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**Environmental
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Acid Metalliferous/Mine Drainage (AMD) and Management

**Roper Bar Project Area
Western Desert Resources Ltd**

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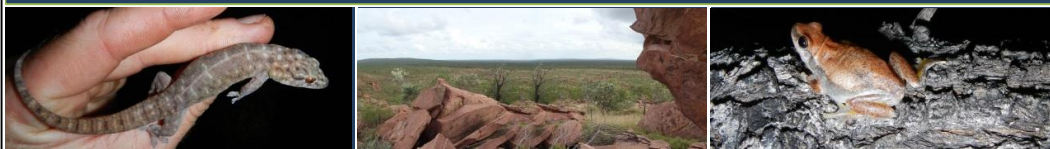


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Western Desert Resources Limited
Roper Bar Iron Ore Project



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Abbreviations and Definitions

Acronym / Term	Definition (Determination)	Unit
ABA	The acid-base accounting test was developed in 1974 to evaluate coal mine waste and was modified by Sobek <i>et al.</i> in 1978. Acid-Base Accounting is a test to assess the potential of a material to produce both acid and neutralisation potential.	
ACM	Acid Consuming Materials – are materials with capacity to neutralise acid.	kgH ₂ SO ₄ /ton
AFP	Acid Formation Potential is the potential for a material to produce acid.	kgH ₂ SO ₄ /ton
AMD	Acid Metalliferous/Mine Drainage – originates when sulfide material is exposed to the atmosphere. This causes the formation of sulfuric acid and the potential outflow of acidic and usually highly metal-rich water into the environment. Potential sulfide-bearing material includes waste rock from overburden, interburden, and processed ore (tailings).	
ANC	Acid Neutralising Capacity (Laboratory Analysis) - is the measure of acid neutralising capacity, usually expressed by carbonates (e.g. calcite and dolomite) and silicates.	kgH ₂ SO ₄ /ton
APR	Acid Potential Ratio (Calculation) – is the ratio of ANC/MPA and is used to classify material as either NAF or PAF (see definitions below).	
ARD	Acid Rock Drainage – the use of this term indicate natural weathering and oxidation unmined outcrops of sulfide bearing materials.	
Kinetic Testing	Tests results provide information on the rate of sulphide reaction over time, time periods for reaction, and control techniques which can optimise treatment and control to address the specific severity and duration of reaction.	
MPA	Maximum Potential Acidity or APP (Acid Production Potential) (Calculation) - It is determined by multiplying the Sulfide-S values (in %) by 30.6, which accounts for the reaction stoichiometry for the complete oxidation of pyrrhotite and pyrite by O ₂ to Fe(OH) ₃ and H ₂ SO ₄ . MPA does not take into account the effect of any acid consuming materials in the rock material.	kgH ₂ SO ₄ /ton
NAF	Non Acid Forming (Calculation). Materials are classified as NAF if either: - Sulfide-S < 0.3%, or - Sulfide-S ≥ 0.3% and NAPP is negative with ANC/MPA ≥ 2.0 (see also PAF definition below)	
NAG	Net Acid Generation or NAP (Net Acid Production) (Laboratory Analysis) –hydrogen peroxide is used to accelerate the oxidation of sulfides present in the material. The acid produced may be partially or totally consumed by acid neutralising components in the material. The pH of the solution is determined and then titrated to pH 7. This gives a value for the Net acid or neutralizing potential of the sample.	kgH ₂ SO ₄ /ton
NAPP	Net Acid Producing Potential (Calculation) - NAPP = MPA - ANC. Conceptually, a negative NAPP indicates all acid produced is neutralised and a positive NAPP indicates the material is net acid producing.	kgH ₂ SO ₄ /ton
NNP	Net Neutralising Potential (Calculation) - NNP = ANC - MPA. Conceptually, a positive NNP indicates all acid produced is neutralised and a negative NAPP indicates the material is net acid producing. NNP is a conservative measure as it tends to overestimate the acid producing potential because it does not differentiate between acid producing and non-acid producing forms of sulfur.	kgH ₂ SO ₄ /ton
PAF	Potential Acid Forming (Calculation). Materials are classified as PAF if either: - Sulfide-S ≥ 0.3% and NAPP is positive, or - Sulfide-S ≥ 0.3% and NAPP is negative, but ANC/MPA < 2.0 (see also NAF definition above)	
SOR	Sulfide Oxidation Rate - Sulfide reaction over period of time.	mgSO ₄ /kg/ week
Static Testing	A static test determines both the total acid generating and total acid neutralizing potential of a sample.	
Sulfide-S	Sulfide Sulfur (Calculation) – is the sulfur in the material present as sulphide. Sulfide Sulfur = Total-S - Sulfate-S	%(w/w)
Total-S	Total Sulfur (Laboratory Analysis) – is the total sulfur in a material in all its forms.	%(w/w)

