-0 | 0.001 | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| **Zirconium** | 7440-67-7 | 0.005 | mg/L | <0.005 | <0.005 | <0.005 | <0.005 | ---- |
| **Vanadium** | 7440-62-2 | 0.01 | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| **Zinc** | 7440-66-6 | 0.005 | mg/L | **0.193** | **1.34** | **0.205** | **2.65** | ---- |
| **Iron** | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | <0.05 | <0.05 | ---- |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | |
| **Mercury** | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | <0.0001 | <0.0001 | ---- |
| **EK040P: Fluoride by PC Titrator** | | | | | | | | |
| **Fluoride** | 16984-48-8 | 0.1 | mg/L | **0.3** | **0.5** | <0.1 | **0.2** | ---- |
| **EN055: Ionic Balance** | | | | | | | | |
| **ø Total Anions** | ---- | 0.01 | meq/L | **14.5** | **24.9** | **3.12** | **21.0** | ---- |
| **ø Total Cations** | ---- | 0.01 | meq/L | **13.9** | **27.2** | **3.21** | **21.6** | ---- |
| **ø Ionic Balance** | ---- | 0.01 | % | **2.19** | **4.30** | **1.47** | **1.49** | ---- |

Trilab
Soil Rock Calibration

**Brisbane**
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**Perth**
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Queens Park
WA 6107
Ph: +61 8 9258 8323

# PARTICLE SIZE DISTRIBUTION TEST REPORT

**Test Method: AS 1289 3.6.1, 2.1.1**

| | | | |
|---|---|---|---|
| **Client** | RGS Environmental Pty Ltd | **Report No.** | 16090382-G |
| **Address** | PO Box 3091, Sunnybank South QLD 4109 | **Report Date** | 21/09/2016 |
| **Project** | RGSMRO KLC Project | | |

| **Sample No.** | 16090382 | 16090383 | 16090384 | - | - | - | - |
|---|---|---|---|---|---|---|---|
| **Test Date** | 21/09/2016 | 8/09/2016 | 21/09/2016 | - | - | - | - |
| **Client ID** | 1_NAF Rock - Rock Sample | 2_Moderate PAF Rock - Rock Sample | 3_High PAF Rock - Rock Sample | - | - | - | - |
| **Depth (m)** | Not Supplied | Not Supplied | Not Supplied | - | - | - | - |
| **Moisture (%)** | 0.3 | 0.2 | 0.2 | - | - | - | - |
| | | | | | | | |
| **AS SIEVE SIZE (mm)** | **PERCENT PASSING** | | | | | | |
| **150** | | | | - | - | - | - |
| **75** | | | | - | - | - | - |
| **63** | | | | - | - | - | - |
| **53** | | | | - | - | - | - |
| **37.5** | | | | - | - | - | - |
| **26.5** | 100 | 100 | 100 | - | - | - | - |
| **19** | 99 | 96 | 96 | - | - | - | - |
| **13.2** | 78 | 61 | 64 | - | - | - | - |
| **9.5** | 51 | 34 | 37 | - | - | - | - |
| **6.7** | 33 | 20 | 24 | - | - | - | - |
| **4.75** | 25 | 13 | 19 | - | - | - | - |
| **2.36** | 9 | 4 | 9 | - | - | - | - |
| **1.18** | 5 | 1 | 5 | - | - | - | - |
| **0.600** | 3 | 1 | 3 | - | - | - | - |
| **0.425** | 3 | 1 | 3 | - | - | - | - |
| **0.300** | 2 | 1 | 2 | - | - | - | - |
| **0.150** | 2 | 1 | 2 | - | - | - | - |
| **0.075** | 1 | 0 | 1 | - | - | - | - |

NOTES/REMARKS:

Sample/s supplied by the client



Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/National Standards.

Tested at Trilab Brisbane Laboratory.

Authorised Signatory
J. Russell

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

**Laboratory No. 9926**

The results of calibrations and tests performed apply only to the specific instrument or sample at the time of test unless otherwise clearly stated.
Reference should be made to Trilab's "Standard Terms and Conditions of Business" for further details.
Trilab Pty Ltd ABN 25 065 630 506

*ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING*

# Certificate of Analysis

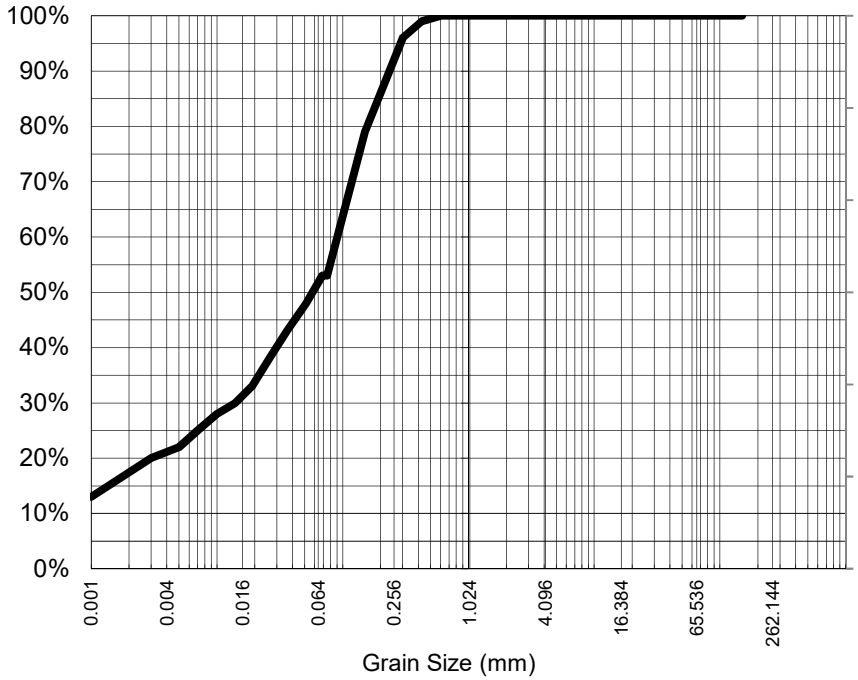
ALS Laboratory Group Pty Ltd
2 Byth Street
Stafford, QLD 4053
pH 07 3243 7222
samples.brisbane@alsenviro.com

**ALS Environmental**

**Brisbane QLD**

| | | | |
|---|---|---|---|
| **CLIENT:** | ALAN ROBERTSON | **DATE REPORTED:** | 3-Sep-2021 |
| **COMPANY:** | RGS ENVIRONMENTAL CONSULTANTS PTY LTD | **DATE RECEIVED:** | 24-Aug-2021 |
| **ADDRESS:** | 3/30 Lensworth Street Coopers Plains | **REPORT NO:** | EB2124089-001 / PSD |
| **PROJECT:** | 2021066 MRO KLC cont | **SAMPLE ID:** | 2021066_0002 |

## Particle Size Distribution




| Particle Size (mm) | % Passing |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| 0.600 | 100% |
| 0.425 | 99% |
| 0.300 | 96% |
| 0.150 | 79% |
| 0.075 | 53% |
| Particle Size (microns) | |
| 51 | 48% |
| 36 | 43% |
| 26 | 38% |
| 19 | 33% |
| 14 | 30% |
| 10 | 28% |
| 7 | 25% |
| 5 | 22% |
| 1 | 13% |

| | |
|---|---|
| Median Particle Size (mm)* | 0.058 |

## Analysis Notes

*Samples analysed as received.*

*Median Particle Size is not covered under the current scope of ALS's NATA accreditation.*

**Sample Comments:**

**Analysed:** 30-Aug-21

**Loss on Pretreatment** NA

**Limit of Reporting:** 1%

**Sample Description:**

**Dispersion Method** Shaker

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density (<2.36mm)** 2.75

**NATA Accreditation: 825 Site: Brisbane**
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NATA
WORLD RECOGNISED ACCREDITATION

Satish Trivedi
Soil Senior Chemist
***Authorised Signatory***

# Certificate of Analysis

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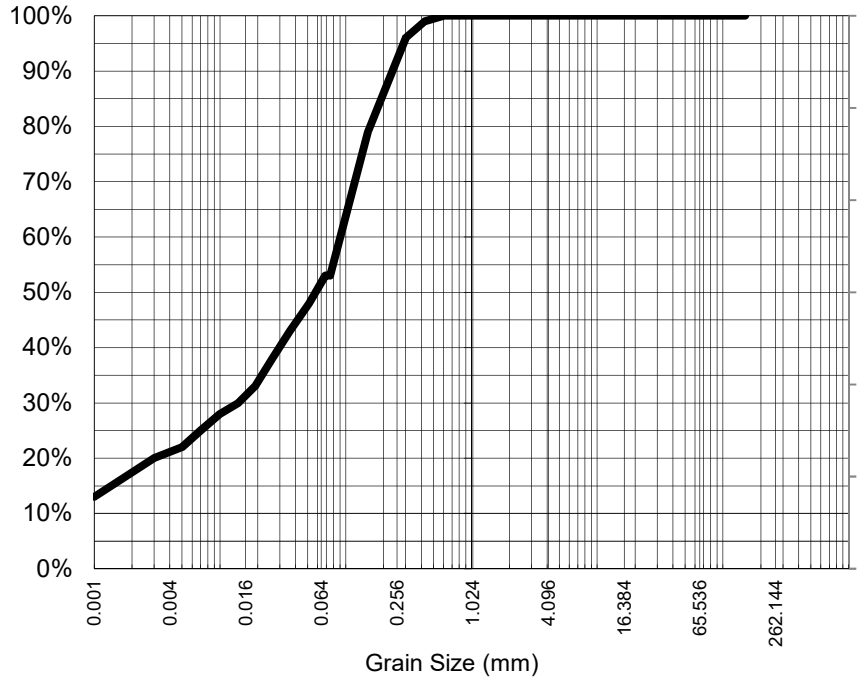
**ALS Environmental**

**Brisbane QLD**

| | | | |
|---|---|---|---|
| **CLIENT:** | ALAN ROBERTSON | **DATE REPORTED:** | 3-Sep-2021 |
| **COMPANY:** | RGS ENVIRONMENTAL CONSULTANTS PTY LTD | **DATE RECEIVED:** | 24-Aug-2021 |
| **ADDRESS:** | 3/30 Lensworth Street Coopers Plains | **REPORT NO:** | EB2124089-001DUP / PSD |
| **PROJECT:** | 2021066 MRO KLC cont | **SAMPLE ID:** | 2021066_0002 |

## Particle Size Distribution




| Particle Size (mm) | % Passing |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| 0.600 | 100% |
| 0.425 | 99% |
| 0.300 | 96% |
| 0.150 | 79% |
| 0.075 | 53% |
| Particle Size (microns) | |
| 51 | 48% |
| 36 | 43% |
| 26 | 38% |
| 19 | 33% |
| 14 | 30% |
| 10 | 28% |
| 7 | 25% |
| 5 | 22% |
| 1 | 13% |

| | |
|---|---|
| Median Particle Size (mm)* | 0.058 |

## Analysis Notes

*Samples analysed as received.*

*Median Particle Size is not covered under the current scope of ALS's NATA accreditation.*

**Sample Comments:**

**Analysed:** 30-Aug-21

**Loss on Pretreatment** NA

**Limit of Reporting:** 1%

**Sample Description:**

**Dispersion Method** Shaker

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density (<2.36mm)** 2.75

**NATA Accreditation: 825 Site: Brisbane**
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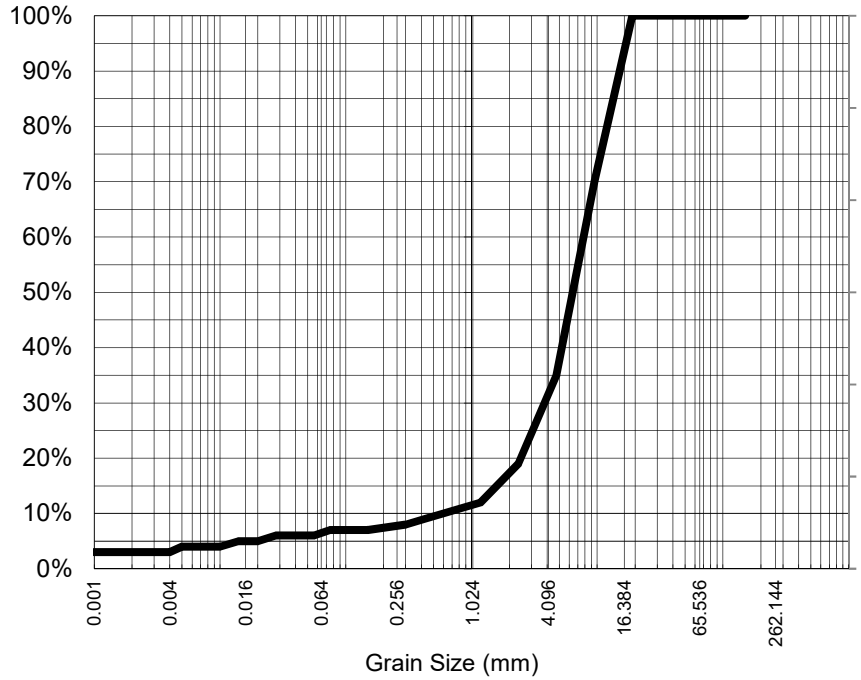
|---|---|---|---|
| **CLIENT:** | ALAN ROBERTSON | **DATE REPORTED:** | 3-Sep-2021 |
| **COMPANY:** | RGS ENVIRONMENTAL CONSULTANTS PTY LTD | **DATE RECEIVED:** | 24-Aug-2021 |
| **ADDRESS:** | 3/30 Lensworth Street Coopers Plains | **REPORT NO:** | EB2124089-003 / PSD |
| **PROJECT:** | 2021066 MRO KLC cont | **SAMPLE ID:** | 2021066_0004 |

## Particle Size Distribution




| Particle Size (mm) | % Passing |
|---|---|
| | |
| | |
| | |
| 19.0 | 100% |
| 9.50 | 70% |
| 4.75 | 35% |
| 2.36 | 19% |
| 1.18 | 12% |
| 0.600 | 10% |
| 0.425 | 9% |
| 0.300 | 8% |
| 0.150 | 7% |
| 0.075 | 7% |
| Particle Size (microns) | |
| 56 | 6% |
| 39 | 6% |
| 28 | 6% |
| 20 | 5% |
| 14 | 5% |
| 10 | 4% |
| 7 | 4% |
| 5 | 4% |
| 1 | 3% |

## Analysis Notes

*Samples analysed as received.*

| | |
|---|---|
| Median Particle Size (mm)* | 6.786 |

*Median Particle Size is not covered under the current scope of ALS's NATA accreditation.*

| | | | |
|---|---|---|---|
| **Sample Comments:** | AS1289.3.6.3 states that hydrometer analysis is not applicable for samples containing <10% fines (<75um). Results should be assessed accordingly | **Analysed:** | 30-Aug-21 |
| **Loss on Pretreatment** | NA | **Limit of Reporting:** | 1% |
| **Sample Description:** | | **Dispersion Method** | Shaker |
| **Test Method:** | AS1289.3.6.2/AS1289.3.6.3 | | |
| **Soil Particle Density (<2.36mm)** | 2.79 | | |

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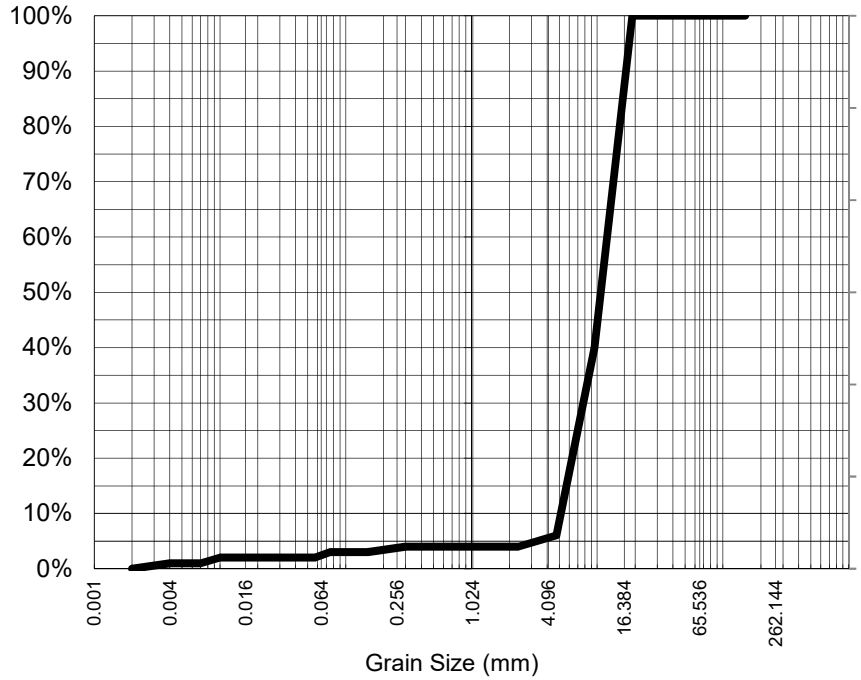
**ALS Environmental**

**Brisbane QLD**

| | | | |
|---|---|---|---|
| **CLIENT:** | ALAN ROBERTSON | **DATE REPORTED:** | 3-Sep-2021 |
| **COMPANY:** | RGS ENVIRONMENTAL CONSULTANTS PTY LTD | **DATE RECEIVED:** | 24-Aug-2021 |
| **ADDRESS:** | 3/30 Lensworth Street Coopers Plains | **REPORT NO:** | EB2124089-005 / PSD |
| **PROJECT:** | 2021066 MRO KLC cont | **SAMPLE ID:** | 2021066_0006 |

## Particle Size Distribution




| Particle Size (mm) | % Passing |
|---|---|
| | |
| | |
| | |
| 19.0 | 100% |
| 9.50 | 40% |
| 4.75 | 6% |
| 2.36 | 4% |
| 1.18 | 4% |
| 0.600 | 4% |
| 0.425 | 4% |
| 0.300 | 4% |
| 0.150 | 3% |
| 0.075 | 3% |
| Particle Size (microns) | |
| 57 | 2% |
| 41 | 2% |
| 29 | 2% |
| 20 | 2% |
| 15 | 2% |
| 10 | 2% |
| 7 | 1% |
| 5 | 1% |
| 2 | 0% |

## Analysis Notes

*Samples analysed as received.*

| | |
|---|---|
| Median Particle Size (mm)* | 11.083 |

*Median Particle Size is not covered under the current scope of ALS's NATA accreditation.*

**Sample Comments:** AS1289.3.6.3 states that hydrometer analysis is not applicable for samples containing <10% fines (<75um). Results should be assessed accordingly

**Analysed:** 30-Aug-21

**Loss on Pretreatment** NA

**Limit of Reporting:** 1%

**Sample Description:**

**Dispersion Method** Shaker

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density (<2.36mm)** 2.65

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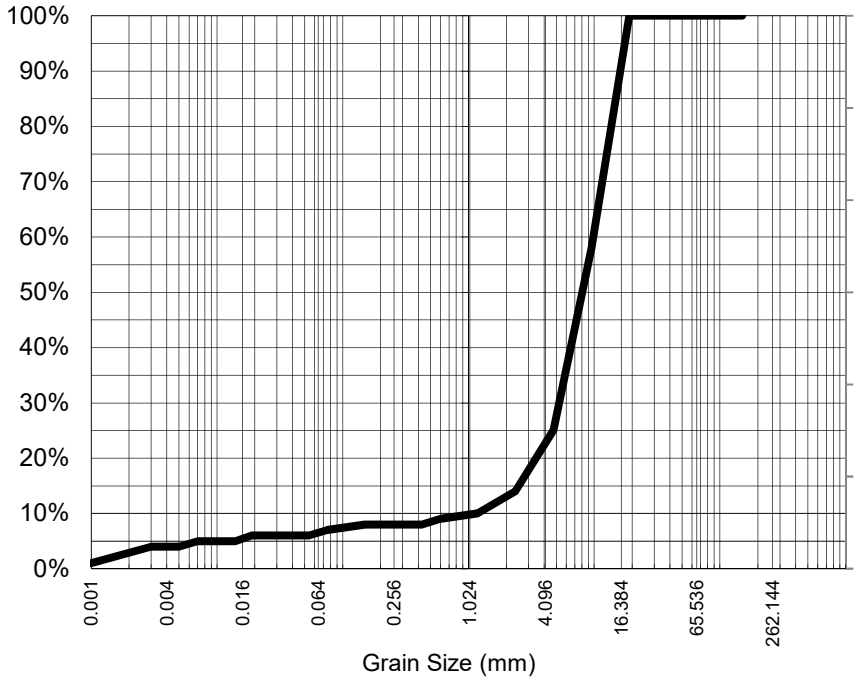
**Brisbane QLD**

| | | | |
|---|---|---|---|
| **CLIENT:** | ALAN ROBERTSON | **DATE REPORTED:** | 3-Sep-2021 |
| **COMPANY:** | RGS ENVIRONMENTAL CONSULTANTS PTY LTD | **DATE RECEIVED:** | 24-Aug-2021 |
| **ADDRESS:** | 3/30 Lensworth Street Coopers Plains | **REPORT NO:** | EB2124089-007 / PSD |
| **PROJECT:** | 2021066 MRO KLC cont | **SAMPLE ID:** | 2021066_0008 |

## Particle Size Distribution




| Particle Size (mm) | % Passing |
|---|---|
| | |
| | |
| | |
| 19.0 | 100% |
| 9.50 | 58% |
| 4.75 | 25% |
| 2.36 | 14% |
| 1.18 | 10% |
| 0.600 | 9% |
| 0.425 | 8% |
| 0.300 | 8% |
| 0.150 | 8% |
| 0.075 | 7% |
| Particle Size (microns) | |
| 54 | 6% |
| 38 | 6% |
| 27 | 6% |
| 19 | 6% |
| 14 | 5% |
| 10 | 5% |
| 7 | 5% |
| 5 | 4% |
| 1 | 1% |

| | |
|---|---|
| Median Particle Size (mm)* | 8.348 |

## Analysis Notes

*Samples analysed as received.*

** Soil Particle Density results fell outside the scope of AS 1289.3.6.3. Typical sediment SPD values used for calculations and consequently, NATA endorsement does not apply to hydrometer results*

*Median Particle Size is not covered under the current scope of ALS's NATA accreditation.*

| | | | |
|---|---|---|---|
| **Sample Comments:** | AS1289.3.6.3 states that hydrometer analysis is not applicable for samples containing <10% fines (<75um). Results should be assessed accordingly | **Analysed:** | 30-Aug-21 |
| **Loss on Pretreatment** | NA | **Limit of Reporting:** | 1% |
| **Sample Description:** | | **Dispersion Method** | Shaker |
| **Test Method:** | AS1289.3.6.2/AS1289.3.6.3 | | |
| **Soil Particle Density (<2.36mm)** | 3.11 (2.85)* | | |

**NATA Accreditation: 825 Site: Brisbane**
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**Satish Trivedi**
Soil Senior Chemist
***Authorised Signatory***