Executive Summary

The EIS guidelines for the proposed Roper Bar Iron Ore Project of Western Desert Resources Limited (WDRL) requires an assessment of the acid metalliferous/mine drainage and metal leaching potential of waste rocks and ore to ascertain the potential impacts to the local and wider environment.

This report documents the geochemical characterization of the main lithotypes (i.e. rock types) at the Roper Bar Iron Ore Project, particularly lithotypes within and around the vicinity of the proposed mining pits, and defines the regimes for managing the potential for acid formation.

The specific scope of activities included:

- Characterise selected drill-core rock samples in terms of their potential for acid forming (PAF) properties and enrichment and/or release of available metals to the environment.
- Analyse the sulfur distribution among the waste rock and ore materials.
- Evaluate results and assess the implications for mine operations with regards to waste rock management.

Detailed PAF analysis was undertaken on a total of 204 samples selected from 58 exploration drill holes. An analysis of sulfur distribution within the ore and waste was also undertaken on a total of 6,385 XRF sulfur assays or handheld Niton XRF readings at 1m downhole intervals in exploration drill holes within the perimeters of the proposed open pits. The test program included laboratory testing of samples, mineralogical assessments, predictive Acid Base Accounting (ABA) and hydrogeochemical assessments of leachates. An indicative mass rock/ore ABA balance was also developed to evaluate the potential of the site to produce acidic and/or alkaline effluents during and following mining operations. The salient findings are:

Mineralogical assessment:

- The characteristic mineralogical composition across the site is Quartz > Hematite > Siderite > Pyrite > Kaolinite > Muscovite > Goethite > Iron. Sulfides, principally pyrite, are present in minor or trace concentrations except Area E East where concentrations are more significant.
- XRF analysis defines the samples as having elemental composition in the order of Si > Fe > Al > Mg > Mn > K > Ca > Na. Sporadic occurrences of sulfides, principally pyrite, are also significant.
- Sample enrichment, defined by the values of the Geochemical-Abundance Index (GAI), occurs by iron, sulfur and manganese only. Significant enrichment with sulfur, by about 96-fold, was observed in samples from Area E East, particularly among the oolites, sandstones and oolite sandstones at depths between 19m and 24m below ground level.
- SEM and EDS analysis also shows that elemental concentration is in the order oxygen > carbon > iron > silicon, with varying minor and trace amounts of aluminium, calcium, magnesium and sulfur. About 95% of samples assessed, particularly the oolites, sandstones, sandstone oolites and the sandy oolites, contain minor to trace quantities of sulfur.

Acid-base chemistry:

- The highest oxidation-pH occurs at depths between 23m and 25m below ground level among oolites and strongly sideritic sandy oolites in Area E South, indicating significant concentrations of readily available alkaline materials. The lower oxidation pH values were in samples from Areas E East, F East Pit 1 and F East Pit 3.
- Total sulfur distribution and concentrations varies with depth and lithological compositions. From the total of 204 samples, 55% of samples contain Total-S lower than 0.3%, with a maximum concentration of 5.97% in the sandstones of the Kyalla Member (KYM) in Area E East.

- The highest average concentration of sulfur (1.58%) was observed in Area E East, whilst the lowest (0.21%) was observed in E South. Area F East Pit 1 has a significant average sulfur concentration (0.86%) ranging from 0.01% to 2.70%.
- Sulfur concentrations in a total of 18,866 readings in samples from exploration drillholes indicate an overall low level, with sporadic high sulfur concentrations particularly at Areas E East and F East.
- ANC assessment of samples indicates that most of the samples in all prospect areas contain low ANC values with an average of $\sim 15\text{kgH}_2\text{SO}_4/\text{ton}$. However, sporadic sandstones and oolites in all prospect areas (particularly those located near the surface) presented relatively high ANC concentrations.
- The highest average ANC ($22.75\text{kgH}_2\text{SO}_4/\text{ton}$) concentrations were found in the lithotypes within Area E South, indicating that from a waste management perspective, this area contains significant ANC hosting materials.
- The majority of PAF samples in Area E East are located between the surface and 100m below ground level ($\sim 76\%$), with the highest concentrations at depths between up to 50m. Sandstones, Oolites, Sandy Oolites and Siltstones contain the highest PAF concentrations. Clays in this sequence are NAF materials. Concentrations of PAF materials decrease with depth to about 40%.
- A total of 9% of samples in Area E South are classified as PAF mostly near the surface. All samples below 50m depth were classified as NAF, with only one sample (silt at a depth of $\sim 57\text{m}$) falling in the uncertain category.
- Area F East includes Pits 1, 2 and 3. About 41% of the near surface samples to a depth of about 50m below ground level are classified as PAF materials, with significant concentrations of PAF sandstones and oolites at depths between 15m and 36m below ground level. Significant concentrations of NAF materials are near the surface, up to 15m deep.
- A lower amount of PAF materials ($\sim 18\%$) occur in Area F West. Most of the samples are scattered across the stratigraphical sequence, with particular concentrations between 40m and 50m below ground level. Sandstones and sandstone oolites, which compose about 50% of lithotypes within this horizon, contain the highest concentrations of PAF materials.
- Siltstones, oolites and deep-bedded sandstones are predominantly NAF materials within Area F West. The shallow sideritic oolites and oolite sandstones fall in “uncertain to be classified” category.
- NAG values range from less $0.1\text{kgH}_2\text{SO}_4/\text{ton}$ to a maximum of $154\text{kgH}_2\text{SO}_4/\text{ton}$ and strongly correlate with the highest NAPP values.
- In general, using the proposed criteria:
 - 52% of the samples can be classified as **Non-Acid Forming (NAF)**.
 - 34% are classified as **Potentially Acid forming (PAF)**.
 - 14% of samples fall within the **zone of uncertainty (UC)**, which necessitates further assessment.

Hydrogeochemical assessment:

- Average pH values of leachates from 83 samples are slightly acidic (pH 6.3) and range from 3.0 to 8.2. The low average pH values are associated with samples from Area E East, whilst the highest average pH (pH 7.3) was observed in sample solutions from Area F East Pit 2, indicating these samples have very reactive alkaline materials.
- Despite the low pH observed in samples from Area E East, average calcium and magnesium concentrations are relatively high. Potassium and aluminium are also relatively high, indicating

that these samples have readily available carbonates and aluminosilicate minerals to buffer potential acid environments in the short term.

- Generally, the highest concentrations of sulfate, iron, aluminium and manganese and most other metals were associated with low-pH samples.
- According to their hardness the majority of leachates can be classified as very soft, with only five samples ranging from moderately soft to very hard waters.
- Most of the samples from Areas E East and E South produced sodium-potassium-bicarbonate type waters, whilst a significant number of samples from Areas F East Pit 2 and Pit 3 produced sodium-potassium-sulfate-chloride leachate types.

Indicative Waste Rock ABA balance:

- In an overall mass balance, only 30% of materials contain significant MPA concentrations.
- Most of the near-surface materials to a depth of about 20m across all proposed pits rendered positive NNP values, indicating the presence of significant quantities of ANC materials.
- The top 51m in Area F West render positive NNP values with high ANC materials at depths between 15m and 37m below ground level.
- Although a positive NNP was calculated for Area E East, MPA materials are significant, particularly at depths between 15m and 23m and between 25m and 77m below ground level. Lithotypes with significant ANC characteristics are located below 77m.
- With the exception of Area F East Pit 1, ANC materials are higher than MPA materials in all other pits indicating lower AMD potential for these pits.
- MPA materials in Area F East Pit 1 are significant at depths between 15m and 39m below ground level whilst in Area F East Pit 3 MPA material are located between 39m and 51m extending to about 87m below ground level.