# Certificate of Analysis

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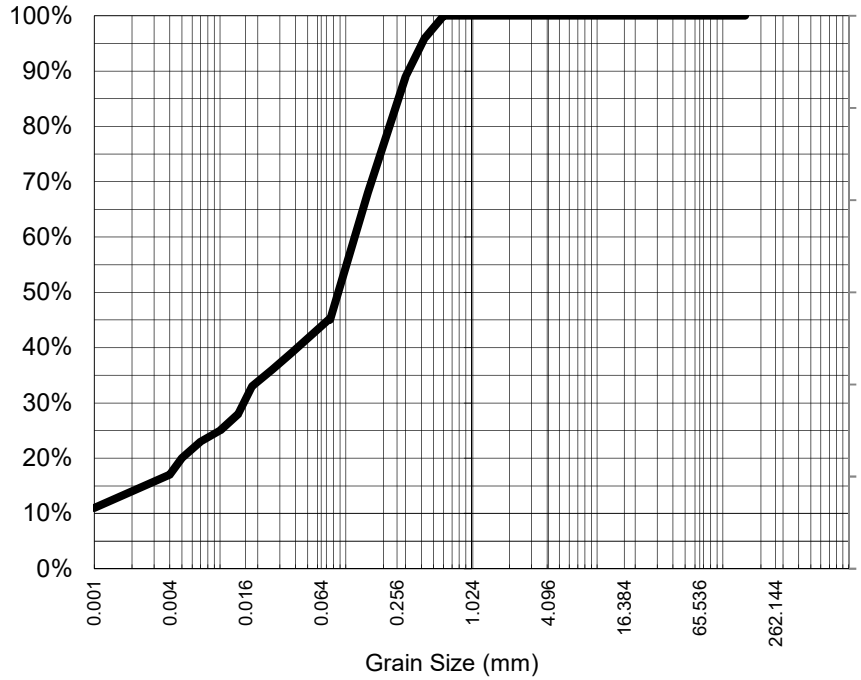
samples.brisbane@alsenviro.com

**ALS Environmental**

**Brisbane QLD**

| | | | |
|---|---|---|---|
| **CLIENT:** | ALAN ROBERTSON | **DATE REPORTED:** | 3-Sep-2021 |
| **COMPANY:** | RGS ENVIRONMENTAL CONSULTANTS PTY LTD | **DATE RECEIVED:** | 24-Aug-2021 |
| **ADDRESS:** | 3/30 Lensworth Street Coopers Plains | **REPORT NO:** | EB2124089-008 / PSD |
| **PROJECT:** | 2021066 MRO KLC cont | **SAMPLE ID:** | 2021066_0009 |

## Particle Size Distribution




| Particle Size (mm) | % Passing |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| 0.600 | 100% |
| 0.425 | 96% |
| 0.300 | 89% |
| 0.150 | 68% |
| 0.075 | 45% |
| Particle Size (microns) | |
| 52 | 42% |
| 37 | 39% |
| 26 | 36% |
| 18 | 33% |
| 14 | 28% |
| 10 | 25% |
| 7 | 23% |
| 5 | 20% |
| 1 | 11% |

| | |
|---|---|
| Median Particle Size (mm)* | 0.091 |

*Median Particle Size is not covered under the current scope of ALS's NATA accreditation.*

## Analysis Notes

*Samples analysed as received.*

**Sample Comments:**

**Analysed:** 30-Aug-21

**Loss on Pretreatment** NA

**Limit of Reporting:** 1%

**Sample Description:**

**Dispersion Method** Shaker

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density (<2.36mm)** 2.73

**NATA Accreditation: 825 Site: Brisbane**
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Satish Trivedi
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## 9.4 Attachment D: Levay & Co, X Ray Vision, and BMC laboratory results

**LEVAY & CO. ENVIRONMENTAL SERVICES**
*Water Quality, Water Treatment and Environmental Pollution Research Laboratories*

**Job No.**
**L&C-16-232**

# REPORT

## QXRD Analysis of Waste Rock and Tailings from Mt. Rawdon Gold Mine

*Prepared for:*

Dr Alan Robertson
RGS Environmental Pty Ltd
123 Wynne Street,
Sunnybank Hills QLD 4109

*Prepared by:*

Dr. Russell Schumann
Levay & Co. Environmental Services
R1-03 Building R
Mawson Lakes Campus
University of South Australia
Mawson Lakes SA 5095

Date: 12 September 2016

## Introduction

Levay & Co. Environmental Services received three waste rock and one tailings sample originating from the Mt. Rawdon Gold Mine from RGS Environmental to determine their mineralogical content by (semi-) quantitative x-ray diffraction (QXRD) analysis. The sample details are provided in the table below.

**Table 1. List of samples received for QXRD analysis**

| Sample ID. | Sample Description |
|---|---|
| KLC1 | NAF waste rock |
| KLC2 | Moderate PAF waste rock |
| KLC3 | High PAF waste rock |
| KLC 4 | Uncertain tailings |

## (Semi) - Quantitative X-Ray Diffraction (QXRD)

X-ray diffraction traces were obtained with a Panalytical XPERT POWDER X-Ray Diffractometer using a graphite monochrometer and $CoK_{\alpha}$ radiation. Operating conditions were 36kV/30mA, step scan $0.02\theta/2\theta$ at $1^{o}/2\theta$/min, range $5^{o}$ to $76^{o}$ $2\theta$, fixed $1^{o}$ divergence and receiving slits and a $0.15^{o}$ scatter slit. Mineral phases present were identified by computer-aided (Panalytical X'Pert HighScore Plus, Bruker Diffrac Plus EVA) searches of the 2013 ICDD PDF4 minerals sub-file. Quantitative XRD results were obtained using SiroQuant™ ver 4.0 and refinement of the most suitable mineral structures available in the current software package databank.

# Results

The results of QXRD analysis of the waste rock and tailings samples are shown in Table 2 below. Results are generally in agreement with ABA results, with decreasing carbonate and increasing pyrite content from NAF to high PAF wastes. The pyrite content is also in general agreement with CRS results, although a CRS of 3.6% for the high PAF waste may suggest the pyrite content of 9.6% from QXRD may be slightly over-estimated.

**Table 2 QXRD results**

| Phase | Weight % | | | |
|---|---|---|---|---|
| | **KLC1** | **KLC2** | **KLC3** | **KLC4** |
| | **NAF Waste Rock** | **Moderate PAF Waste Rock** | **HIGH PAF Waste Rock** | **Uncertain Tailings** |
| Albite | 36.9 | 27.5 | 1.7 | 12.2 |
| Ankerite | - | - | 0.1 | - |
| Calcite | 8.9 | 3.1 | 3.3 | 1.6 |
| Chlorite | 13.2 | 12.4 | 12.0 | 8.9 |
| Gypsum | - | 0.1 | 0.5 | 0.2 |
| Jarosite | - | - | 0.1 | 0.1 |
| Microcline | - | 0.9 | 0.9 | 0.9 |
| Muscovite | 18.3 | 20.7 | 33.6 | 27.5 |
| Pyrite | 0.6 | 2.0 | 9.6 | 8.2 |
| Quartz | 22.2 | 33.1 | 38.1 | 40.5 |

**LEVAY & CO. ENVIRONMENTAL SERVICES**
*Water Quality, Water Treatment and Environmental Pollution Research Laboratories*

**Job No.**
**L&C-16-232**

# REPORT

## QXRD Analysis of Waste Rock and Tailings from Mt. Rawdon Gold Mine

*Prepared for:*

Dr Alan Robertson
RGS Environmental Pty Ltd
123 Wynne Street,
Sunnybank Hills QLD 4109

*Prepared by:*

Dr. Russell Schumann
Levay & Co. Environmental Services
R1-03 Building R
Mawson Lakes Campus
University of South Australia
Mawson Lakes SA 5095

Date: 12 September 2016

## Introduction

Levay & Co. Environmental Services received three waste rock and one tailings sample originating from the Mt. Rawdon Gold Mine from RGS Environmental to determine their mineralogical content by (semi-) quantitative x-ray diffraction (QXRD) analysis. The sample details are provided in the table below.

**Table 1. List of samples received for QXRD analysis**

| Sample ID. | Sample Description |
|---|---|
| KLC1 | NAF waste rock |
| KLC2 | Moderate PAF waste rock |
| KLC3 | High PAF waste rock |
| KLC 4 | Uncertain tailings |

## (Semi) - Quantitative X-Ray Diffraction (QXRD)

X-ray diffraction traces were obtained with a Panalytical XPERT POWDER X-Ray Diffractometer using a graphite monochrometer and $CoK_{\alpha}$ radiation. Operating conditions were 36kV/30mA, step scan $0.02\theta/2\theta$ at $1^{o}/2\theta$/min, range $5^{o}$ to $76^{o}$ $2\theta$, fixed $1^{o}$ divergence and receiving slits and a $0.15^{o}$ scatter slit. Mineral phases present were identified by computer-aided (Panalytical X'Pert HighScore Plus, Bruker Diffrac Plus EVA) searches of the 2013 ICDD PDF4 minerals sub-file. Quantitative XRD results were obtained using SiroQuant™ ver 4.0 and refinement of the most suitable mineral structures available in the current software package databank.

# Results

The results of QXRD analysis of the waste rock and tailings samples are shown in Table 2 below. Results are generally in agreement with ABA results, with decreasing carbonate and increasing pyrite content from NAF to high PAF wastes. The pyrite content is also in general agreement with CRS results, although a CRS of 3.6% for the high PAF waste may suggest the pyrite content of 9.6% from QXRD may be slightly over-estimated.

**Table 2 QXRD results**

| Phase | Weight % | | | |
|---|---|---|---|---|
| | **KLC1** | **KLC2** | **KLC3** | **KLC4** |
| | **NAF Waste Rock** | **Moderate PAF Waste Rock** | **HIGH PAF Waste Rock** | **Uncertain Tailings** |
| Albite | 36.9 | 27.5 | 1.7 | 12.2 |
| Ankerite | - | - | 0.1 | - |
| Calcite | 8.9 | 3.1 | 3.3 | 1.6 |
| Chlorite | 13.2 | 12.4 | 12.0 | 8.9 |
| Gypsum | - | 0.1 | 0.5 | 0.2 |
| Jarosite | - | - | 0.1 | 0.1 |
| Microcline | - | 0.9 | 0.9 | 0.9 |
| Muscovite | 18.3 | 20.7 | 33.6 | 27.5 |
| Pyrite | 0.6 | 2.0 | 9.6 | 8.2 |
| Quartz | 22.2 | 33.1 | 38.1 | 40.5 |

# *LEVAY & CO. ENVIRONMENTAL SERVICES*

*Water Quality, Water Treatment and Environmental Pollution Research Laboratories*


**Job No.**
**L&C-21-166**

# REPORT

## QXRD Analysis of MRO KLC Samples

**Purchase Order No. 20210029**

*Prepared for:*

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*Prepared by:*


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Date: 9th September, 2021

## Introduction

Levay & Co. Environmental Services received twelve samples (RGS Job No. 2021066 – MRO KLC) from RGS Environmental to determine their mineralogical content by (semi-) quantitative x-ray diffraction (QXRD) analysis. The sample details are provided in the table below.

**Table 1. List of samples received for QXRD analysis**

| Sample ID. | Levay & Co. ID. | Sample Description |
|---|---|---|
| 2021066_0002 | 21-166-01 | Waste Rock/Tailings |
| 2021066_0003 | 21-166-02 | Waste Rock/Tailings |
| 2021066_0004 | 21-166-03 | Waste Rock/Tailings |
| 2021066_0005 | 21-166-04 | Waste Rock/Tailings |
| 2021066_0006 | 21-166-05 | Waste Rock/Tailings |
| 2021066_0007 | 21-166-06 | Waste Rock/Tailings |
| 2021066_0008 | 21-166-07 | Waste Rock/Tailings |
| 2021066_0009 | 21-166-08 | Waste Rock/Tailings |
| 2021066_0010 | 21-166-09 | Waste Rock/Tailings |
| 2021066_0011 | 21-166-10 | Waste Rock/Tailings |
| 2021066_0012 | 21-166-11 | Waste Rock/Tailings |
| 2021066_0013 | 21-166-12 | Waste Rock/Tailings |

## (Semi) - Quantitative X-Ray Diffraction (QXRD)

X-ray diffraction traces were obtained from the sample with a Panalytical Aeris Powder Diffractometer. Operating conditions were 40kV/15mA, Fe Kß filter, step scan 0.01/29 secs˚2θ at, 1/2˚ divergence and a 1.0˚ ant-scatter slit. Scan range was 5° to 90° 2θ. Phases were identified by computer search/match of the COD 2021 Database. Quantitative results determined with full pattern Rietveld refinement software.

## Results

The results from QXRD analysis of the above listed samples are shown in Table 2 below. Semiquantitative detection limit is approximately 0.4 wt % in these sample types. The lower than 0.4 wt % results have been reported to indicate the presence of these mineral phases. The results reported below the detection limit is only qualitative.

## Table 2: QXRD results

| Phase | 2021066_0002 Weight %[1] | 2021066_0003 Weight %[1] | 2021066_0004 Weight %[1] | 2021066_0005 Weight %[1] | 2021066_0006 Weight %[1] | 2021066_0007 Weight %[1] |
|---|---|---|---|---|---|---|
| Albite | 18.7 | 22.3 | 27.6 | 17.4 | 23.2 | ND |
| Calcite | 3.7 | 7.2 | 6.5 | 7.0 | 4.5 | 1.9 |
| Chlorite | 5.0 | 11.6 | 15.0 | 7.3 | 4.0 | 5.8 |
| Gypsum | 0.1 | 0.1 | ND | 0.1 | 0.1 | 0.1 |
| Jarosite | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Muscovite | 22.8 | 18.3 | 15.5 | 23.5 | 17.3 | 35.7 |
| Orthoclase | 3.4 | 1.8 | 4.8 | 2.0 | 2.3 | 0.6 |
| Pyrite | 2.3 | 2.5 | 0.5 | 8.0 | 3.7 | 11.9 |
| Quartz | 43.5 | 35.7 | 29.4 | 34.1 | 44.3 | 43.4 |
| Rutile | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |

1 Detection limit ~0.4 wt.%
2 ND = Non Detectable

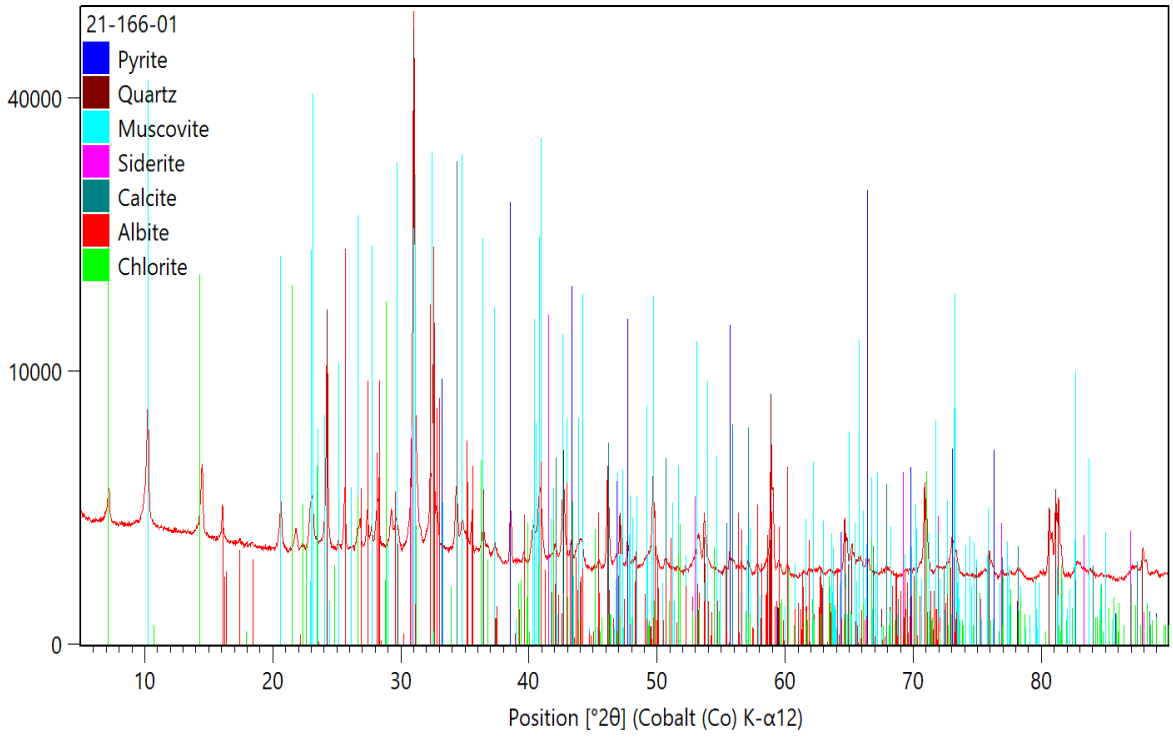
## Table 2: QXRD results

| Phase | 2021066_0008 Weight %[1] | 2021066_0009 Weight %[1] | 2021066_0010 Weight %[1] | 2021066_0011 Weight %[1] | 2021066_0012 Weight %[1] | 2021066_0013 Weight %[1] |
|---|---|---|---|---|---|---|
| Albite | ND | 12.7 | 15.4 | ND | 0.3 | 6.2 |
| Calcite | 4.6 | 3.0 | 2.4 | 4.2 | 3.6 | 2.3 |
| Chlorite | 5.4 | 6.6 | 7.2 | 6.3 | 4.0 | 4.5 |
| Gypsum | 0.1 | 0.2 | 2.1 | 0.2 | 0.5 | 0.4 |
| Jarosite | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Muscovite | 32.9 | 27.3 | 28.8 | 39.3 | 33.6 | 35.4 |
| Orthoclase | 0.7 | 3.9 | 1.4 | 0.3 | 1.3 | 1.8 |
| Pyrite | 6.1 | 3.9 | 3.4 | 9.7 | 7.5 | 9.8 |
| Quartz | 49.5 | 41.9 | 38.8 | 39.6 | 48.6 | 38.9 |
| Rutile | 0.5 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 |

1 Detection limit ~0.4 wt.%
2 ND = Non Detectable

## Results Graphical – Phase ID

### 21-166-01: 2021066_0002

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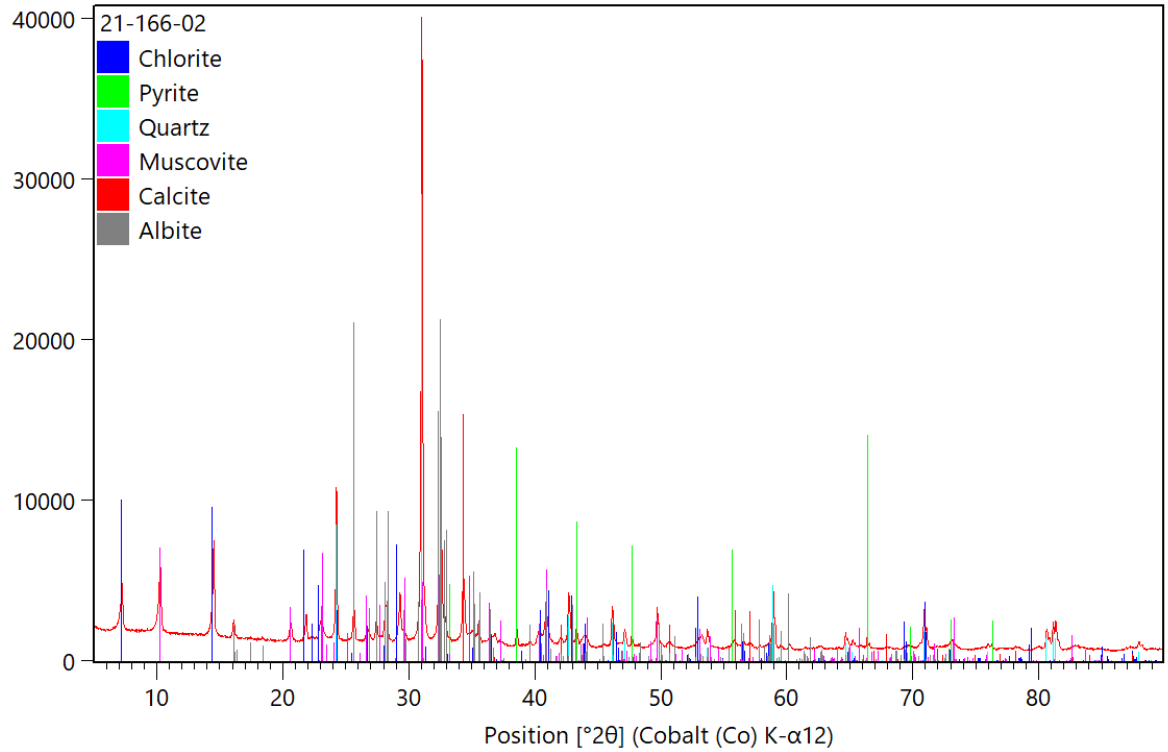

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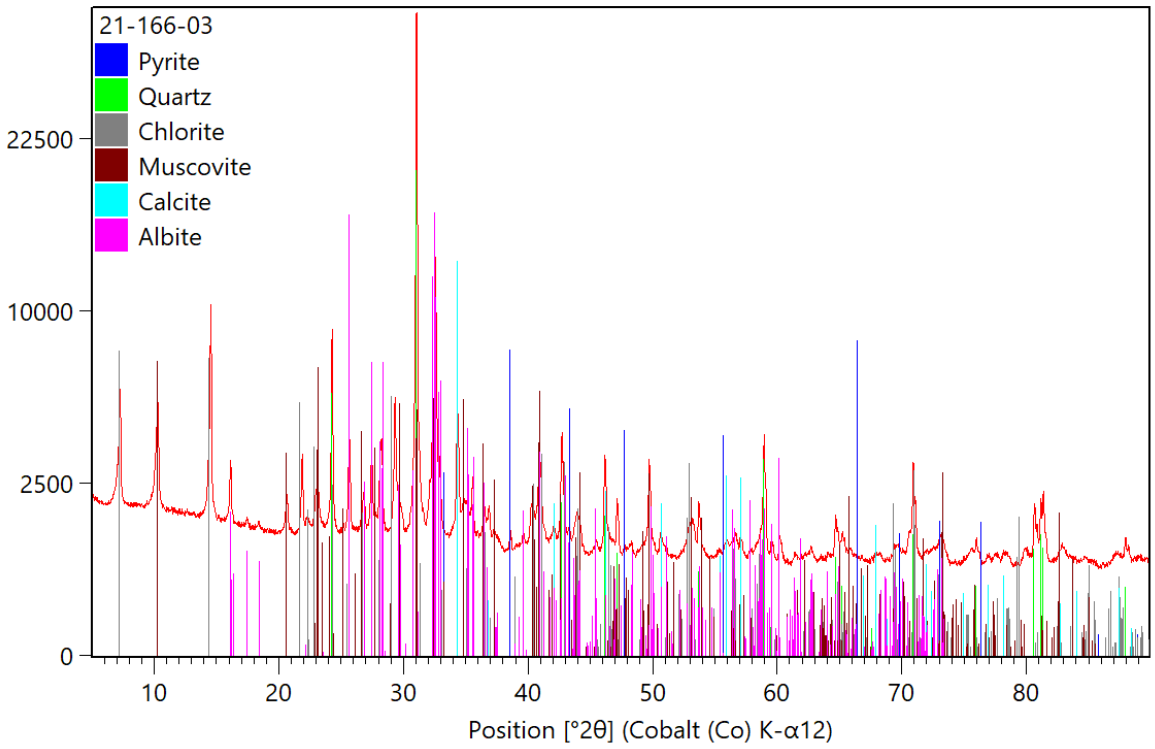