Based on the assessment outlined above, coupled with a detailed risk assessment, a framework has been provided for ongoing assessment, and by applying a conservative approach, the implications for mine waste management indicates that careful management of ores and waste rocks will be required. Specific practical AMD management entails:

- Since current predictions indicate that about 70% of materials contain higher ANC capacities, waste rocks to be managed and disposed of will be subject to:
 - Site control and monitoring of excavated materials whilst developing the pit structures which will also be carefully engineered and monitored.
 - Upfront engineering/scientific approaches to identify/predict, prevent, remediate and monitor potential AMD formation.
 - Assessment and performance evaluation of selected methodologies for the on-going identification/prediction, prevention, treatment and remediation of AMD. Rehabilitation and closure of the mine will be the driver for this assessment.
 - On-going risk assessment to define impacts on the local ecosystems and downstream environments.

Specific approaches selected to adequately manage the potential for AMD formation during the construction phase in the RBIO, WDRL includes:

- Continuous and detailed geochemical characterisation of waste/ore materials including:
 - Identification and review of available site collated data.
 - Targeted drilling at narrower spacing to define whether predicted and identified PAF materials, particularly those defined as highly localised, are extent across the bulk and ore body and

waste rock materials. Findings will assist in improving delineation of both PAF/NAF waste and ore materials and define further management processes.

- Refine geochemical characterisation plan. A refined geochemical characterisation plan may include:
 - Refine block model to improve waste rock/ore body delineation on regards to NAF/PAF characterisation.
 - Define NAF/PAF characterisation in exposed and properly delineated low grade ore bodies.
 - Define selective and targeted sampling procedures for NAF/PAF characterisation.
 - In-field characterisation/screening for PAF of both waste and ore body. The in-situ paste pH is a simple method for determining readily available acidity and alkalinity and indicates the immediate reactivity of sulphides and acid neutralising minerals present in the samples and this shall be the principal screening test. In this context:
 - A paste pH > 5.0 suggest the presence of reactive carbonates.
 - A paste pH < 5.0 suggests that the materials contain acidity from prior acid generation.
 - Specific paste pH screening methodology and steps will be defined and implemented before mine operations starts.
 - Where feasible and practical water sampling in the excavated area would be carried out to define natural weathering features.
 - Where materials shows low paste-pHs, representative samples will be send to the laboratory for full ABA assessment and results will be used for the overall mass waste rock ABA evaluation.
 - Where PAF materials are encountered, materials will be segregated and where possible prevent wider interaction with the atmosphere, particularly by rainfall. If disposal of these materials due to operational activities is postponed, materials will be provisionally encapsulated with NAF materials to then adequately be disposed of.
 - Implementation of kinetic tests to investigate SoRs and potential quality of drainage from mine waste structures, and this will entail:
 - Short term tests pre-mining kinetic tests. Although a detailed methodology to implement the test is in progress, a preferred kinetic tests approach will include the implementation of field test columns and pads for each materials of concern.
 - Monitoring of weathering conditions, drainage chemistry and loadings.
 - Long term kinetic tests. Investigation phase.
 - Refine the overall Waste Rock Management Plan.
- During-mining PAF waste rock management activities:
 - Implement long term kinetic tests. This will include:
 - Continuing pre-mine field kinetic tests and setting up new field test pads and monitoring sites on project components to study materials of concern.
 - Monthly basis monitoring of weathering conditions, drainage chemistry and loadings.
 - Prediction of post-closure drainage chemistry which will be periodically repeated.
 - Refine waste management approaches and included conceptual models to suit new observations and findings.
 - The conceptual model for the disposal of PAF waste/low grade ore materials include:

- Initial excavated NAF materials will be used to construct engineered beds and/or cells for the disposal by encapsulation of PAF materials. Encapsulation of PAF materials with high NAF materials will be accomplished.
- Mine engineered waste rock dumps will include drainage systems, sediment traps, seepage diversion barriers and collection ponds, and embankments to prevent surface waters entering the waste rock dumps containing PAF materials.
- Identification of clay and highly weathered NAF materials to be used to construct an impermeable base for the Waste Rock Dump and for providing a landscaped cap during rehabilitation with the view to minimize ingress of oxygen and infiltration of rain. Significant weathered NAF rock materials, excluding those that are potentially acid forming, would be considered to be used for constructing pads and walls.
- Inhibition of oxygen and water into PAF materials is to be achieved by engineered dry covers. The applicability of store-release cover types as an option is being currently investigated.
- Monitoring will include surface water structures conveying and containing waters from ore and waste rock dumps. Shallow and deep bores for ground water monitoring will be constructed up and downstream of these facilities.