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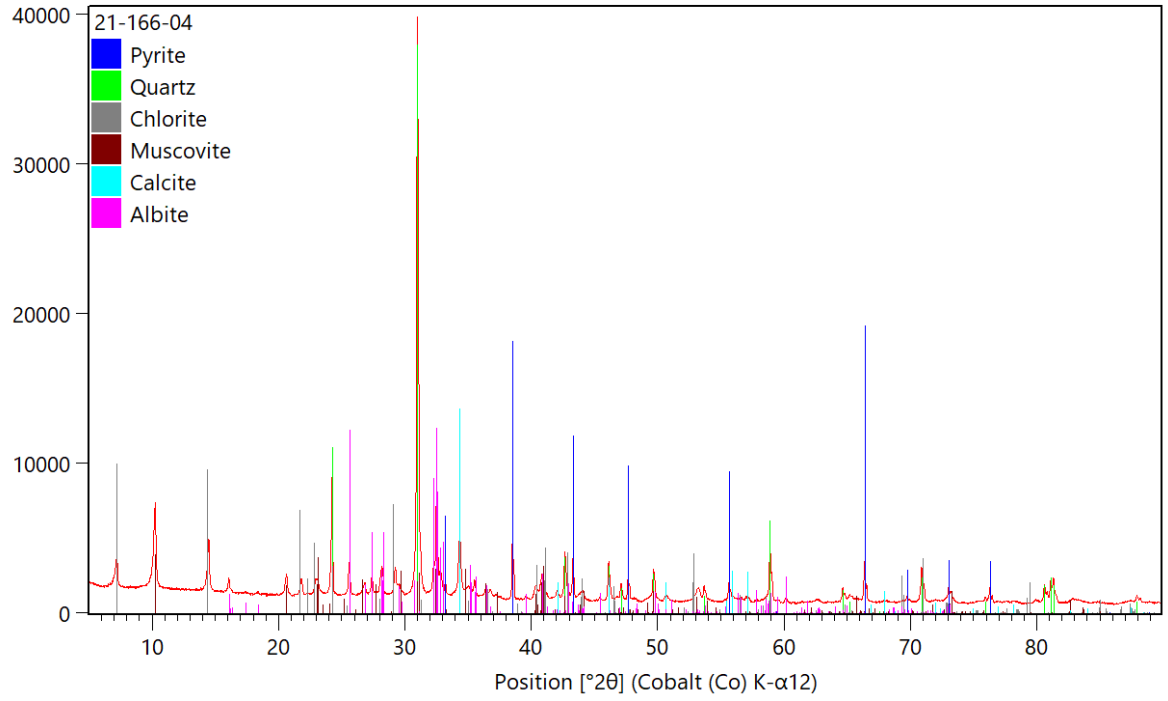

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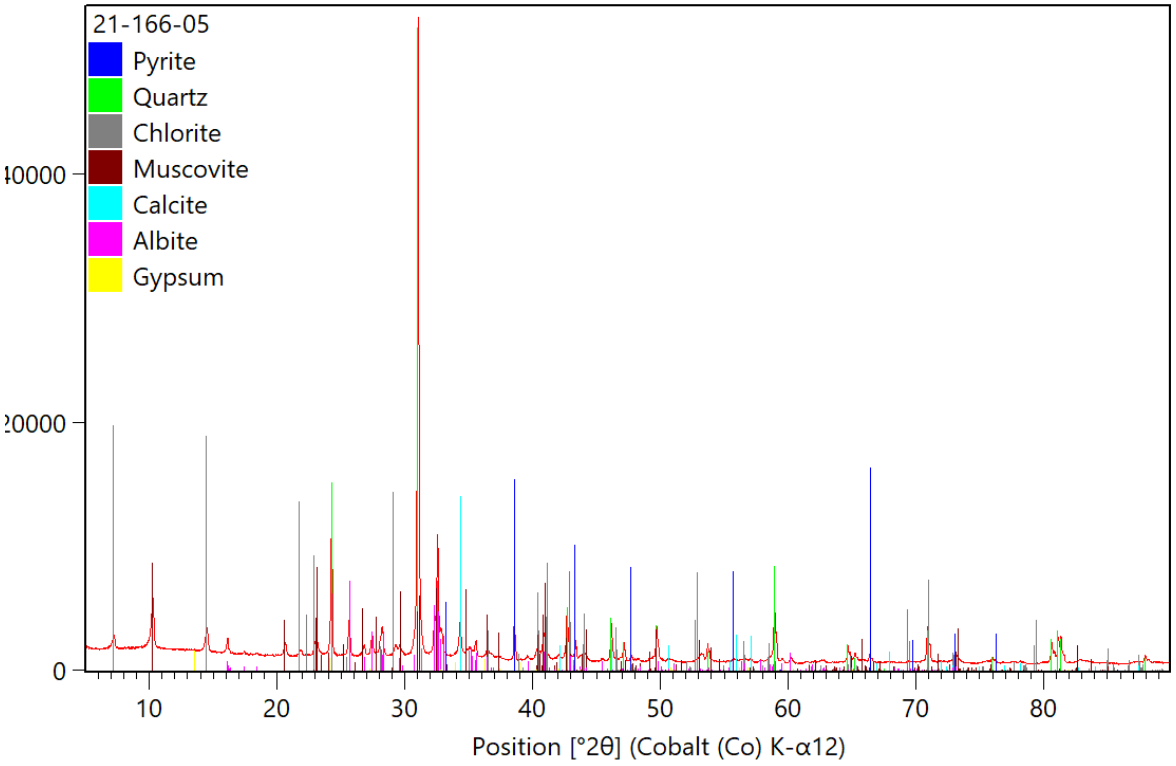


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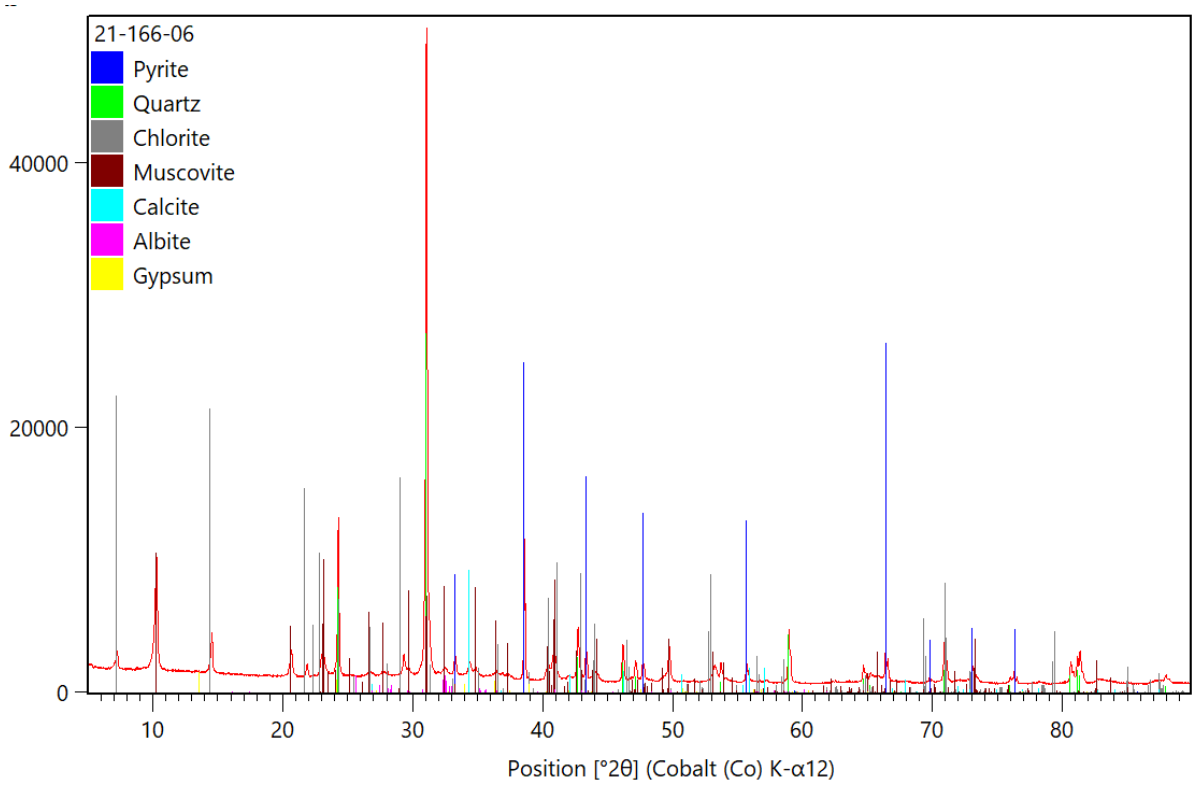

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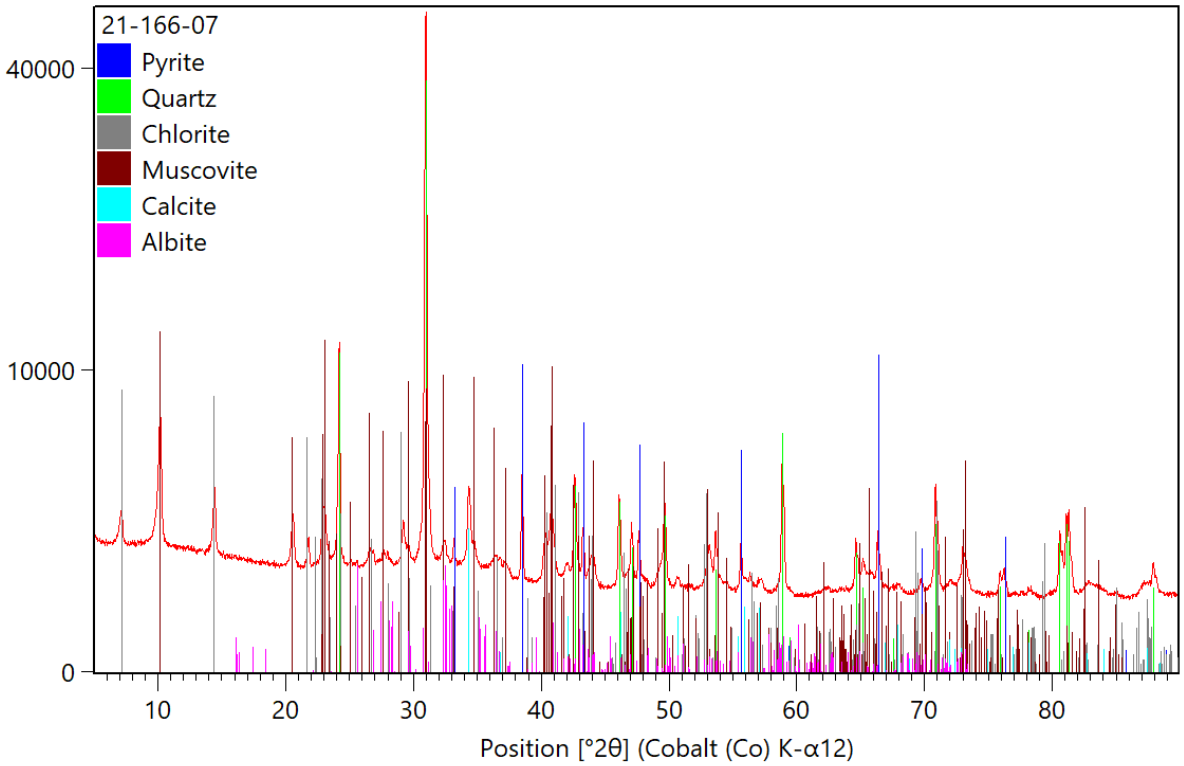


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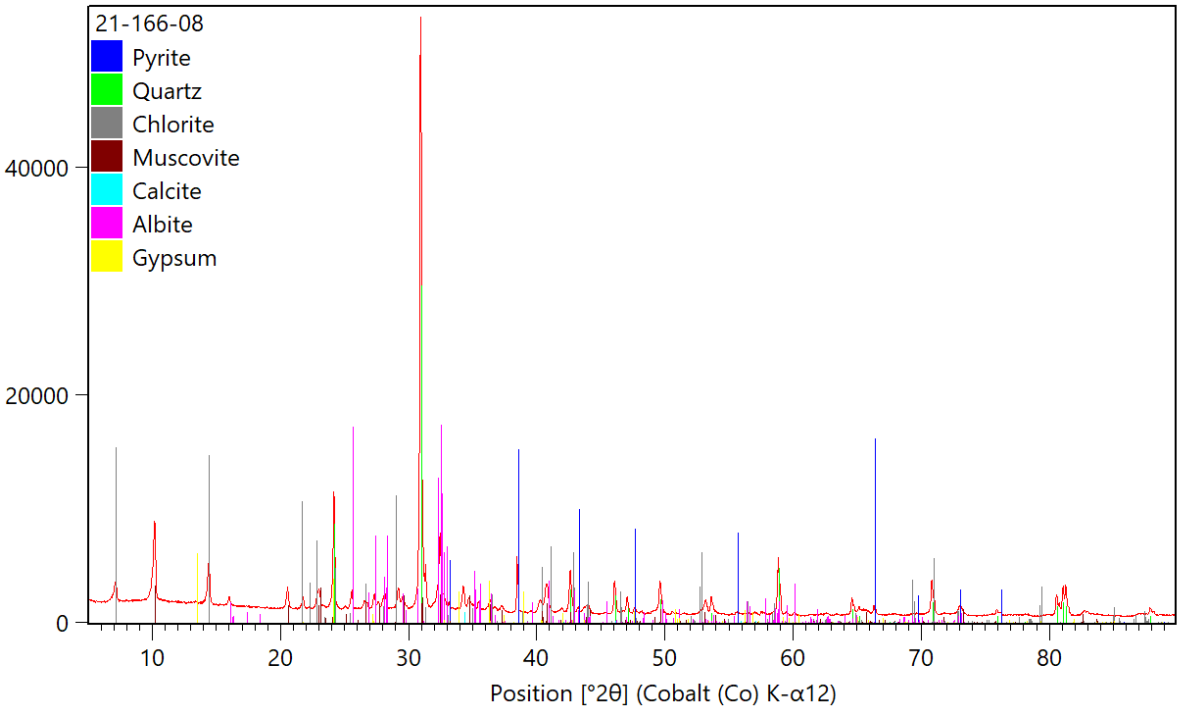

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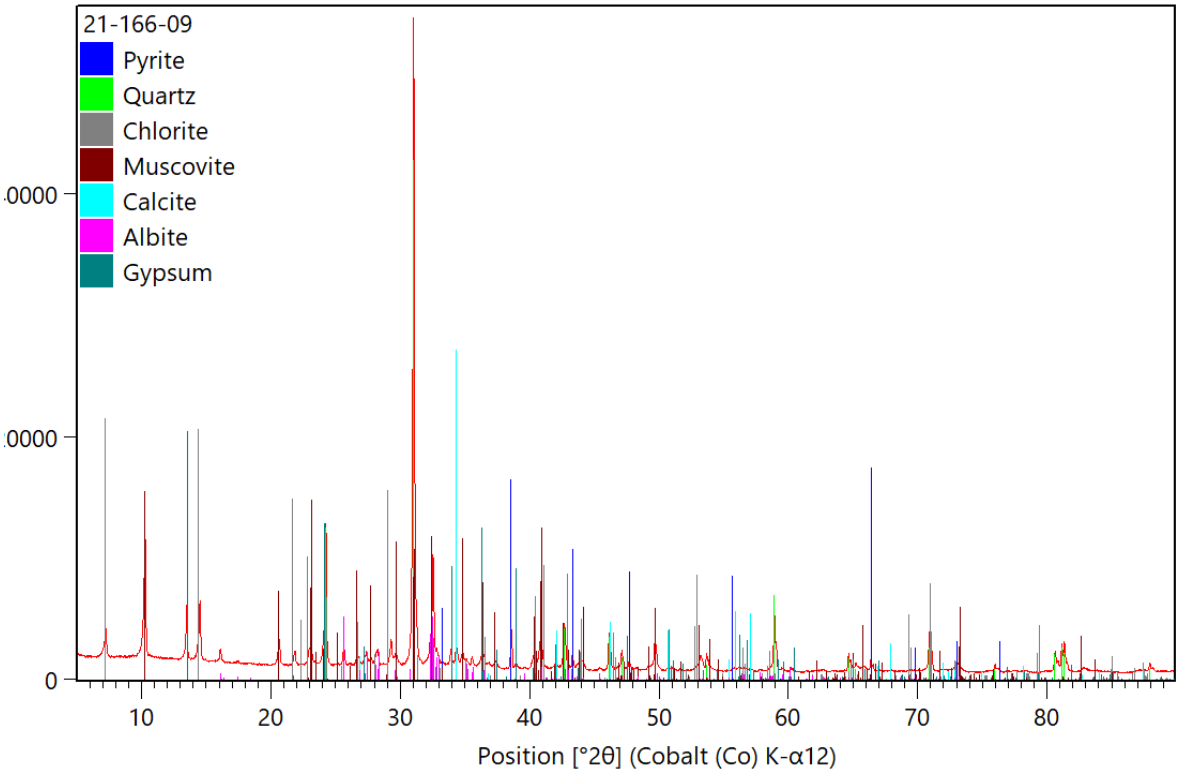


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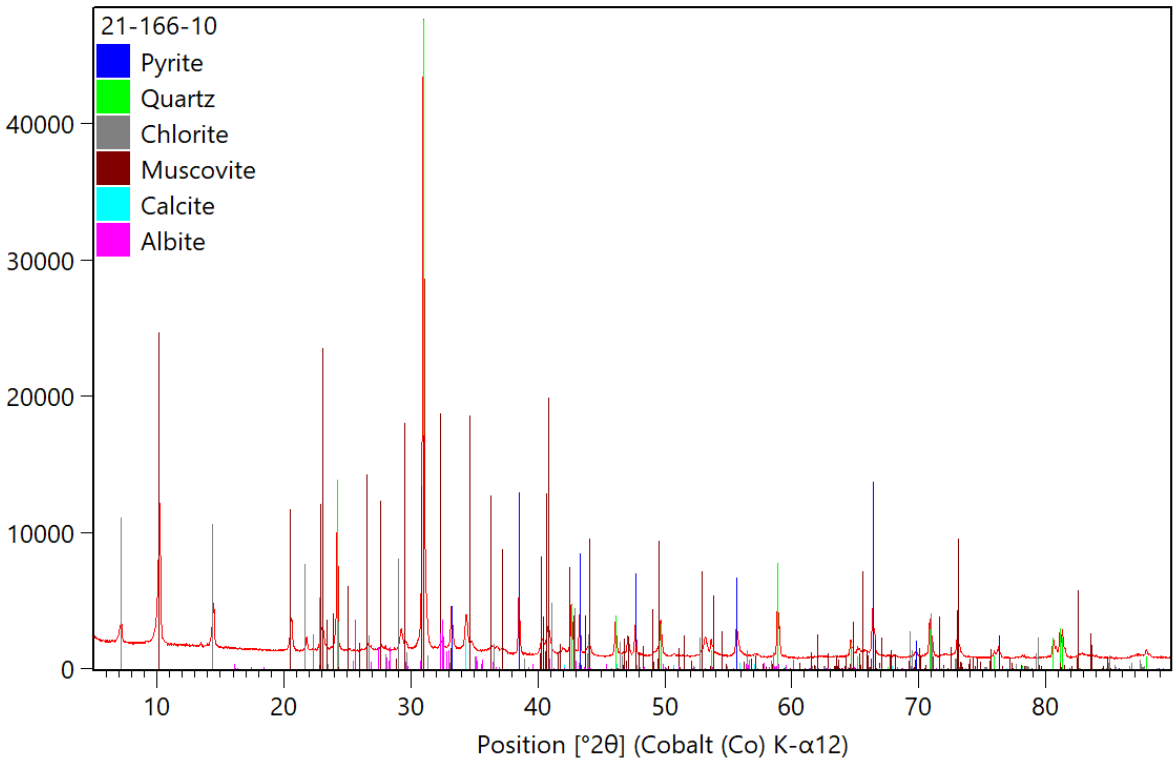

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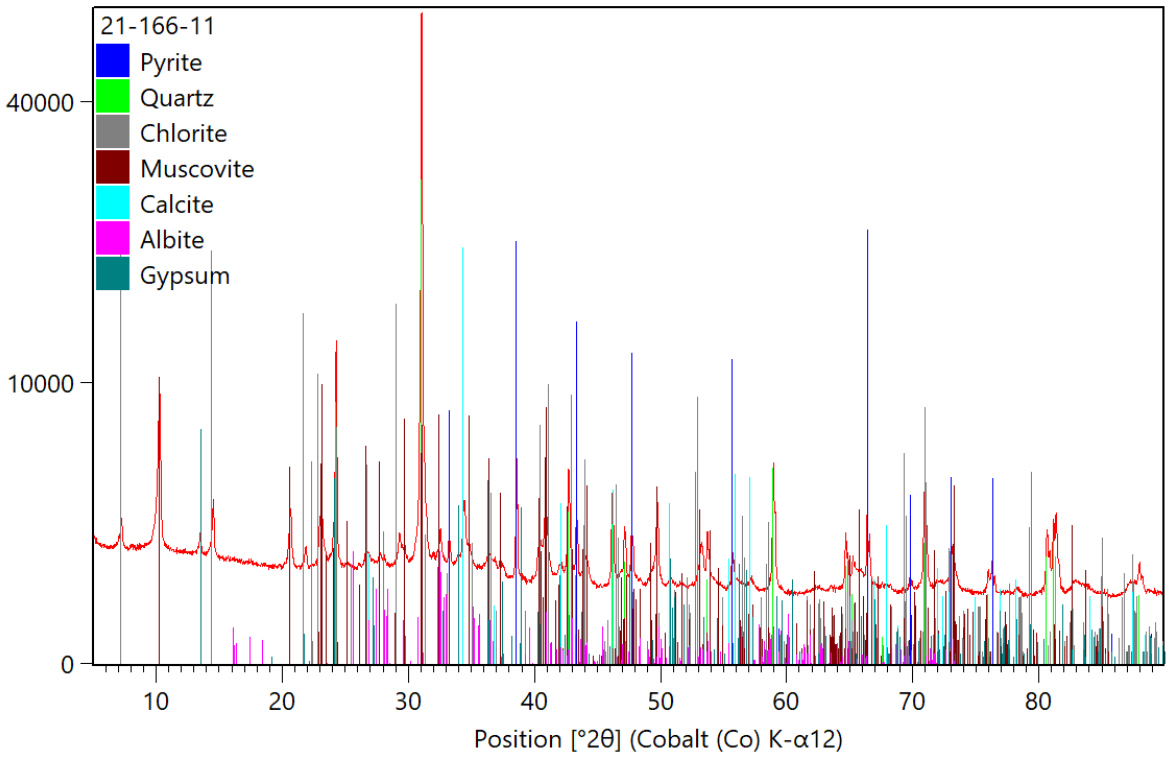


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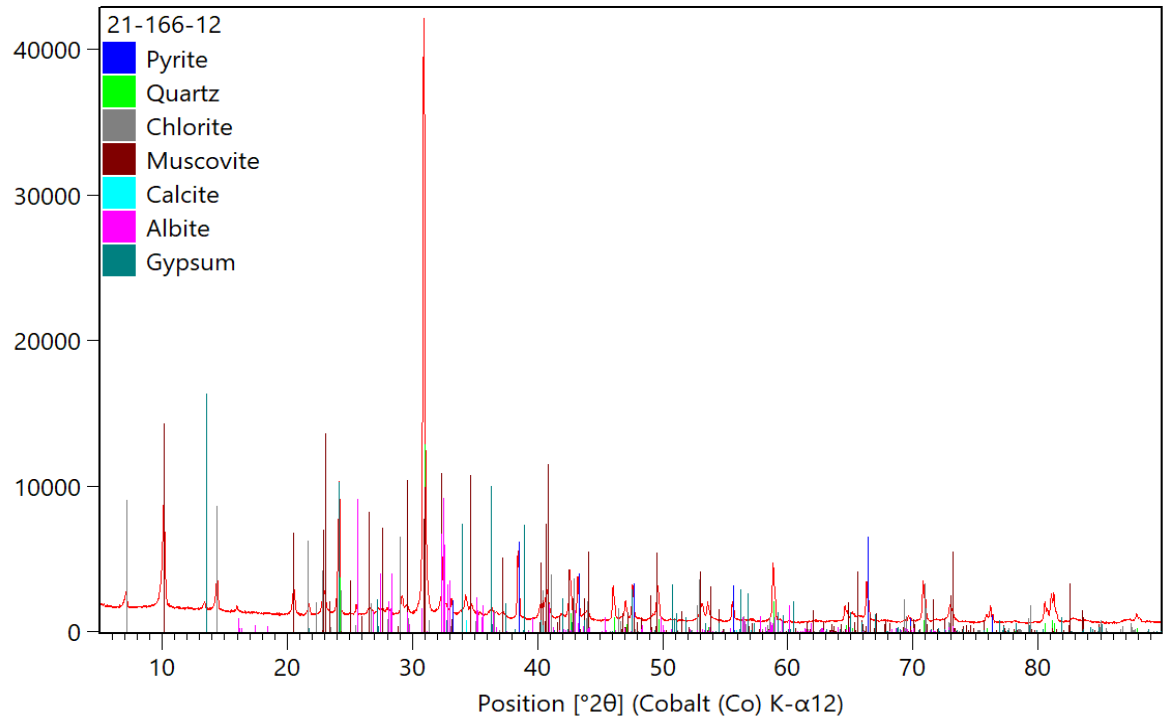

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**RGS Environmental Consultants Pty Ltd**
**3/30 Lensworth Street,**
**Coopers Plains QLD 4108**

**Attention: Asitha Jayasinghe**

**December 22, 2023**

**Report Number: LS3020**

# Quantitative Analysis of Waste Rock and Tailings Materials

**Introduction:**

Eight samples of waste rock and tailings materials were submitted for qualitative and quantitative phase analysis using X-ray diffraction (XRD).

**Sampling & Preparation:**

No sampling information was available for the samples submitted. The samples were supplied in a powder form.

The samples were mixed with 20% w/w of zinc oxide to determine the non-crystalline (amorphous) component.

**Analytical Method:**

The XRD patterns were The XRD patterns were produced using a Bruker-AXS D8 Endeavor XRD with copper radiation at 40 kV and 25 mA, over a range of 5 to 80 degrees 2θ, with an approximately 0.02 degree step and an effective 192 second per step count time using a Lynx-Eye XE-T detector.

Identification of phases present was carried out using Bruker EVA Search/Match software and the ICDD PDF-5 database (2024) with SIROQUANT version 5 software used to further characterize the samples.

**Results:**

The XRD scans are attached including the Search/Match information.

Note that the intensity of the peaks in an XRD pattern depend upon the crystallinity as well as the concentration of the phase.

The quantitative results are summarised in the following tables:

| | SPL ID: | LS3020-01 | LS3020-02 |
|---|---|---|---|
| | Customer ID: | 2023062_NAF_MID | 2023062_NAF_Top |
| **Phase Name/Formula** | **ICDD Ref** | **Weight %** | **Weight %** |
| Quartz; $SiO_2$ | 00-046-1045 | 21 | 21 |
| Chlorite; $(Mg, Fe)_6(Si, Al)_4O_{10}(OH)_8$ | 00-029-0701 | 10 | 10 |
| Muscovite; $KAl_2(Si_3Al)O_{10}(OH,F)_2$ | 00-006-0263 | 14 | 14 |
| Plagioclase Feldspar; $NaAlSi_3O_8$ | 00-019-1184 | 26 | 26 |
| Potassium Feldspar; $KAl_3SiO_8$ | 00-031-0966 | Poss. Trace | Poss. Tracer |
| Calcite; magnesian; $(Ca, Mg)CO_3$ | 01-089-1304 | 5 | 6 |
| Pyrite; $FeS_2$ | 00-042-1340 | 1 | 1 |
| Amorphous Material | N/A | 23 | 22 |

| | SPL ID: | LS3020-03 | LS3020-04 |
|---|---|---|---|
| | Customer ID: | 2023062_MODPAF_Top | 2023062_MODPAF_MID |
| **Phase Name/Formula** | **ICDD Ref** | **Weight %** | **Weight %** |
| Quartz; $SiO_2$ | 00-046-1045 | 29 | 29 |
| Chlorite; $(Mg, Fe)_6(Si, Al)_4O_{10}(OH)_8$ | 00-029-0701 | 6 | 7 |
| Muscovite; $KAl_2(Si_3Al)O_{10}(OH,F)_2$ | 00-006-0263 | 21 | 15 |
| Plagioclase Feldspar; $NaAlSi_3O_8$ | 00-019-1184 | 16 | 20 |
| Potassium Feldspar; $KAl_3SiO_8$ | 00-031-0966 | Poss. Trace | 1 |
| Calcite; magnesian; $(Ca, Mg)CO_3$ | 01-089-1304 | 2 | 3 |
| Pyrite; $FeS_2$ | 00-042-1340 | 4 | 4 |
| Amorphous Material | N/A | 22 | 21 |

| | SPL ID: | LS3020-05 | LS3020-06 |
|---|---|---|---|
| | Customer ID: | 2023062_HIGHPAF_Top | 2023062_HIGHPAF_MID |
| **Phase Name/Formula** | **ICDD Ref** | **Weight %** | **Weight %** |
| Quartz; $SiO_2$ | 00-046-1045 | 35 | 34 |
| Chlorite; $(Mg, Fe)_6(Si, Al)_4O_{10}(OH)_8$ | 00-029-0701 | 6 | 7 |
| Muscovite; $KAl_2(Si_3Al)O_{10}(OH,F)_2$ | 00-006-0263 | 22 | 22 |
| Plagioclase Feldspar; $NaAlSi_3O_8$ | 00-019-1184 | 1 | Poss. Trace |
| Potassium Feldspar; $KAl_3SiO_8$ | 00-031-0966 | Trace | 1 |
| Calcite; magnesian; $(Ca, Mg)CO_3$ | 01-089-1304 | 2 | 1 |
| Pyrite; $FeS_2$ | 00-042-1340 | 15 | 11 |
| Amorphous Material | N/A | 19 | 24 |

| | SPL ID: | LS3020-07 | LS3020-08 |
|---|---|---|---|
| | Customer ID: | 2023062_TAILING_TOP | 2023062_TAILING_MID |
| **Phase Name/Formula** | **ICDD Ref** | **Weight %** | **Weight %** |
| Quartz; $SiO_2$ | 00-046-1045 | 38 | 36 |
| Chlorite; $(Mg, Fe)_6(Si, Al)_4O_{10}(OH)_8$ | 00-029-0701 | 4 | 6 |
| Muscovite; $KAl_2(Si_3Al)O_{10}(OH,F)_2$ | 00-006-0263 | 16 | 17 |
| Plagioclase Feldspar; $NaAlSi_3O_8$ | 00-019-1184 | 12 | 14 |
| Potassium Feldspar; $KAl_3SiO_8$ | 00-031-0966 | 3 | 2 |
| Calcite; magnesian; $(Ca, Mg)CO_3$ | 01-089-1304 | 1 | 1 |
| Pyrite; $FeS_2$ | 00-042-1340 | 4 | 4 |
| Amorphous Material | N/A | 22 | 20 |

**Results and Discussion:**

The results of the analysis are summarised in the tables and scans attached. Results are given as % of the total.

The limitations of qualitative XRD analysis are as follows:

1. There is a limit of detection of 1-2% on most crystalline phases.
2. Where there exist multiple phases, overlap of diffracted reflections can occur, thus rendering some ambiguity into the interpretation.
3. Some phases cannot be unambiguously identified as they are present in minor or trace amounts.

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

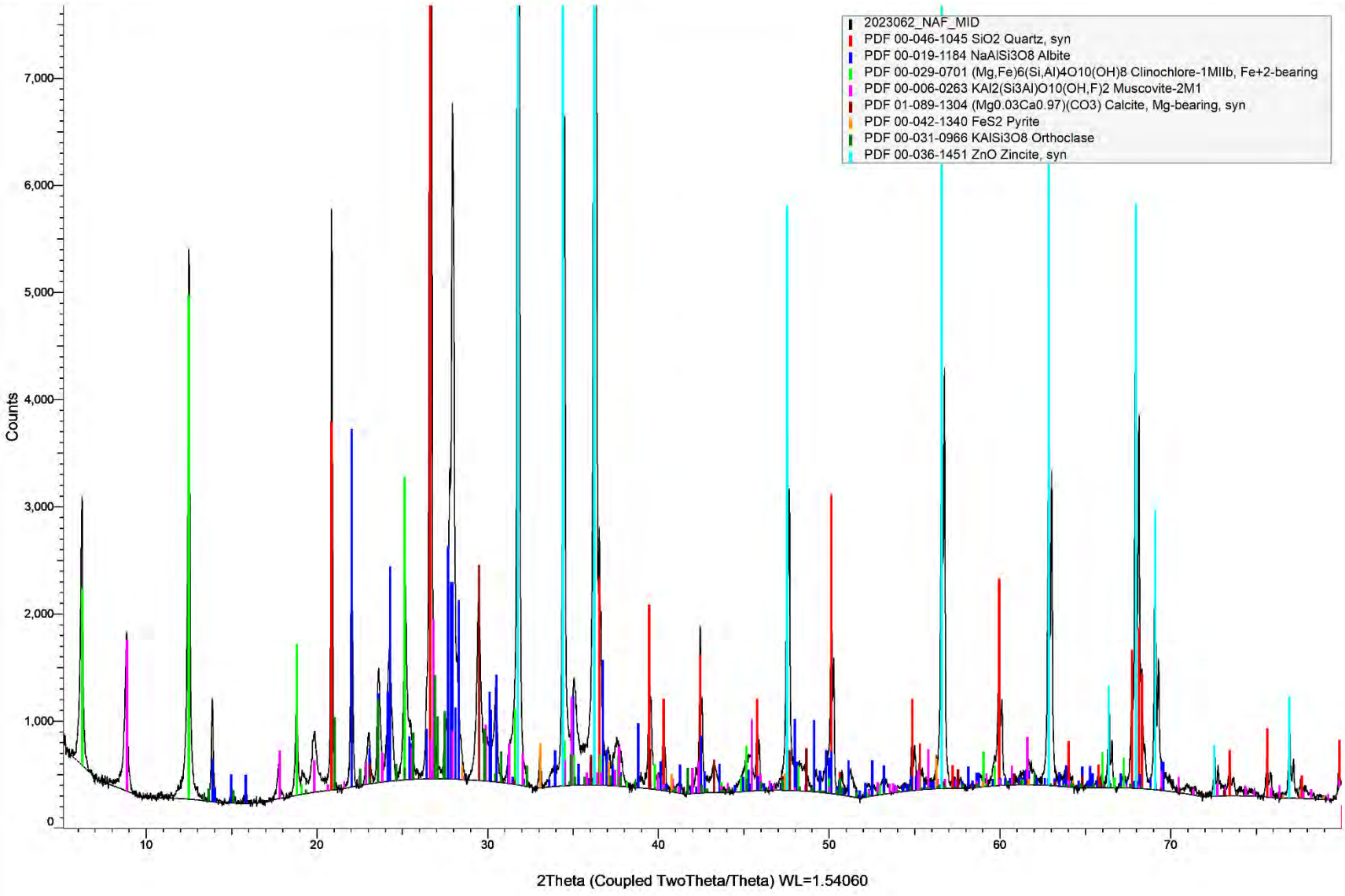
1. The limitations for qualitative XRD analysis all apply
2. The method as described is standardless as it relies solely on the published crystallographic data available for each phase. Some crystallographic data may not exactly describe the phases present.
3. Results are normalized to 100% and do not include estimates of unidentified or amorphous materials unless otherwise stated.

Potential limitations on the quantitative analysis can also include effects from varying crystallinity of each mineral, their preferred orientation in the sample preparation and their differing absorption of the X-rays.

**Christopher Kelaart**
**X-Ray Vision Australia Pty Ltd**

X-RAYvision
AUSTRALIA

## LS3020-01



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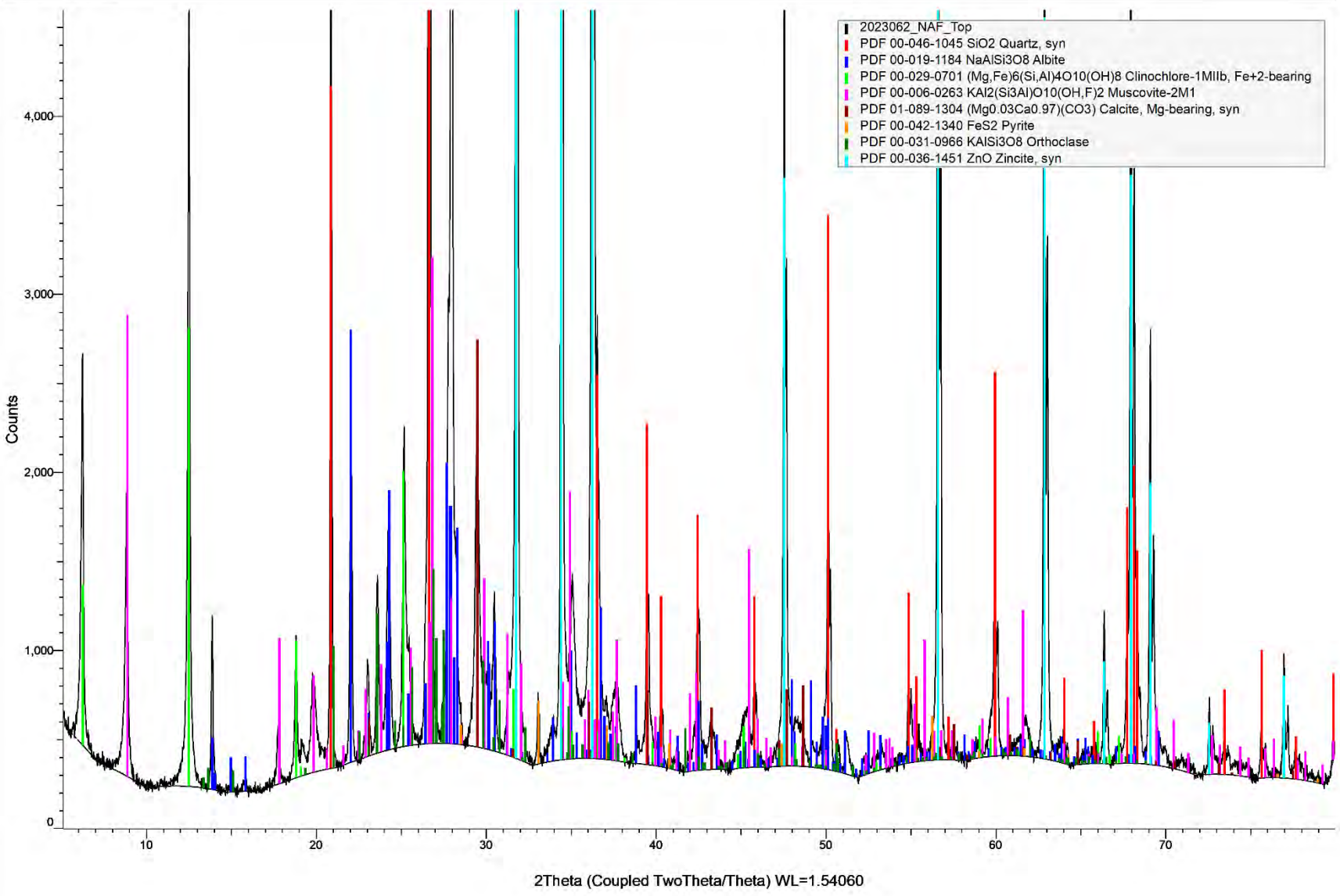
## LS3020-02



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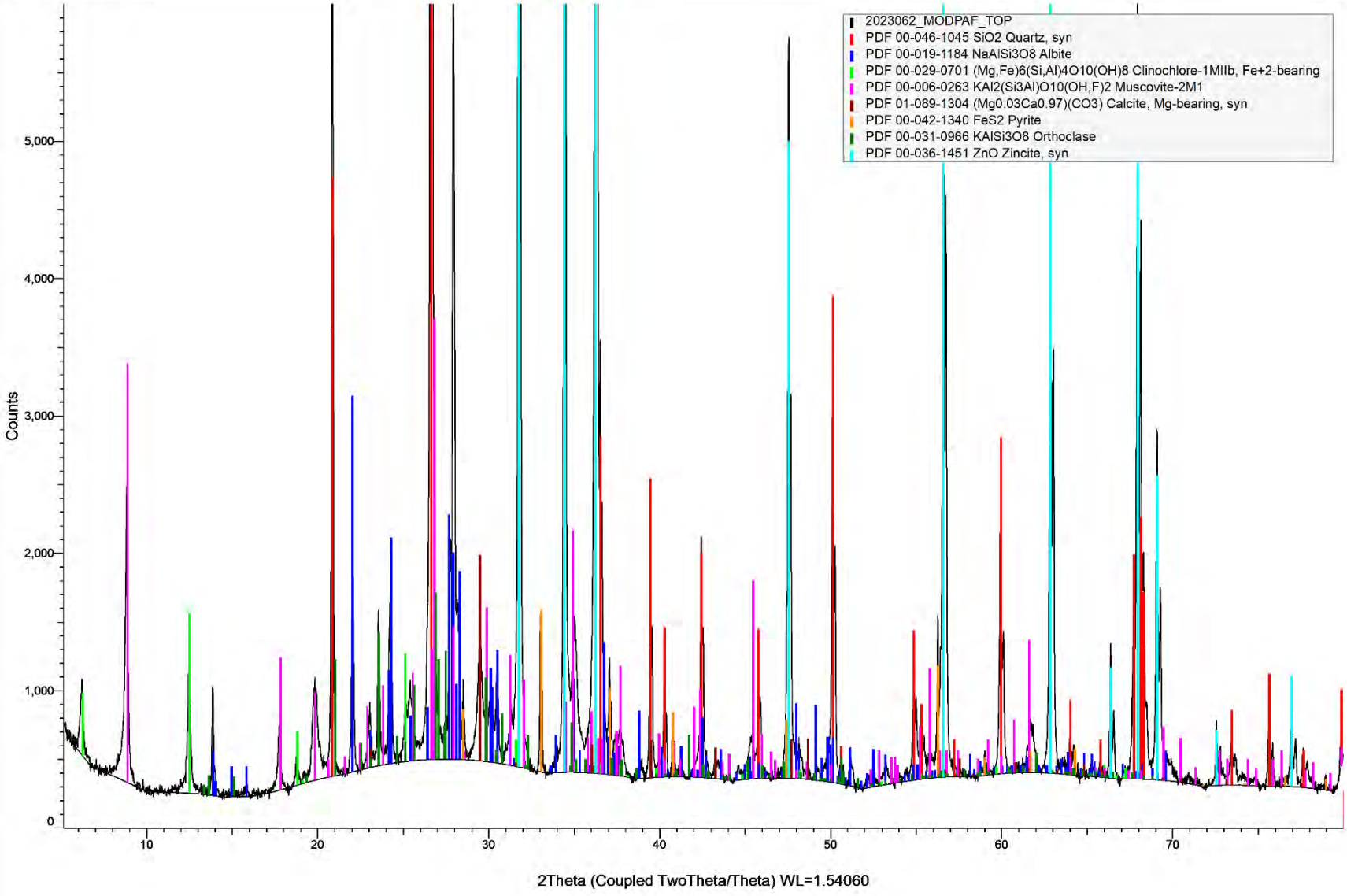

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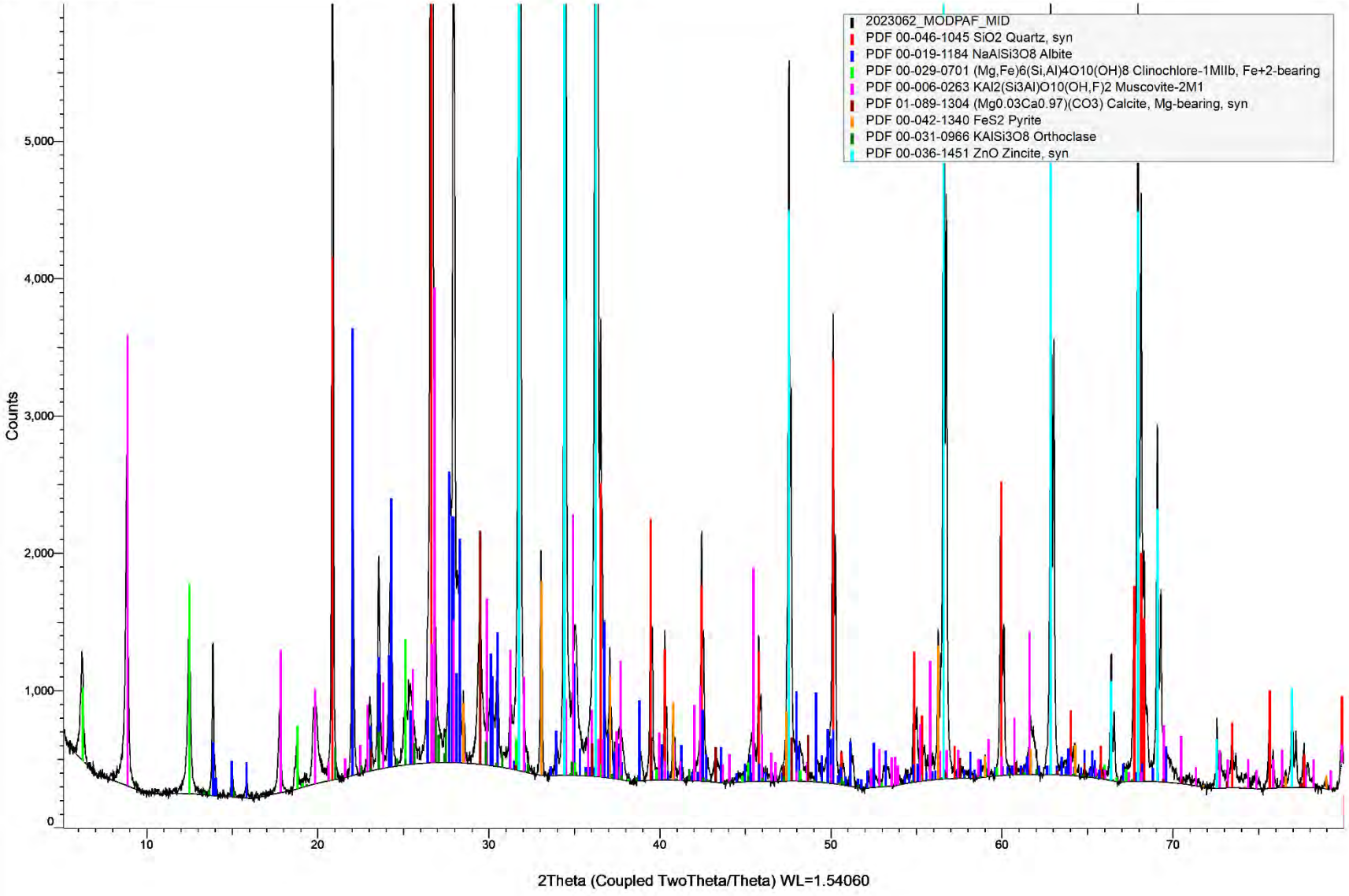
## LS3020-04



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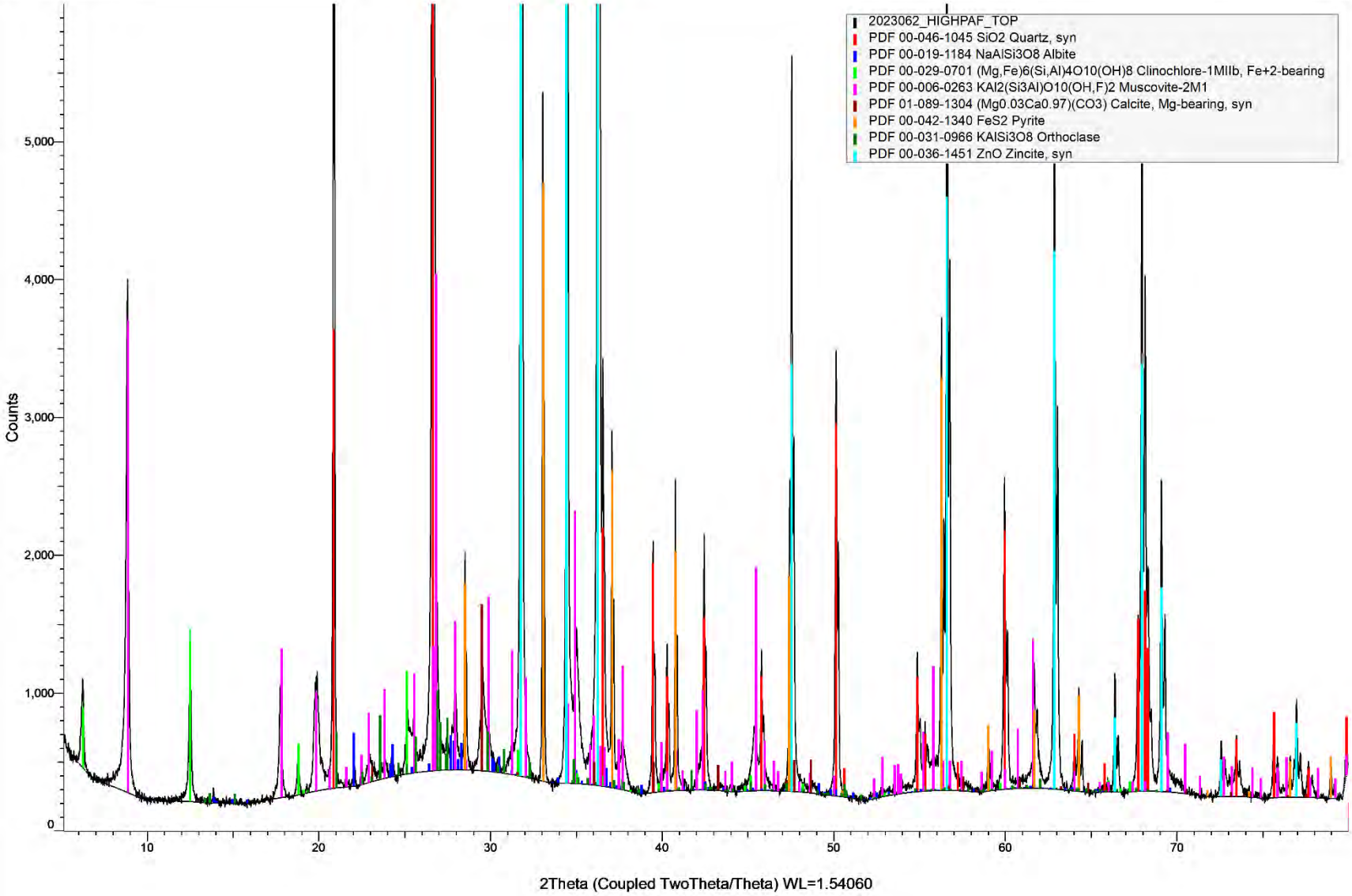

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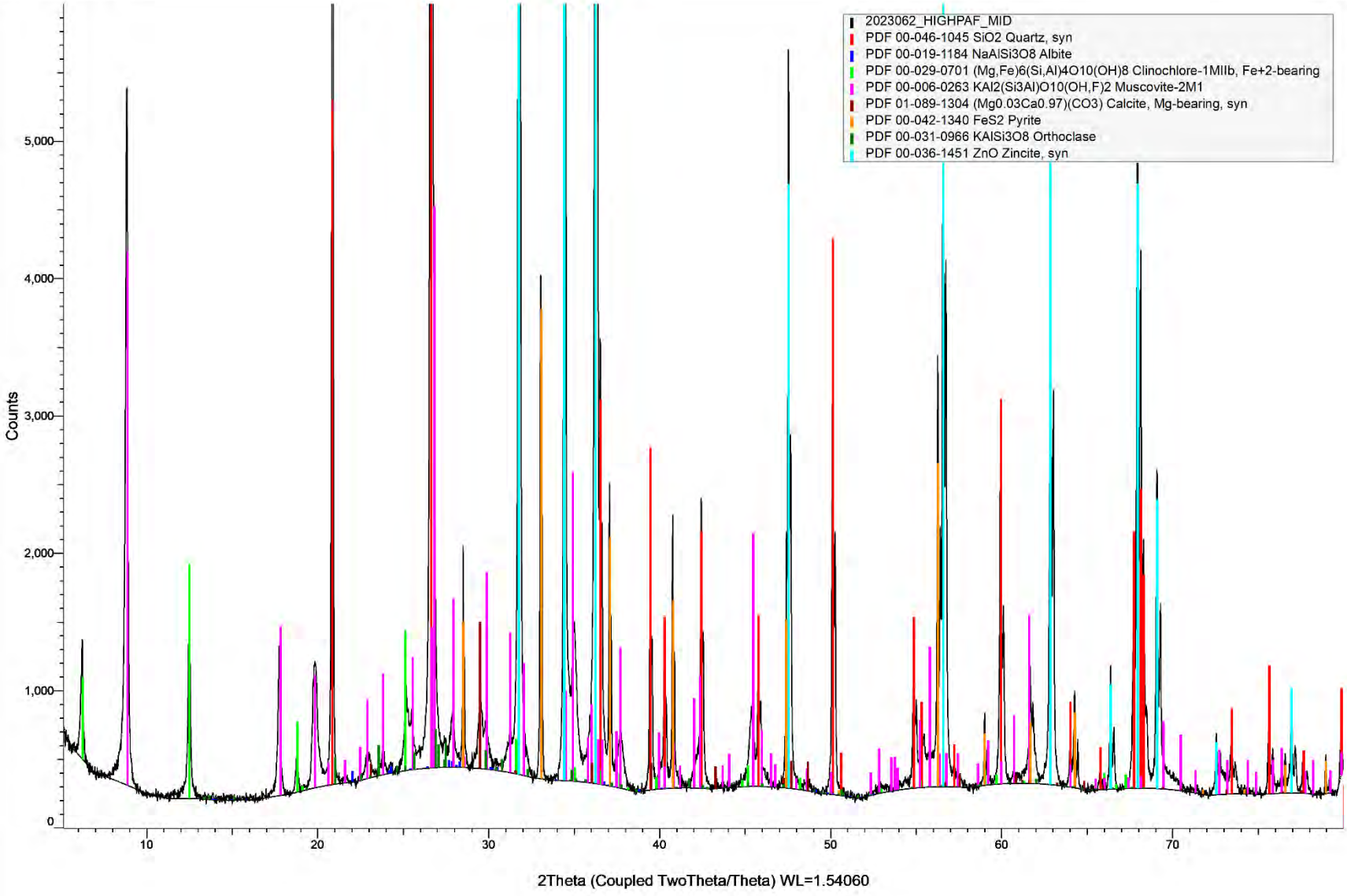
## LS3020-06



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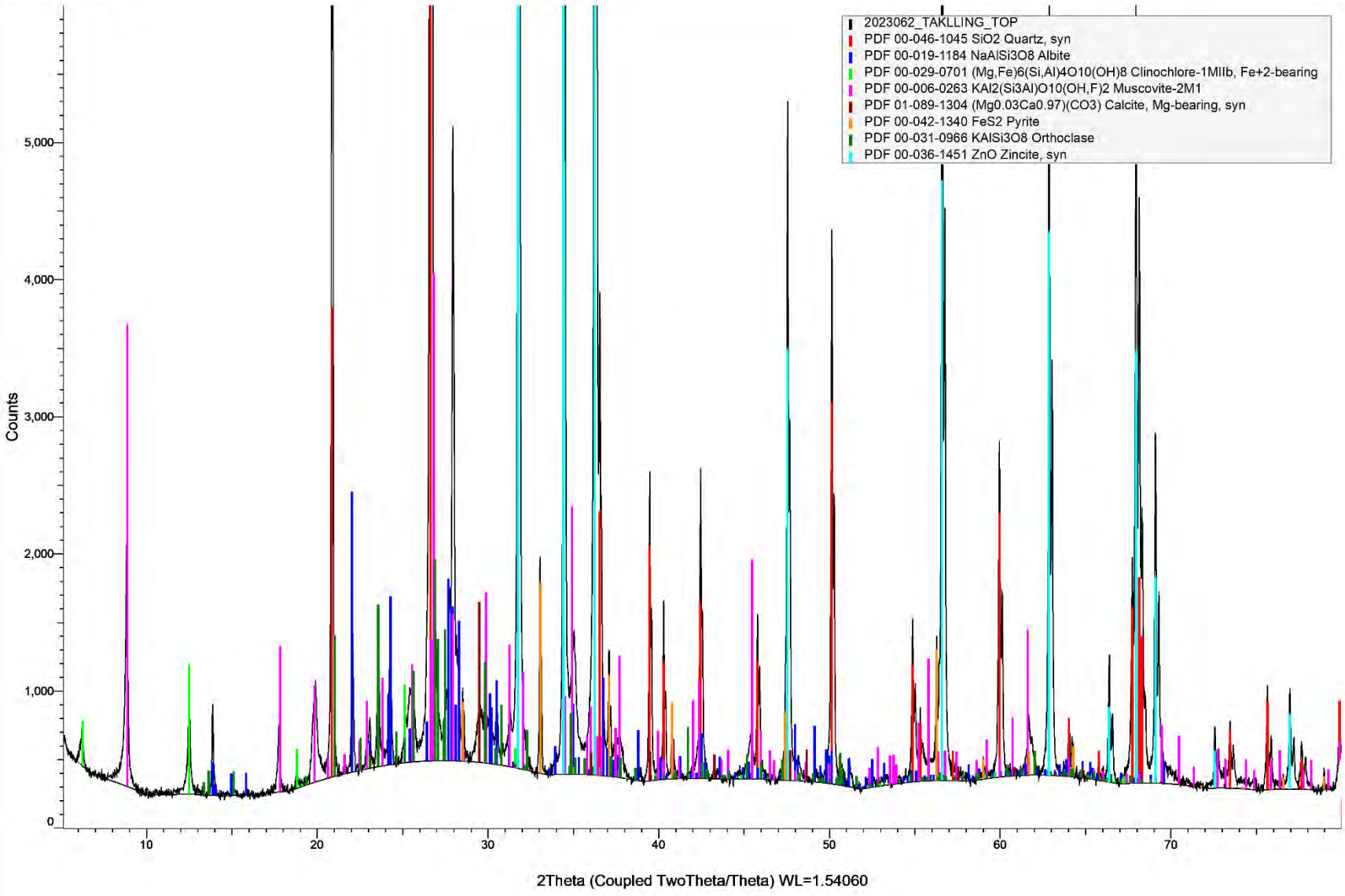
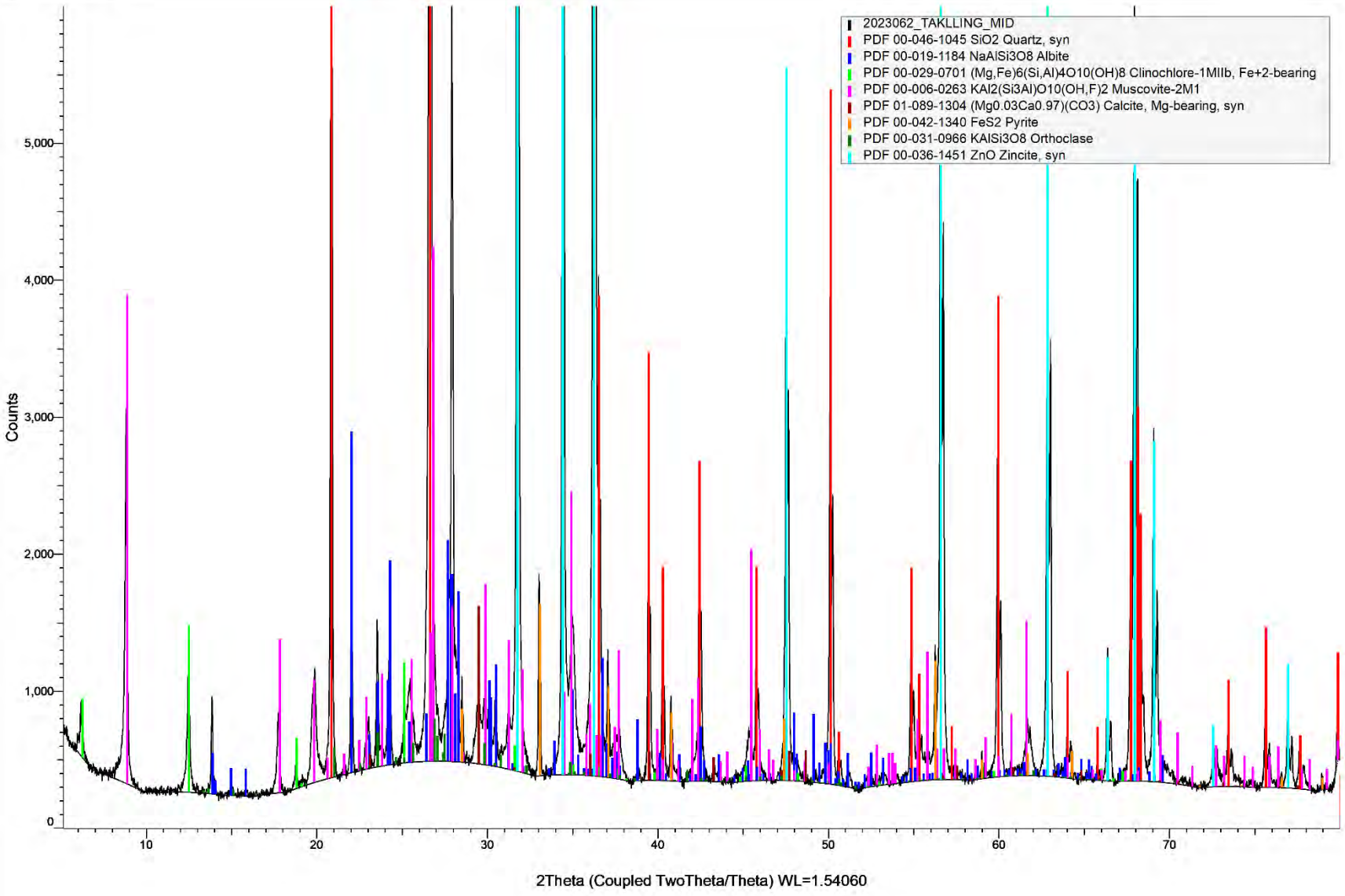
## LS3020-07



X-RAYvision
AUSTRALIA

## LS3020-08



XRD RESULTS FROM X-Ray VISION

| | High PAF mid | High PAF top | Mod PAF mid | Mod PAF top |
|---|---|---|---|---|
| Quartz | 34.74 | 35.47 | 28.1 | 28.48 |
| Pyrite | 4.64 | 6.45 | 2.05 | 1.64 |
| Calcite | 1.54 | 1.32 | 3.57 | 1.31 |
| Muscovite | 29.55 | 30.34 | 18.86 | 23.71 |
| Chamosite | 3.28 | 3.11 | 4.54 | 3.52 |
| Albite | | | 20.75 | 15.98 |
| Anorthite | | | | |
| Amor. | 6.25 | 3.31 | 2.13 | 5.35 |
| | 80 | 80 | 80 | 79.99 |

BMD XRD INTERPREATATION

| | **High PAF mid** | High PAF mid (X-ray vision) | **High PAF top** | High PAF top (X-ray vision) | **Mod PAF mid** | Mod PAF mid (X-ray vision) | **Mod PAF top** | Mod PAF top (X-ray vision) |
|---|---|---|---|---|---|---|---|---|
| Quartz | 43.4 | 34 | 44.3 | 35 | 28.1 | 29 | 35.6 | 29 |
| Pyrite | 5.8 | 11 | 8.1 | 15 | 2.1 | 4 | 2.1 | 4 |
| Calcite | 1.9 | 1 | 1.7 | 2 | 2.5 | 2 | 1.6 | 2 |
| Muscovite | 36.9 | 22 | 37.9 | 22 | 18.7 | 21 | 29.6 | 21 |
| Chlorite | 4.1 | 7 | 3.9 | 6 | 4.6 | 6 | 4.4 | 6 |
| Na plagioclase (Na plagioclase) | 0.0 | trace ? | 0.0 | 1 | 20.7 | 16 | 20.0 | 16 |
| Na-Ca plagioclase (K orthclase) | 0.0 | 1 | 0.0 | trace | 0.0 | trace ? | 0.0 | trace ? |
| Amor. | 7.8 | 24 | 4.1 | 19 | 3.4 | 22 | 6.7 | 22 |
| | | | | | | | | |
| ANC (kg H2SO4/t) | 19 | 10 | 16 | 20 | 25 | 20 | 16 | 20 |
| MPA (kg H2SO4/t) | 95 | 180 | 132 | 245 | 34 | 65 | 34 | 65 |
| **NAPP (kg H2SO4/t)** | **76** | **170** | **116** | **226** | **9** | **46** | **17** | **46** |

**Comments**

Amorphous content in X-ray Vision analyses is greater

Quartz and muscovite content in BMC analyses is greater

Some variation in identification of feldspars

X-ray vision tends to have greater pyrite and less carbonate. Worth comparing to CRS S and inorganic C assays?

NAPP values makes sense

| | NAF mid | NAF top | Tailings mid | Talings top |
|---|---|---|---|---|
| Quartz | 19.89 | 19.62 | 35.91 | 37.41 |
| Pyrite | 0.81 | 0.77 | 1.44 | 1.55 |
| Calcite | 6.71 | 4.67 | 1.5 | 1.17 |
| Muscovite | 17.87 | 15.5 | 22.06 | 20.82 |
| Chamosite | 8.69 | 8.76 | 2.83 | 2.37 |
| Albite | 26.94 | 23.63 | 8.16 | 8.42 |
| Anorthite | | | 5.39 | 6.1 |
| Amor. | -0.9 | 7.05 | 2.7 | 2.14 |
| | 80.01 | 80 | 79.99 | 79.98 |

| | **NAF mid** | NAF mid (X-ray vision) | **NAF top** | NAF top (X-ray vision) | **Tailings mid** | Tailings mid (X-ray vision) | **Talings top** | Tailings top (X-ray vision) |
|---|---|---|---|---|---|---|---|---|
| Quartz | 24.6 | 21 | 24.5 | 21 | 44.9 | 36 | 46.8 | 38 |
| Pyrite | 1.0 | 1 | 1.0 | 1 | 1.8 | 4 | 1.9 | 4 |
| Calcite | 8.3 | 5 | 5.8 | 6 | 1.9 | 1 | 1.5 | 1 |
| Muscovite | 22.1 | 14 | 19.4 | 14 | 27.6 | 17 | 26.0 | 16 |
| Chlorite | 10.7 | 10 | 11.0 | 10 | 3.5 | 6 | 3.0 | 4 |
| Na plagioclase (Na plagioclase) | 33.3 | 26 | 29.5 | 26 | 10.2 | 14 | 10.5 | 12 |
| Na-Ca plagioclase (K orthclase) | 0.0 | trace ? | 0.0 | trace ? | 6.7 | 2 | 7.6 | 3 |
| Amor. | 0.0 | 23 | 8.8 | 22 | 3.4 | 20.0 | 2.7 | 22 |
| | | | | | | | | |
| ANC (kg H2SO4/t) | 81 | 49 | 57 | 59 | 18 | 10 | 14 | 10 |
| MPA (kg H2SO4/t) | 16 | 16 | 16 | 16 | 29 | 65 | 32 | 65 |
| **NAPP (kg H2SO4/t)** | **-65** | **-33** | **-41** | **-42** | **11** | **56** | **17** | **56** |

**Comments**

Amorphous content in X-ray Vision analyses is greater

Quartz and muscovite content in BMC analyses is greater

Some variation in identification of feldspars

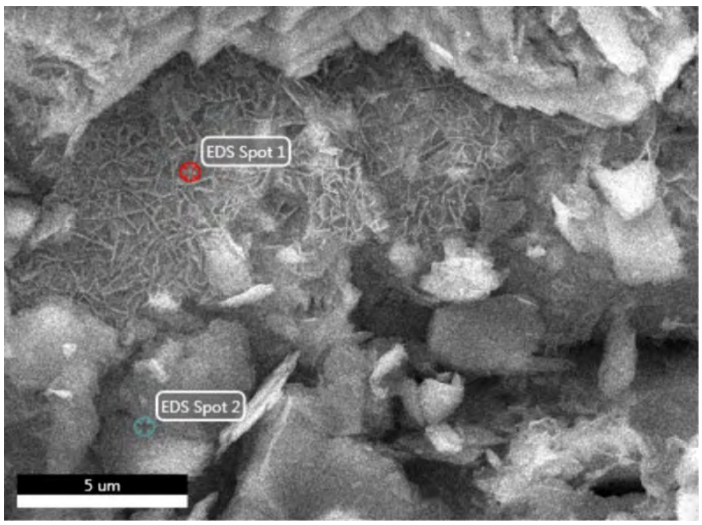
X-ray vision tends to have greater pyrite and less carbonate. Worth comparing to CRS S and inorganic C assays?

NAPP values makes sense

**High PAF (TOP)**

**Py-Sp_1_Hi**

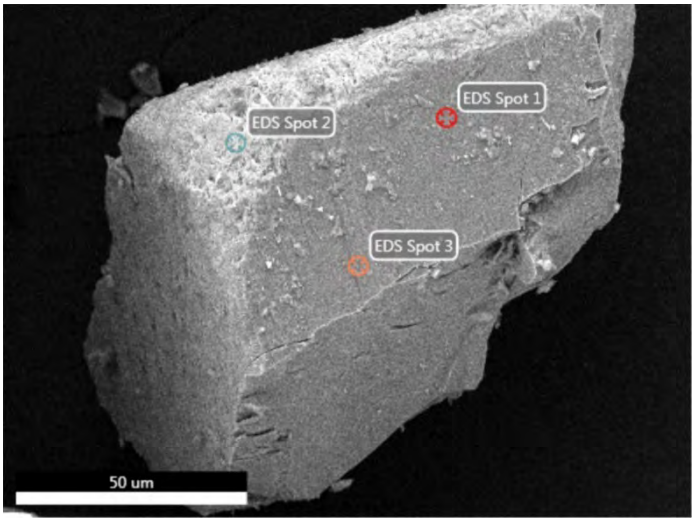
| Element | Spot 1 | Spot 2 |
|---|---|---|
| Al | 0.6 | 9.5 |
| C | | |
| Ca | 0.4 | |
| Cl | | |
| F | | |
| Fe | 6.1 | 3.5 |
| Fr | | |
| K | 0.4 | 2.1 |
| Mg | | 0.2 |
| Mn | | |
| Na | | |
| NI | | |
| O | 45.9 | 42.2 |
| Pt | | |
| S | 20.1 | 13.9 |
| Si | 1.8 | 10.7 |
| Ti | | |
| Zn | 24.8 | 17.9 |



**High PAF (TOP)**

**Py 2**

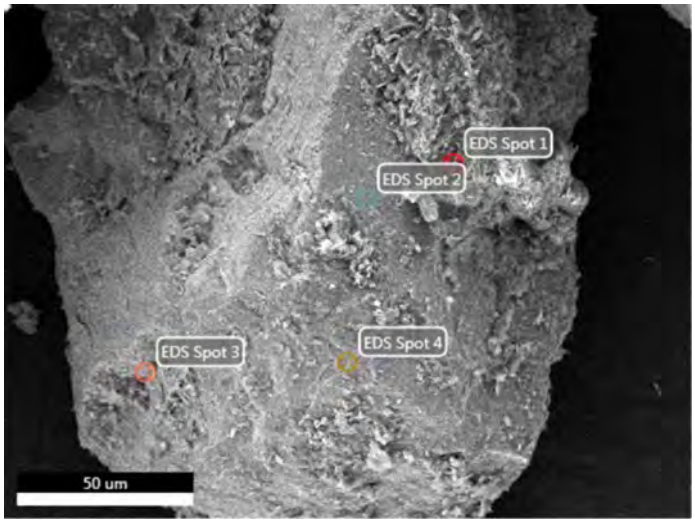
| Element | Spot 1 | Spot 2 | Spot 3 |
|---|---|---|---|
| Al | 0.6 | 1.7 | |
| C | | | |
| Ca | | 0.5 | |
| Cl | | | |
| F | | | |
| Fe | 24.1 | 27.2 | 19.1 |
| Fr | | | |
| K | | 0.7 | |
| Mg | | | |
| Mn | | | |
| Na | 2.4 | 1.9 | |
| Ni | | | |
| O | 12.5 | 25.5 | 10.6 |
| Pt | | | |
| S | 59.9 | 40.1 | 70.0 |
| Si | 0.5 | 2.5 | 0.4 |
| Ti | | | |
| Zn | | | |



**High PAF (TOP)**

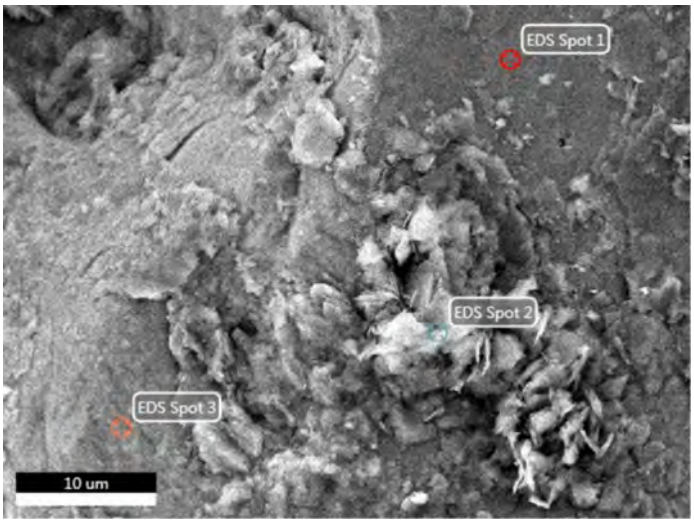
**Py 3**

| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 |
|---|---|---|---|---|
| Al | 5.9 | | 6.4 | |
| C | | | | |
| Ca | | | | |
| Cl | | | | |
| F | | | | |
| Fe | 31.6 | 26.5 | 5.5 | 16.7 |
| Fr | | | | |
| K | 1.5 | | 0.6 | |
| Mg | 0.1 | | | |
| Mn | | | | |
| Na | | | | |
| Ni | | | | |
| O | 43.8 | 9.8 | 77.7 | 9.3 |
| Pt | | | | |
| S | 0.7 | 62.8 | 1.4 | 73.9 |
| Si | 16.5 | 0.8 | 8.4 | |
| Ti | | | | |
| Zn | | | | |



**High PAF (TOP)**
**Py3_Hi**

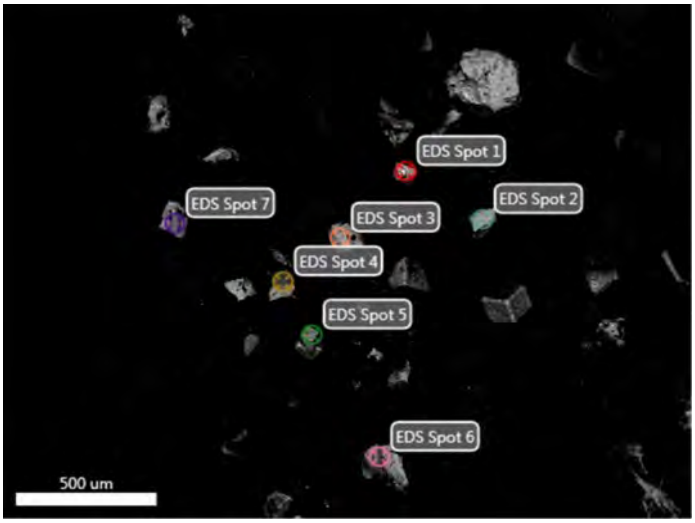
| Element | Spot 2 | Spot 2 | Spot 3 |
|---|---|---|---|
| Al | 1.4 | 13.4 | 0.6 |
| C | | | |
| Ca | | | |
| Cl | | | |
| F | | | |
| Fe | 24.7 | 0.6 | 33.6 |
| Fr | | | |
| K | | 4.3 | |
| Mg | | 1.4 | |
| Mn | | | |
| Na | | | |
| Ni | | | |
| O | 7.5 | 63.8 | 5.4 |
| Pt | | | |
| S | 65.4 | 0.4 | 59.7 |
| Si | 1.1 | 16.1 | 0.8 |
| Ti | | | |
| Zn | | | |



**High PAF (TOP)**

**Whole**

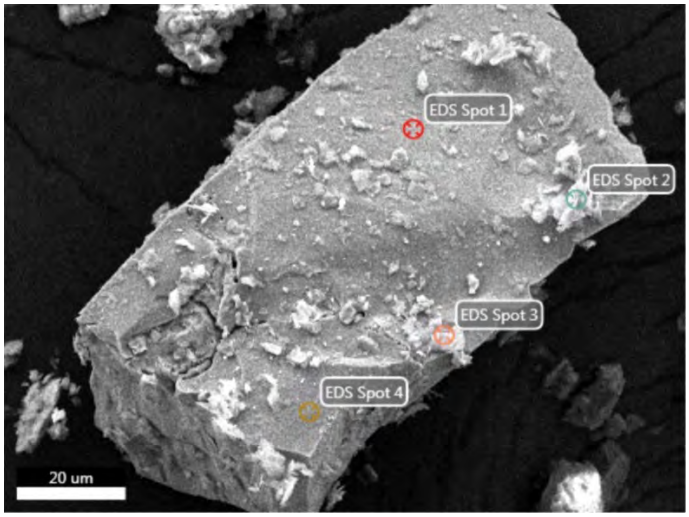
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 | Spot 7 |
|---|---|---|---|---|---|---|---|
| Al | 1.5 | | **4.1** | **1.0** | 2.2 | **3.1** | |
| C | | | | | | | |
| Ca | | | | | 0.1 | | |
| Cl | | | | | | | |
| F | | 6.8 | | | | | |
| Fe | 21.8 | 24.0 | 35.6 | 13.9 | 17.7 | 26.8 | 10.9 |
| Fr | | | | | | | |
| K | | | 0.4 | | 0.2 | 0.4 | |
| Mg | | | 1.2 | | | 0.1 | |
| Mn | | | | | | | |
| Na | 8.5 | | | 4.0 | | | |
| Ni | | | | | | | |
| O | 21.6 | 18.1 | 27.5 | 66.7 | 38.5 | 35.1 | 65.4 |
| Pt | | | | | | | |
| S | 45.8 | 51.2 | 28.0 | 13.3 | 40.2 | 27.8 | 23.7 |
| Si | 0.8 | | 3.3 | 1.2 | 1.2 | 6.8 | |
| Ti | | | | | | | |
| Zn | | | | | | | |



**High PAF (MID)**

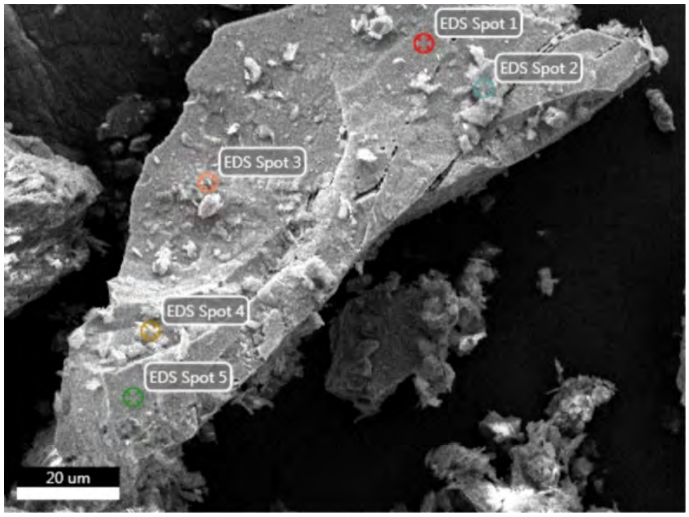
**Py1**

| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 |
|---|---|---|---|---|
| Al | 1.0 | 7.6 | 6.8 | |
| C | | | | |
| Ca | | | 0.4 | |
| Cl | | | | |
| F | | | | |
| Fe | 27.8 | 2.6 | 9.2 | 28.3 |
| Fr | | | | |
| K | | 1.3 | 0.3 | |
| Mg | | 1.5 | 5.8 | |
| Mn | | | | |
| Na | | 1.3 | | |
| Ni | | | | |
| O | 12.8 | 65.5 | 59.9 | 13.0 |
| Pt | | | | |
| S | 57.5 | 2.2 | 11.7 | 58.1 |
| Si | 0.9 | 17.7 | 5.9 | 0.7 |
| Ti | | 0.5 | | |
| Zn | | | | |



**High PAF (MID)**
**Py2**

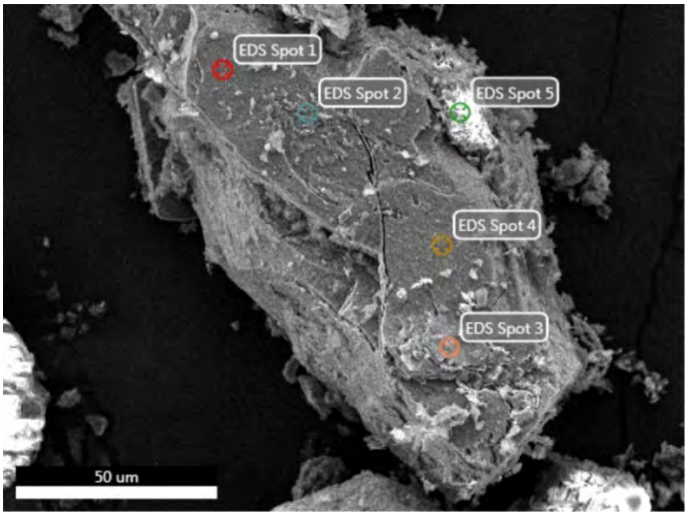
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 |
|---|---|---|---|---|---|
| Al | | 13.0 | 2.6 | 6.6 | |
| C | | | | | |
| Ca | | | | | |
| Cl | | | | | |
| F | | | | | |
| Fe | 30.3 | 1.0 | 10.5 | 9.0 | 26.2 |
| Fr | | | | | |
| K | | 3.8 | 0.4 | 1.5 | |
| Mg | | 1.2 | 0.7 | 1.1 | |
| Mn | | | | | |
| Na | | | | | |
| Ni | | | | | |
| O | 7.1 | 63.2 | 50.9 | 53.8 | 8.5 |
| Pt | | | | | |
| S | 62.6 | 2.4 | 25.1 | 21.4 | 65.3 |
| Si | | 15.4 | 9.9 | 6.6 | |
| Ti | | | | | |
| Zn | | | | | |



**High PAF (MID)**

**Py3**

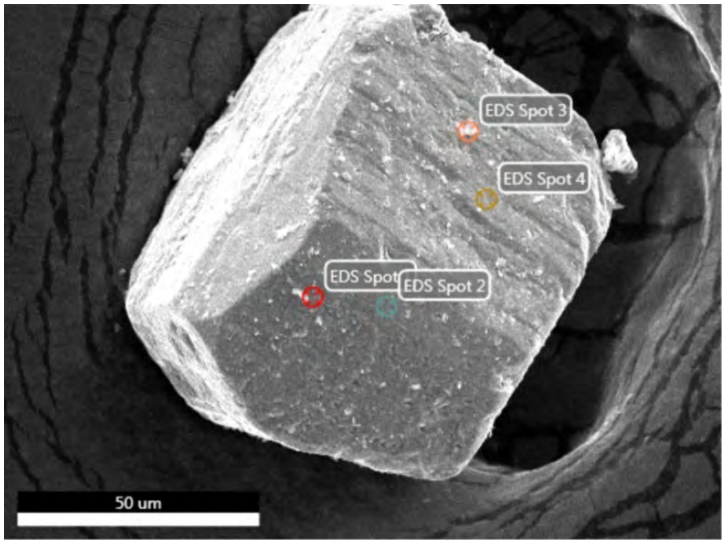
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 |
|---|---|---|---|---|---|
| Al | | 0.3 | 6.6 | 2.7 | 8.7 |
| C | | | | | |
| Ca | | | | | |
| Cl | | | | | |
| F | | | | | |
| Fe | 31.6 | 8.4 | 7.8 | 18.3 | 9.6 |
| Fr | | | | | |
| K | | 1.4 | 1.8 | 0.7 | 1.6 |
| Mg | | | 1.0 | | 1.2 |
| Mn | | | | | |
| Na | | 0.5 | | | |
| Ni | | | | | |
| O | 4.4 | 67.9 | 55.8 | 26.5 | 66.7 |
| Pt | | | | | |
| S | 64.1 | 21.2 | 19.2 | 49.3 | 1.2 |
| Si | | 0.3 | 7.7 | 2.5 | 10.8 |
| Ti | | | | | |
| Zn | | | | | |



Mod PAF (TOP)

**Py1**

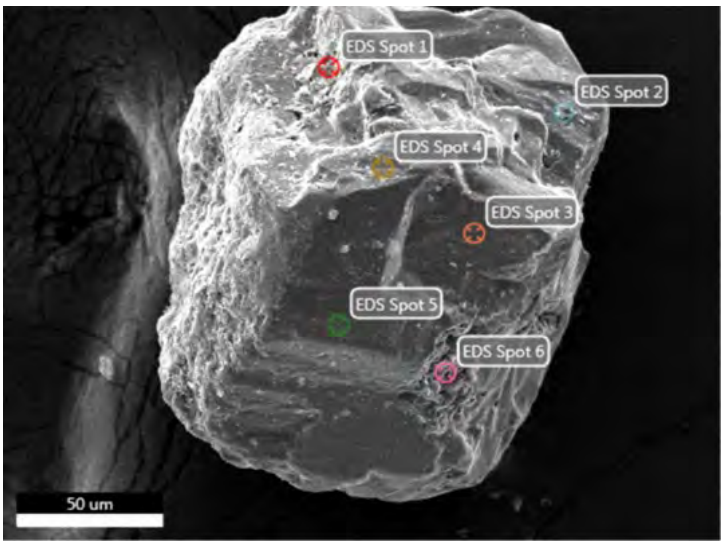
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 |
|---|---|---|---|---|
| Al | 2.2 | 0.3 | 6.1 | 0.7 |
| C | | | | 26.8 |
| Ca | | | | |
| Cl | | | | |
| F | | | | |
| Fe | 26.2 | 30.5 | 10.5 | 21.4 |
| Fr | | | | |
| K | | 0.6 | 1.6 | |
| Mg | | | 0.9 | |
| Mn | | | | |
| Na | | | 1.4 | |
| Ni | | | | |
| O | 25.1 | 5.5 | 50.1 | 7.3 |
| Pt | | | | |
| S | 44.2 | 62.7 | 23.1 | 43.3 |
| Si | 2.5 | 0.4 | 6.4 | 0.4 |
| Ti | | | | |
| Zn | | | | |



Mod PAF (TOP)

**Py2**

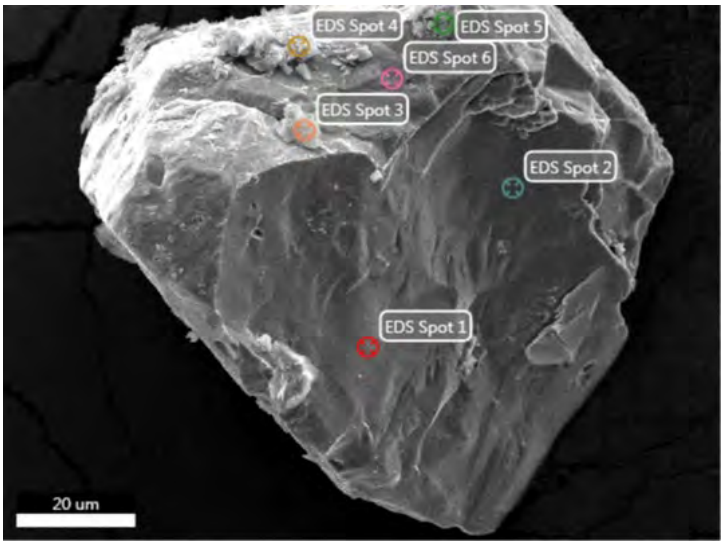
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 |
|---|---|---|---|---|---|---|
| Al | 10.9 | 10.3 | | 3.8 | 0.1 | 7.0 |
| C | | | | | | |
| Ca | | | | | | |
| Cl | | | | | | |
| F | | | | | | |
| Fe | 32.5 | 1.3 | 14.4 | 12.4 | 33.4 | 4.1 |
| Fr | | | | | | |
| K | 5.4 | 3.7 | | | | 6.9 |
| Mg | | 0.8 | | 0.8 | | |
| Mn | | | | | | |
| Na | | 0.5 | | | | |
| Ni | | | | | | |
| O | 34.0 | 54.8 | 19.0 | 53.5 | 17.2 | 38.2 |
| Pt | | | | | | |
| S | 1.0 | 2.2 | 65.9 | 24.7 | 49.0 | 8.0 |
| Si | 16.3 | 26.6 | 0.8 | 4.8 | 0.3 | 35.8 |
| Ti | | | | | | |
| Zn | | | | | | |



Mod PAF (TOP)

**Py3**

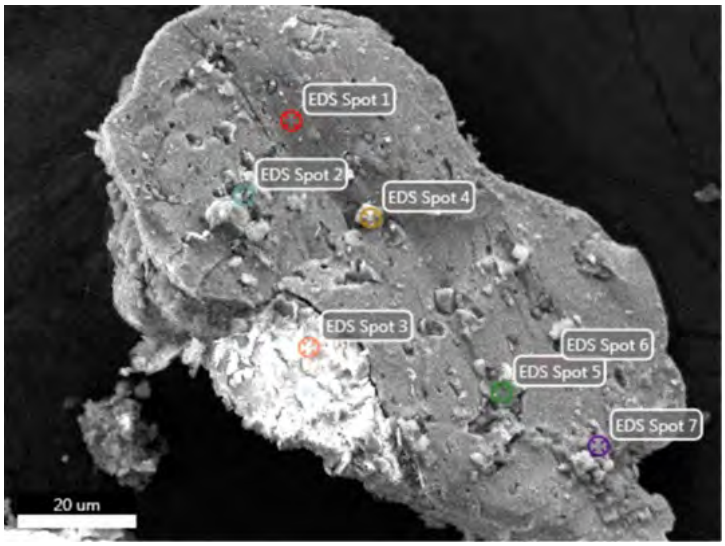
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 |
|---|---|---|---|---|---|---|
| Al | | 0.3 | 10.9 | 8.5 | 4.8 | 0.7 |
| C | | | | | | |
| Ca | | | | | | |
| Cl | | | | | | |
| F | | | | | | |
| Fe | 27.5 | 24.4 | 4.7 | 1.5 | 11.4 | 23.5 |
| Fr | | | | | | |
| K | | | 3.3 | 1.3 | | |
| Mg | | | 0.9 | 0.8 | | |
| Mn | | | | | | |
| Na | | | 0.5 | 3.4 | | |
| Ni | | | | | | |
| O | 16.8 | 4.8 | 64.0 | 67.7 | 55.2 | 36.2 |
| Pt | | | | | | |
| S | 55.7 | 70.3 | 3.4 | 1.2 | 19.8 | 38.6 |
| Si | | 0.2 | 12.3 | 15.7 | 8.8 | 1.0 |
| Ti | | | | | | |
| Zn | | | | | | |



Mod PAF (MID)

**Py1**

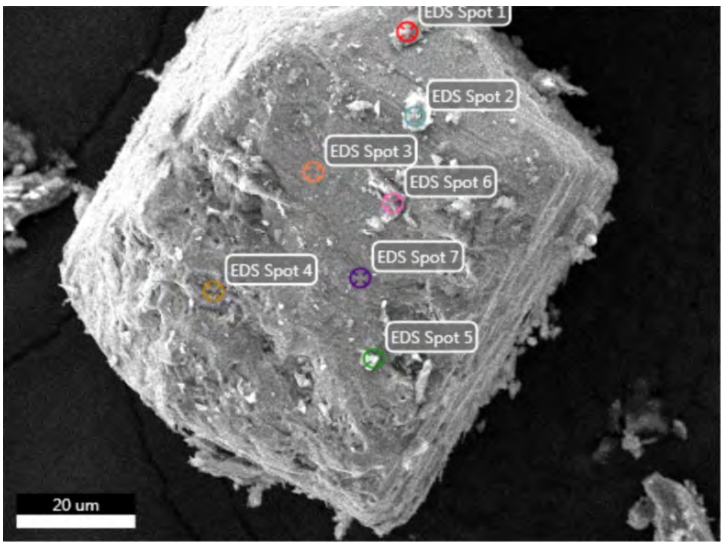
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 | Spot 7 |
|---|---|---|---|---|---|---|---|
| Al | | 7.8 | 13.6 | 7.6 | 1.3 | | 2.0 |
| C | | | | | | 21.4 | |
| Ca | 0.5 | 0.1 | | 0.2 | 0.4 | | |
| Cl | | | | | | | |
| F | | | | | | | |
| Fe | 25.1 | 0.5 | 0.3 | 3.7 | 20.9 | 23.8 | 21.8 |
| Fr | | | | | | | |
| K | | 0.1 | 4.0 | 0.5 | | | 0.4 |
| Mg | 1.0 | 0.4 | 1.3 | 0.6 | 1.2 | | 0.9 |
| Mn | | | | | | | |
| Na | | 8.3 | 0.4 | 6.9 | 1.6 | | 2.1 |
| Ni | | | | | | | |
| O | 62.3 | 63.6 | 64.4 | 62.5 | 47.6 | 9.3 | 35.9 |
| Pt | | | | | | | |
| S | 9.3 | 0.1 | | 1.1 | 24.9 | 44.9 | 33.2 |
| Si | 1.9 | 19.1 | 16.0 | 16.7 | 2.2 | 0.7 | 3.8 |
| Ti | | | | | | | |
| Zn | | | | | | | |



Mod PAF (MID)

**Py2**

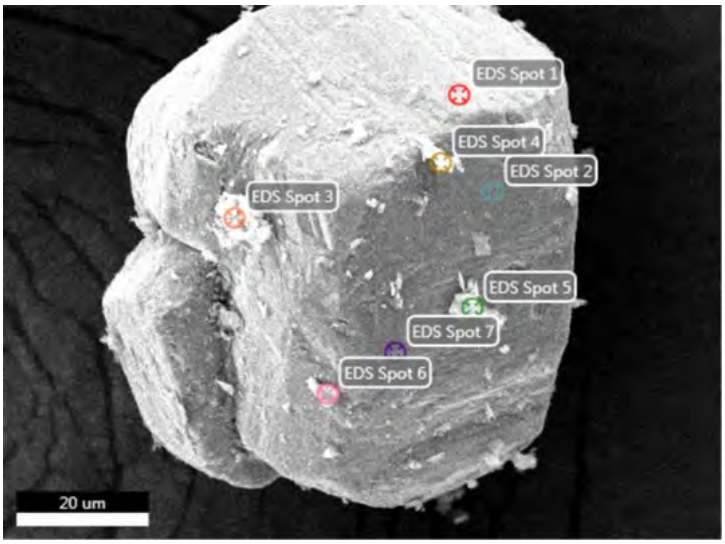
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 | Spot 7 |
|---|---|---|---|---|---|---|---|
| Al | 3.6 | 1.0 | 0.5 | 0.7 | 0.3 | 0.4 | 0.1 |
| C | | | | | | | |
| Ca | 0.8 | | | | | | |
| Cl | | | | | | | |
| F | | | | | | | |
| Fe | 15.0 | 29.1 | 7.0 | 23.2 | 18.4 | 60.6 | 8.9 |
| Fr | | | | | | | |
| K | | | | | | | |
| Mg | 1.1 | 1.0 | | | | | |
| Mn | | | | | | | |
| Na | | | | | | | |
| Ni | | | | | | | |
| O | 44.5 | 8.4 | 14.7 | 11.7 | 3.6 | | 11.6 |
| Pt | | | | | | | |
| S | 31.3 | 59.5 | 76.9 | 63.3 | 77.1 | 38.3 | 78.9 |
| Si | 3.8 | 1.0 | 0.9 | 1.2 | 0.7 | 0.6 | 0.5 |
| Ti | | | | | | | |
| Zn | | | | | | | |



Mod PAF (MID)

**Py3**

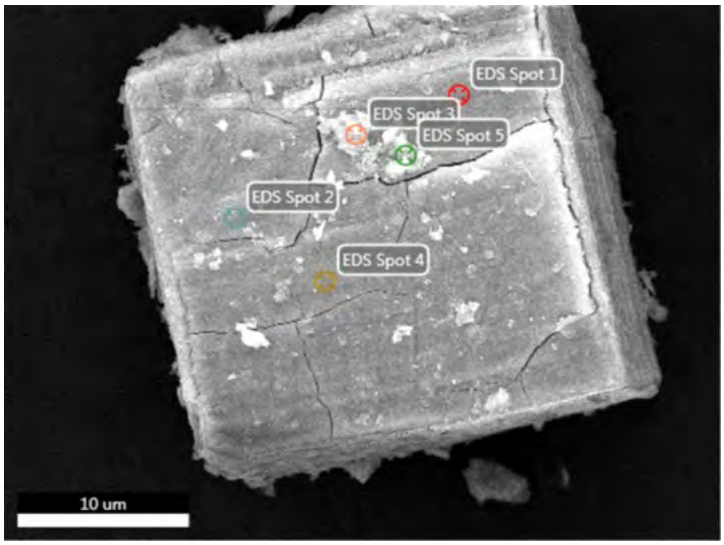
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 | Spot 7 |
|---|---|---|---|---|---|---|---|
| Al | 1.3 | | 6.8 | 6.5 | 6.5 | 0.4 | 0.6 |
| C | | | | | | 20.9 | |
| Ca | | | 6.2 | 1.8 | 0.5 | 14.2 | 0.5 |
| Cl | | | | | | | |
| F | | | | | | | |
| Fe | 28.8 | 26.0 | | | 2.0 | | 22.4 |
| Fr | | | | | | | |
| K | | | 1.0 | 0.8 | 0.8 | | |
| Mg | | 1.0 | 0.4 | 1.7 | 1.0 | 0.4 | |
| Mn | | | | | | | |
| Na | | | | 0.7 | 3.0 | 0.4 | |
| Ni | | | | | | | |
| O | 13.8 | 10.6 | 68.9 | 69.3 | 62.5 | 62.4 | 14.7 |
| Pt | | | | | | | |
| S | 55.1 | 61.7 | 6.6 | 3.3 | 5.9 | 0.8 | 61.0 |
| Si | 1.1 | 0.7 | 10.1 | 15.8 | 17.9 | 0.5 | 0.8 |
| Ti | | | | | | | |
| Zn | | | | | | | |



NAF (TOP)

**Py1**

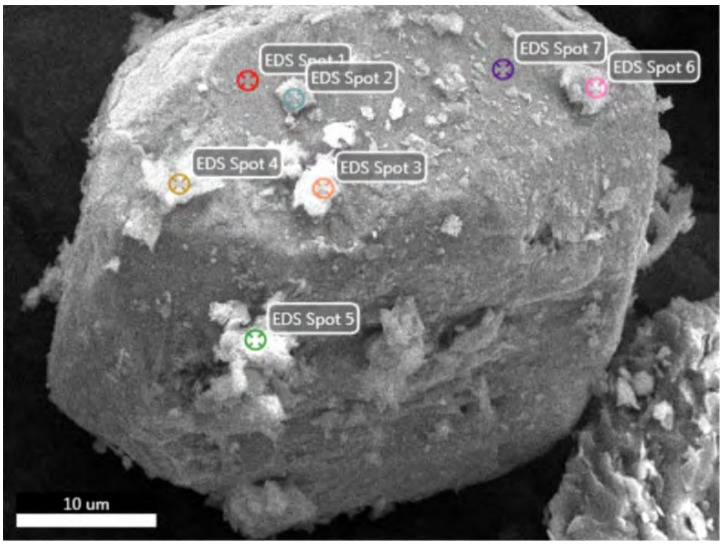
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 |
|---|---|---|---|---|---|
| Al | 0.4 | 0.4 | 4.4 | 0.5 | 4.2 |
| C | | | | | |
| Ca | 1.4 | 1.2 | 1.0 | 1.2 | 1.3 |
| Cl | | | | | |
| F | | | | | |
| Fe | 26.1 | 14.4 | 15.9 | 25.0 | 9.5 |
| Fr | | | | | |
| K | | | 1.0 | | 0.9 |
| Mg | 0.4 | 0.2 | 0.7 | 0.7 | 0.7 |
| Mn | | | | | |
| Na | | | 0.2 | | |
| Ni | | | | | |
| O | 58.0 | 62.5 | 63.5 | 57.4 | 69.4 |
| Pt | | | | | |
| S | 10.5 | 18.6 | 6.1 | 12.4 | 7.9 |
| Si | 3.2 | 2.8 | 7.1 | 2.9 | 6.2 |
| Ti | | | | | |
| Zn | | | | | |



NAF (TOP)

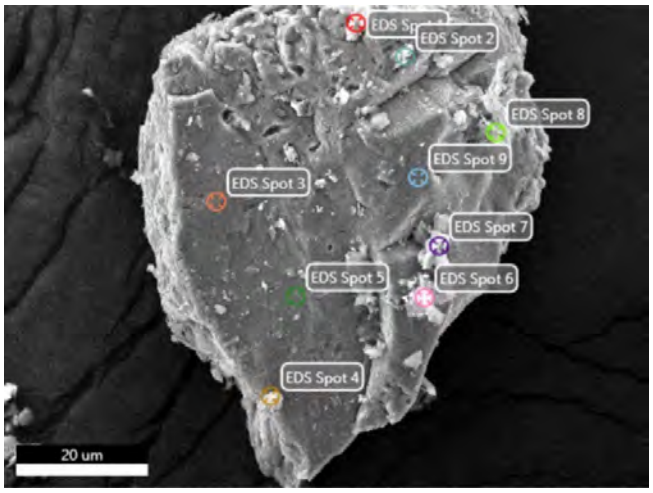
**Py2**

| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 | Spot 7 |
|---|---|---|---|---|---|---|---|
| Al | 1.0 | 0.6 | 0.4 | 4.5 | 3.8 | 13.7 | 0.8 |
| C | | | | | | | |
| Ca | | 7.4 | 0.7 | | 8.7 | | 0.6 |
| Cl | | | | | | | |
| F | | | | | | | |
| Fe | 26.3 | 15.8 | 2.3 | 12.1 | 2.9 | 1.0 | 24.5 |
| Fr | | | | | | | |
| K | | | | 1.0 | 0.5 | 3.5 | |
| Mg | | 0.5 | 0.0 | 0.3 | 0.6 | 0.7 | 1.2 |
| Mn | | | | | | | |
| Na | | 0.3 | | 0.3 | | 0.3 | |
| Ni | | | | | | | |
| O | 17.2 | 56.9 | 71.0 | 42.7 | 78.1 | 66.0 | 62.5 |
| Pt | | | | | | | |
| S | 54.6 | 17.3 | 0.7 | 32.3 | 0.4 | 0.1 | 9.0 |
| Si | 1.0 | 1.2 | 24.6 | 6.8 | 5.1 | 14.7 | 1.6 |
| Ti | | | 0.3 | | | | |
| Zn | | | | | | | |



NAF (TOP)

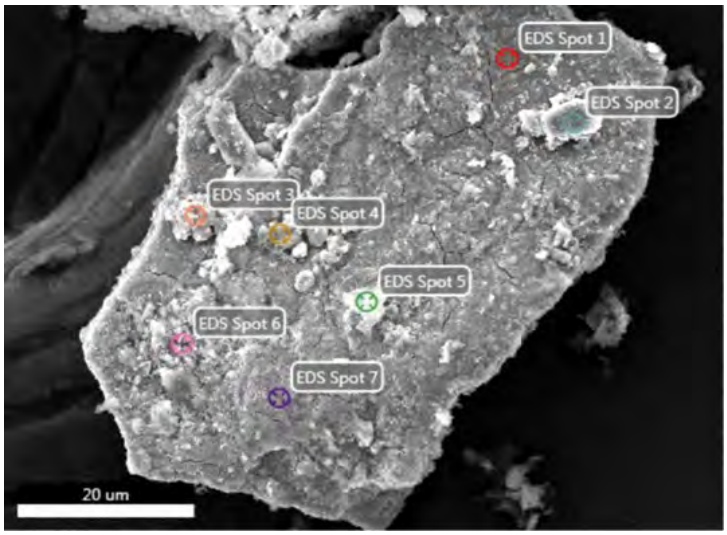
| | | | Py3 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Element** | **Spot 1** | **Spot 2** | **Spot 3** | **Spot 4** | **Spot 5** | **Spot 6** | **Spot 7** | **Spot 8** | **Spot 9** |
| Al | 8.5 | 3.3 | | 7.3 | 0.1 | 9.5 | 8.5 | 5.9 | 0.3 |
| C | | | | | | | 26.9 | | |
| Ca | | 1.2 | | 0.0 | 1.0 | | | 2.0 | 0.6 |
| Cl | | | | | | | | | |
| F | | | | | | | | | |
| Fe | 0.0 | 17.9 | 18.1 | 0.4 | 47.0 | 3.2 | 1.2 | 2.8 | 30.5 |
| Fr | | | | | | | | | |
| K | | 0.3 | | 0.0 | | 2.1 | 2.3 | 1.3 | |
| Mg | | 0.1 | | 0.2 | | 1.7 | 0.3 | 1.1 | 0.4 |
| Mn | | | | | | | | | |
| Na | 9.0 | 0.7 | | 7.5 | | 0.6 | 0.2 | 0.2 | |
| Ni | | | | | | | | | |
| O | 59.3 | 63.8 | 69.5 | 65.6 | 39.2 | 71.6 | 51.3 | 69.2 | 61.3 |
| Pt | | | | | | | | | |
| S | 0.1 | 5.1 | 10.2 | 0.1 | 10.7 | 0.6 | 0.3 | 1.9 | 4.5 |
| Si | 23.1 | 7.7 | 2.2 | 19.0 | 2.1 | 10.7 | 9.0 | 15.9 | 2.4 |
| Ti | | | | | | | | | |
| Zn | | | | | | | | | |



NAF (TOP)

**Py4**

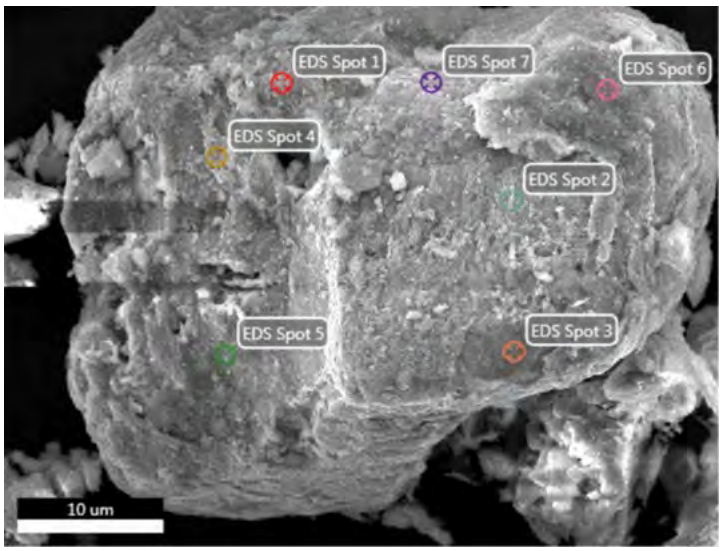
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 | Spot 7 |
|---|---|---|---|---|---|---|---|
| Al | 0.4 | 9.1 | 0.8 | 11.8 | 8.6 | 1.5 | 0.2 |
| C | | | | | | | |
| Ca | | 1.2 | | 6.0 | | 1.7 | |
| Cl | | | | 0.2 | | 1.2 | |
| F | | | | | | | |
| Fe | 17.4 | 0.4 | 17.7 | 1.7 | 7.4 | 26.0 | 30.6 |
| Fr | | | | | | | |
| K | | | | | 2.2 | 0.5 | |
| Mn | | | | | | | |
| Mg | | | | 0.6 | 1.2 | 0.2 | |
| Na | 1.2 | 7.6 | 0.9 | 0.7 | 0.4 | 0.4 | 0.3 |
| Ni | | | | | 0.2 | | |
| O | 72.2 | 60.9 | 57.3 | 64.8 | 67.2 | 53.0 | 50.4 |
| Pt | | | | | | | |
| S | 8.1 | 0.1 | 22.4 | 1.2 | 2.2 | 13.4 | 18.1 |
| Si | 0.6 | 20.8 | 0.9 | 13.0 | 10.7 | 2.1 | 0.4 |
| Ti | | | | | | | |
| Zn | | | | | | | |



NAF (TOP)

**Py5**

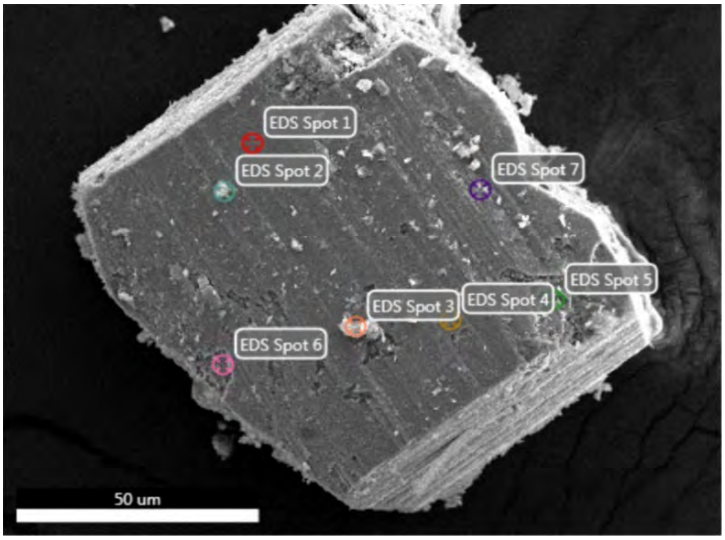
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 | Spot 7 |
|---|---|---|---|---|---|---|---|
| AlK | 0.7 | 1.1 | 0.5 | 0.8 | 0.8 | 2.1 | 1.4 |
| C | | | | | | | |
| Ca | | | | | 1.0 | | 0.3 |
| Cl | | | | | | | |
| F | | | | | | | 16.1 |
| Fe | 9.5 | 22.3 | 23.1 | 12.8 | 62.2 | 17.4 | 0.3 |
| Fr | | | | | | | |
| K | 0.5 | | | | 0.8 | | 0.5 |
| Mg | 0.1 | 0.7 | | 0.1 | 0.1 | | |
| Mn | | | | | | | 1.4 |
| Na | 0.3 | | | 0.0 | | | 72.0 |
| Ni | | | | | | | |
| O | 64.5 | 41.3 | 10.5 | 67.9 | 24.0 | 68.0 | 5.9 |
| Pt | | | | | | | |
| S | 22.7 | 33.2 | 65.6 | 15.2 | 7.5 | 9.9 | 2.1 |
| Si | 1.7 | 1.4 | 0.4 | 3.1 | 3.6 | 2.6 | |
| Ti | | | | | | | |
| Zn | | | | | | | |



NAF (MID)

**Py1**

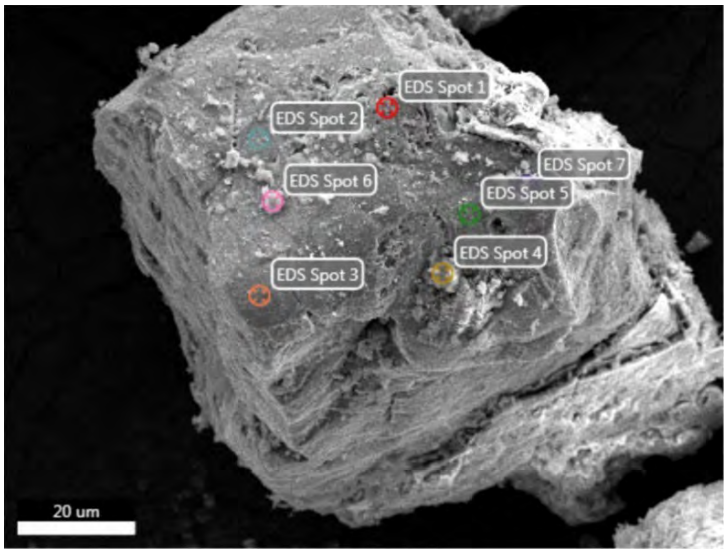
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 | Spot 7 |
|---|---|---|---|---|---|---|---|
| Al | 0.4 | 5.7 | 9.2 | 0.4 | 6.4 | 1.0 | 1.4 |
| C | | | | | | | |
| Ca | | 0.3 | | | 0.4 | 1.9 | 0.7 |
| Cl | | | | | | | |
| F | | | | | | | |
| Fe | 30.6 | 10.0 | 6.5 | 31.9 | 7.4 | 82.2 | 14.5 |
| Fr | | | | | | | |
| K | | 0.4 | 0.4 | | 1.1 | | |
| Mg | 0.3 | 1.0 | 7.0 | | 0.8 | 0.0 | 0.4 |
| Mn | | | | | | | |
| Na | | | | | 0.5 | 0.1 | 0.3 |
| Ni | | | | | | | |
| O | 8.5 | 52.6 | 64.7 | 5.7 | 60.1 | 8.1 | 61.1 |
| Pt | | | | | | | |
| S | 59.5 | 23.5 | 3.8 | 61.4 | 10.9 | 3.9 | 18.1 |
| Si | 0.7 | 6.1 | 8.4 | 0.7 | 8.6 | 2.8 | 3.5 |
| Ti | | 0.3 | | | 3.9 | | |
| Zn | | | | | | | |



NAF (MID)

**Py2**

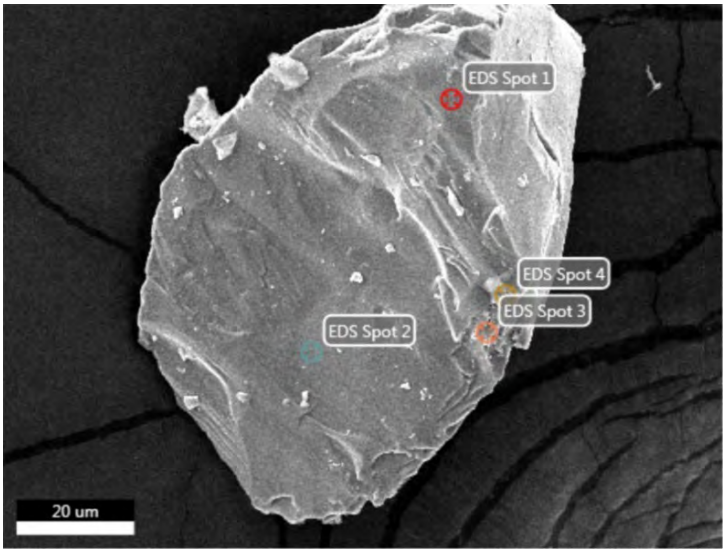
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 | Spot 7 |
|---|---|---|---|---|---|---|---|
| Al | 0.3 | 1.1 | 0.5 | 14.8 | 0.7 | 8.9 | 4.2 |
| C | | | | | | | |
| Ca | 0.8 | | | | | | 2.7 |
| Cl | | | | | | | |
| F | | | | | | | |
| Fe | 28.5 | 23.6 | 21.8 | 0.5 | 22.9 | 4.4 | 11.7 |
| Fr | | | | | | | |
| K | | | | 4.2 | | 0.2 | 0.5 |
| Mg | | | | 0.8 | | 9.8 | 0.9 |
| Mn | | | | | | 0.3 | |
| Na | | | | 0.2 | | | 1.6 |
| Ni | | | | | | | |
| O | 11.9 | 10.8 | 5.9 | 62.6 | 16.4 | 65.1 | 46.3 |
| Pt | | | | | | | |
| S | 57.9 | 63.6 | 71.4 | 0.5 | 59.1 | 3.2 | 26.9 |
| Si | 0.5 | 0.9 | 0.4 | 16.5 | 0.9 | 8.1 | 5.3 |
| Ti | | | | | | | |
| Zn | | | | | | | |



NAF (MID)

**Py3**

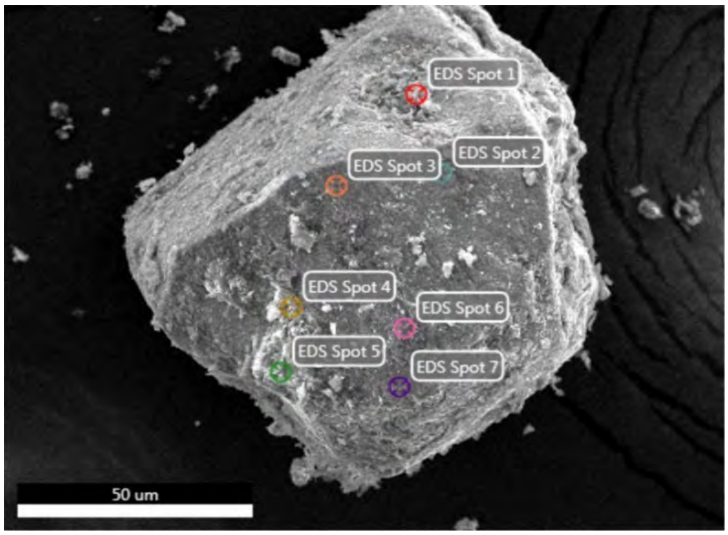
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 |
|---|---|---|---|---|
| Al | 0.3 | 0.2 | 0.1 | 0.1 |
| Ca | | | | |
| Ca | | | | |
| Cl | | | | |
| F | | | | |
| Fe | 40.7 | 49.7 | 13.9 | 55.6 |
| Fr | | | | |
| K | | | | |
| Mg | | | 0.1 | |
| Mn | | | | |
| Na | | | 0.1 | |
| Ni | | | | |
| O | 3.6 | 4.9 | 8.4 | 7.1 |
| Pt | | | | |
| S | 55.0 | 44.9 | 77.2 | 37.0 |
| Si | 0.3 | 0.3 | 0.3 | 0.2 |
| Ti | | | | |
| Zn | | | | |



NAF (MID)

**Py4**

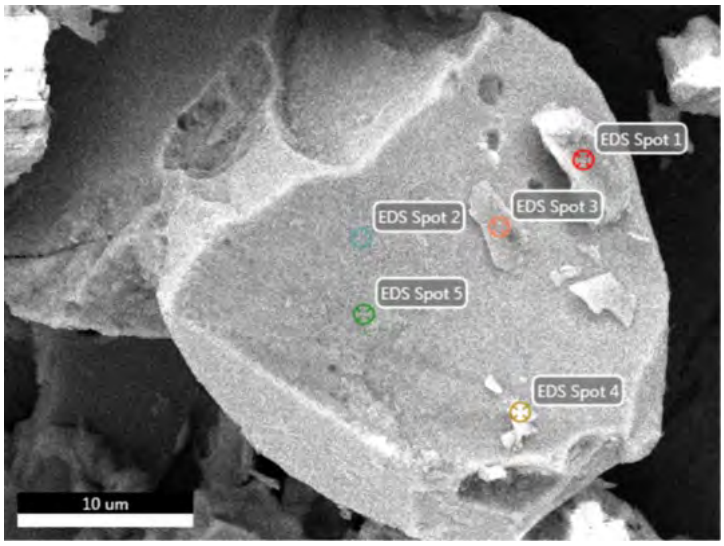
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 | Spot 7 |
|---|---|---|---|---|---|---|---|
| Al | 11.0 | 0.9 | 0.5 | 14.1 | 14.3 | 10.9 | 0.7 |
| C | | | | | | | |
| Ca | | 0.5 | | 0.6 | 0.8 | | |
| Cl | | | | | | | |
| F | | | | | | | |
| Fe | 0.8 | 24.8 | 31.0 | 7.2 | 4.4 | 7.9 | 34.0 |
| Fr | | | | | | | |
| K | 3.0 | | | 2.1 | 3.5 | 2.4 | |
| Mn | | | | | | | |
| Mg | 0.9 | 0.8 | 0.4 | 4.7 | 0.7 | 0.9 | |
| Na | 0.0 | | | 1.1 | 0.6 | | |
| Ni | | | | | | | |
| O | 70.5 | 69.0 | 9.1 | 48.4 | 57.5 | 51.5 | |
| Pt | | | | | | | |
| S | 0.2 | 1.6 | 58.2 | 0.2 | | 13.9 | 64.8 |
| Si | 12.8 | 2.4 | 0.7 | 21.7 | 18.3 | 12.5 | 0.5 |
| Ti | 0.8 | | | | | | |
| Zn | | | | | | | |



TAIL (TOP)

**Py1_spot1**

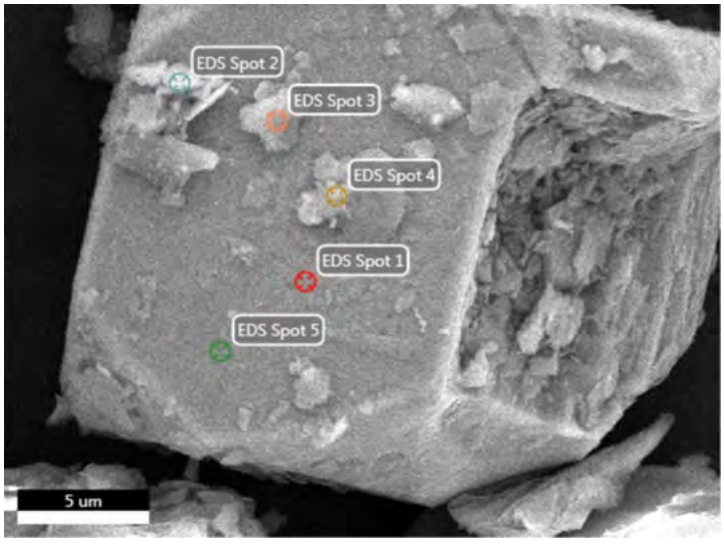
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 |
|---|---|---|---|---|---|
| Al | 11.75 | | 5.67 | 6.86 | 0.75 |
| C | | | | | |
| Ca | | | 0.32 | | |
| Cl | | | | | |
| F | | | | | |
| Fe | 0.55 | 28.44 | 9.2 | 7.47 | 26.83 |
| Fr | | | | | |
| K | 3.44 | | 1.17 | 1.96 | |
| Mg | 0.97 | | 0.66 | 0.97 | |
| Mn | | | | | |
| Na | 0.39 | | 1.3 | 1.05 | 1.44 |
| Ni | | | | | |
| O | 66.46 | 12.63 | 51.4 | 55.43 | 17.04 |
| Pt | | | | | |
| S | 0.28 | 57.86 | 23.36 | 18.25 | 52.45 |
| Si | 16.17 | 1.07 | 6.91 | 8.01 | 1.49 |
| Ti | | | | | |
| Zn | | | | | |



TAIL (TOP)

**Py2_spot3**

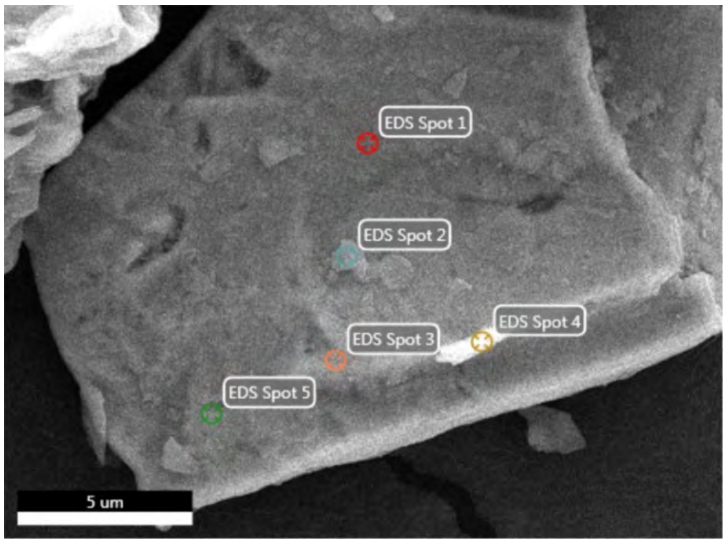
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 |
|---|---|---|---|---|---|
| Al | 0.67 | 1.76 | 5.23 | 6.85 | 0.58 |
| C | | | | | |
| Ca | | 0.57 | | | |
| Cl | | | | | |
| F | | | | | |
| Fe | 19.18 | 3.03 | 6.98 | 8.84 | 19.87 |
| Fr | | | | | |
| K | | 0.36 | 0.4 | 1.53 | |
| Mg | | 0.62 | 4.08 | 3.11 | |
| Mn | | | | | |
| Na | | 0.88 | 0.09 | 0.8 | |
| Ni | | | | | |
| O | 13.36 | 66.55 | 57.58 | 54.56 | 11.51 |
| Pt | | | | | |
| S | 65.59 | 6.87 | 19.8 | 16.28 | 66.89 |
| Si | 1.21 | 19.36 | 5.83 | 8.03 | 1.15 |
| Ti | | | | | |
| Zn | | | | | |



TAIL (TOP)

**Py3_spot4**

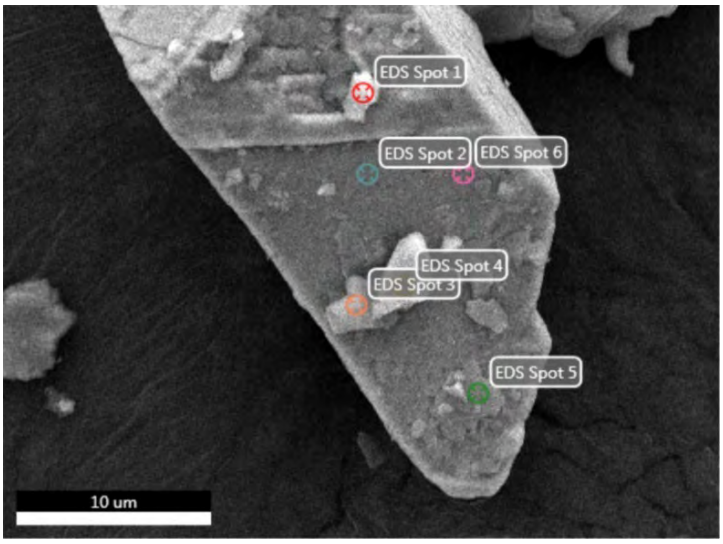
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 |
|---|---|---|---|---|---|
| Al | 0.64 | 4.34 | 1.08 | 4.38 | 0.85 |
| C | | | 32.27 | | |
| Ca | | | | | |
| Cl | | | | | |
| F | | | | | |
| Fe | 49.19 | 15.17 | 16.92 | 3.51 | 16.48 |
| Fr | | | | | |
| K | | 1.13 | | 1.28 | |
| Mg | | 0.42 | | 0.47 | |
| Mn | | | | | |
| Na | | 0.96 | | 0.46 | 0.7 |
| Ni | | | | | |
| O | 4.79 | 40.14 | 23.64 | 45.27 | 26.44 |
| Pt | | | | | |
| S | 43.75 | 32.34 | 56.06 | 6.89 | 52.9 |
| Si | 1.64 | 5.49 | 2.3 | 5.46 | 2.62 |
| Ti | | | | | |
| Zn | | | | | |



TAIL (TOP)

**Py4_spot6**

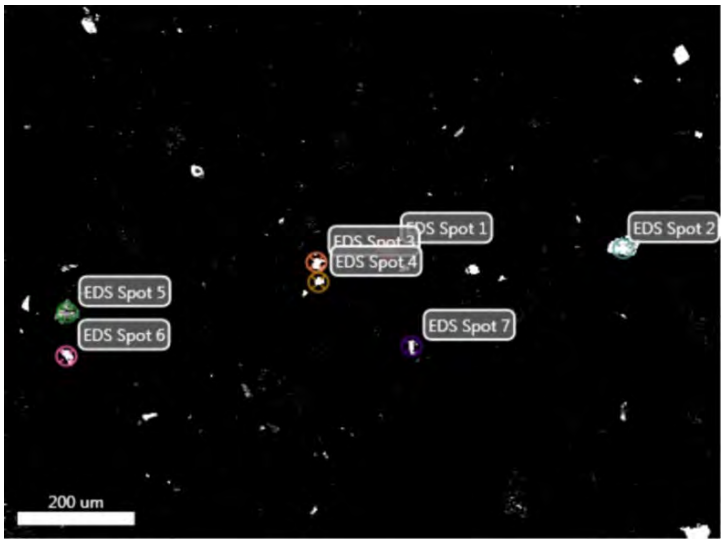
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 |
|---|---|---|---|---|---|---|
| Al | 6.92 | 0.52 | 10.09 | 0.35 | 4.92 | 0.85 |
| C | | | | | | |
| Ca | | 0.64 | | | | |
| Cl | | | | | | |
| F | | | | | | |
| Fe | 3.29 | 28.01 | 7.49 | | 8.67 | 29.15 |
| Fr | | | | | | |
| K | 0.29 | | 2.98 | | 1.24 | |
| Mg | | | 0.8 | | 0.66 | |
| Mn | | | | | | |
| Na | 6.88 | 0.83 | 0.29 | | 0.68 | 0.82 |
| Ni | | | | | | |
| O | 56.76 | 42.28 | 56.04 | 65.27 | 50.6 | 21.55 |
| Pt | | | | | | |
| S | 8.02 | 25.72 | 9.66 | 0.3 | 27.19 | 45.27 |
| Si | 17.84 | 2.02 | 12.65 | 34.08 | 6.04 | 2.35 |
| Ti | | | | | | |
| Zn | | | | | | |



TAIL (TOP)

**Whole**

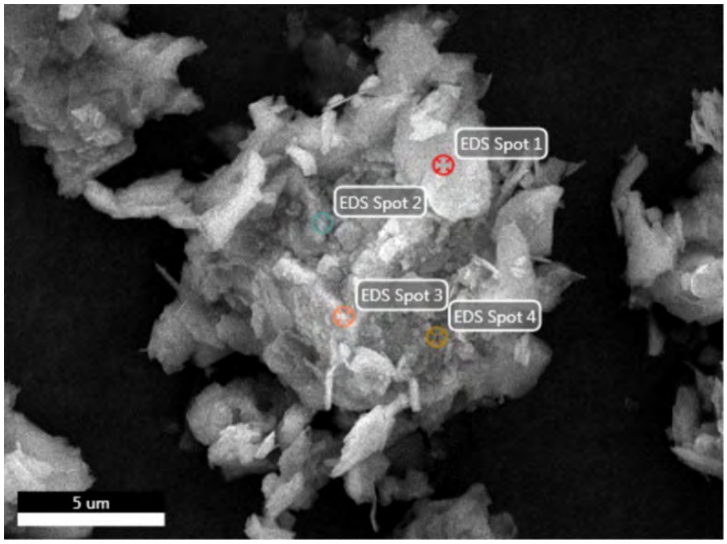
| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 | Spot 5 | Spot 6 | Spot 7 |
|---|---|---|---|---|---|---|---|
| Al | 3.73 | 0.3 | 5.7 | 2.96 | 0.22 | 0.39 | 3.33 |
| C | | | | | | | |
| Ca | | 0.68 | | | | 0.75 | |
| Cl | | | | | | | |
| F | | | | | | | |
| Fe | 15.08 | 15.59 | 16.34 | 14.48 | | 12.25 | 16.07 |
| Fr | | | | | 0.04 | | |
| K | 1.04 | | 1.89 | 1.03 | | | 0.79 |
| Mg | | | 0.48 | | | | 0.69 |
| Mn | | | | | | | |
| Na | 1.66 | 0.86 | 0.42 | 1.5 | | 0.36 | 1.54 |
| Ni | | | | | | | |
| O | 38.35 | 54.09 | 36.75 | 33.72 | 62.99 | 37.19 | 41.46 |
| Pt | | | | | 0.21 | | |
| S | 35.96 | 27.28 | 31.7 | 42.47 | | 47.27 | 30.84 |
| Si | 4.18 | 1.19 | 6.71 | 3.85 | 0.38 | 1.79 | 5.28 |
| Ti | | | | | 36.16 | | |
| Zn | | | | | | | |



TAIL (MID)

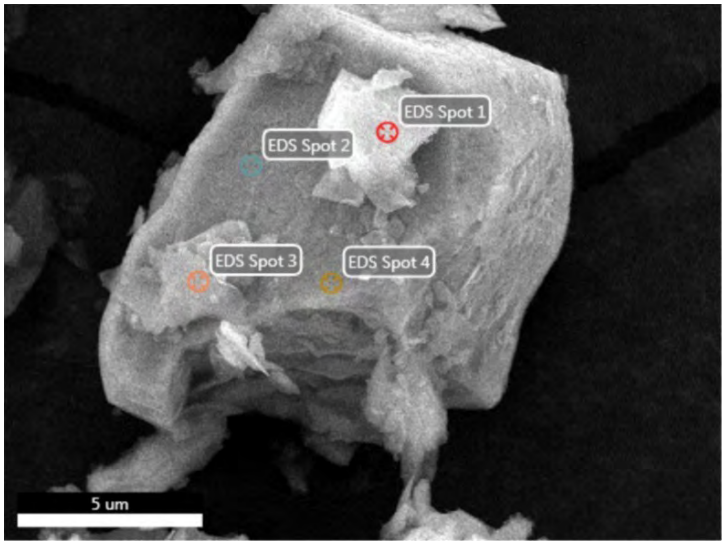
**Py1**

| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 |
|---|---|---|---|---|
| Al | 11.2 | 3.3 | 1.7 | 2.5 |
| C | 12.8 | | | |
| Ca | | 0.7 | 0.7 | |
| Cl | | | | |
| F | | | | |
| Fe | 1.1 | 18.6 | 20.3 | 38.4 |
| Fr | | | | |
| K | 3.6 | 0.7 | | 0.9 |
| Mg | 0.9 | 1.2 | 0.5 | |
| Mn | | | | |
| Na | 0.4 | 2.6 | 1.6 | |
| Ni | | | | |
| O | 55.3 | 43.7 | 38.9 | 10.9 |
| Pt | | | | |
| S | 1.0 | 24.3 | 33.0 | 42.5 |
| Si | 13.7 | 4.8 | 3.3 | 4.8 |
| Ti | | | | |
| Zn | | | | |



TAIL (MID)

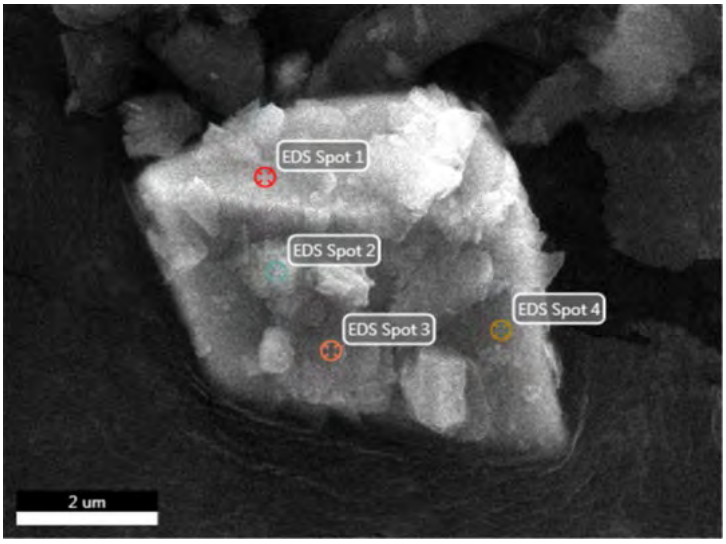
| | | Py2 | | |
|---|---|---|---|---|
| **Element** | **Spot 1** | **Spot 2** | **Spot 3** | **Spot 4** |
| Al | 9.6 | 0.4 | 8.7 | 0.5 |
| C | | | | |
| Ca | | | | |
| Cl | | | | |
| F | | | | |
| Fe | 2.9 | 35.6 | 6.3 | 14.9 |
| Fr | | | | |
| K | 2.7 | | 2.4 | |
| Mg | 1.0 | | 0.7 | |
| Mn | | | | |
| Na | 0.7 | | 0.4 | |
| Ni | | | | |
| O | 64.2 | 8.8 | 57.9 | 19.9 |
| Pt | | | | |
| S | 7.8 | 54.2 | 13.7 | 63.1 |
| Si | 11.1 | 1.1 | 10.0 | 1.7 |
| Ti | | | | |
| Zn | | | | |



TAIL (MID)

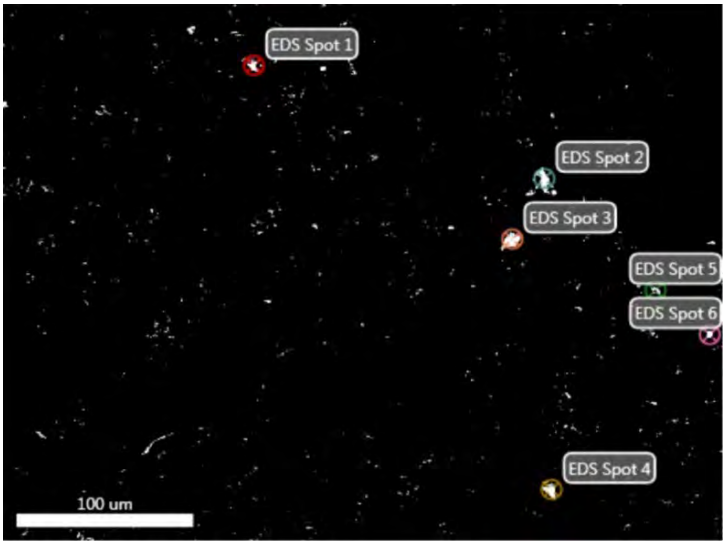
**Py3**

| Element | Spot 1 | Spot 2 | Spot 3 | Spot 4 |
|---|---|---|---|---|
| Al | 1.3 | 2.6 | 3.9 | 0.4 |
| C | | 35.1 | 25.7 | 38.3 |
| Ca | | | | |
| Cl | | | | |
| F | | | | |
| Fe | 22.1 | 5.1 | 11.3 | 15.7 |
| Fr | | | | |
| K | | 0.5 | 0.9 | |
| Mg | 0.6 | 0.3 | 0.2 | |
| Mn | | | | |
| Na | 1.8 | 0.8 | 0.4 | 0.4 |
| Ni | | | | |
| O | 26.3 | 39.7 | 34.4 | 17.4 |
| Pt | | | | |
| S | 45.6 | 8.0 | 17.5 | 26.8 |
| Si | 2.4 | 7.9 | 5.6 | 1.1 |
| Ti | | | | |
| Zn | | | | |



TAIL (MID)

| | Whole | | | | | |
|---|---|---|---|---|---|---|
| **Element** | **Spot 1** | **Spot 2** | **Spot 3** | **Spot 4** | **Spot 5** | **Spot 6** |
| Al | 3.7 | 1.2 | 1.9 | | 1.1 | 0.8 |
| C | | | | | 47.5 | 61.4 |
| Ca | | 0.6 | | | | 0.1 |
| Cl | | | | | | |
| F | | | | | | |
| Fe | 16.5 | 20.8 | 14.2 | 96.1 | 11.4 | 5.5 |
| Fr | | | | | | |
| K | 0.6 | | 0.6 | | 0.4 | 0.2 |
| Mg | 0.0 | 0.6 | 0.2 | | 0.2 | 0.2 |
| Mn | | | | | | |
| Na | 0.3 | 3.3 | 0.3 | | 0.4 | 0.9 |
| Ni | | | | | | |
| O | 43.2 | 55.0 | 28.5 | | 17.4 | 23.0 |
| Pt | | | | | | |
| S | 29.4 | 16.0 | 51.8 | 1.9 | 20.1 | 6.5 |
| Si | 6.3 | 2.6 | 2.6 | 2.0 | 1.6 | 1.5 |
| Ti | | | | | | |
| Zn | | | | | | |



MINE WASTE AND
WATER MANAGEMENT