If ongoing waste characterisation identifies increased concentrations of PAF materials, a further approach of PAF management will include an updated PAF encapsulation model. However, this approach will need to be further investigated and engineered.

Post-mining, closure and rehabilitation: Mine waste handling will include processes and methodologies to prevent or minimize exposure of PAF materials to the atmosphere. Processes and methodologies which may include pit back filling, subaqueous disposal of reactive waste in mine voids and/or in-pit disposal of waste rocks with alkaline materials addition will be described and developed as necessary and consulted with the relevant authorities.

1 Introduction

1.1 Background

Western Desert Resources Limited (WDRL) intends developing the Roper Bar Iron Ore Project (RBIOP). This project is located 50 km inland from the Gulf of Carpentaria (Figure 1), near the Roper River, in the *Gulf Country* of the Northern Territory.

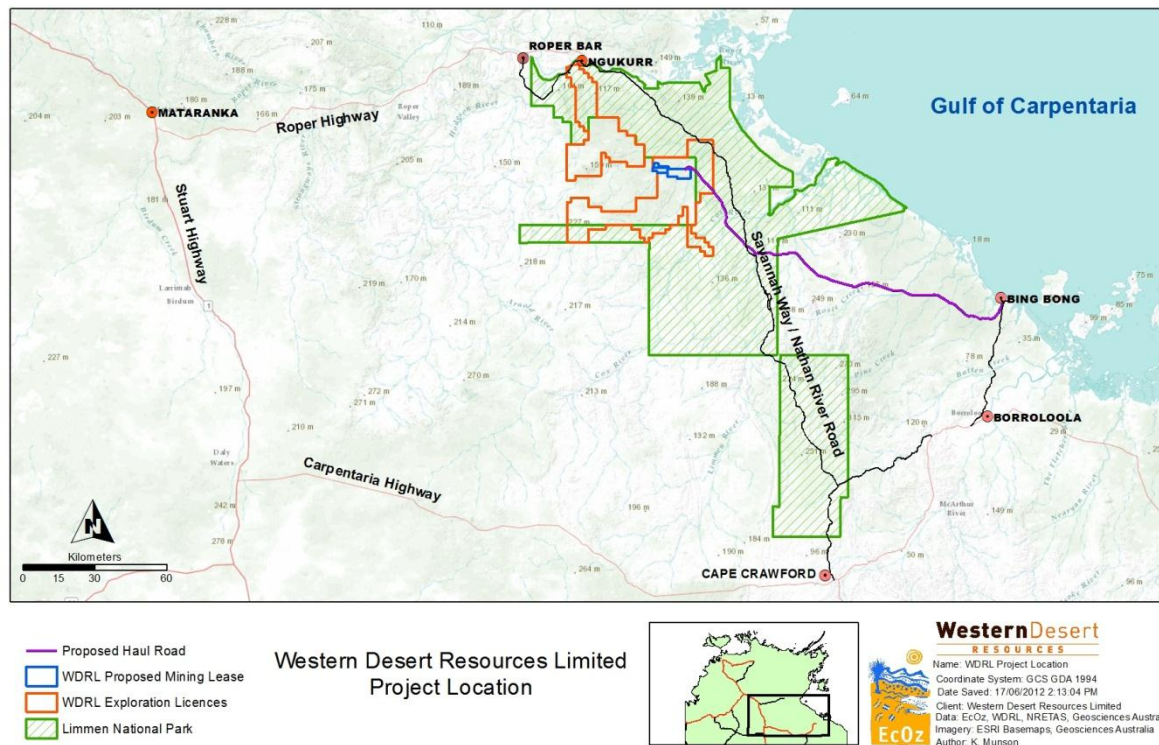


Figure 1: Location of the Roper Bar Iron Ore Deposits.

The RBIOP is a large intracratonic sedimentary basin with an exposed area of about 180,000 km². The dominant stratigraphy comprises of relatively un-metamorphosed and un-deformed sediments of the Mesoproterozoic Roper Group. Near the top of this sequence, occurs in outcrop and under shallow cover, an oolitic ironstone called the Sherwin Ironstone Formation (SIF) which hosts all the known iron mineralisation and deposits.

This sedimentary iron-ore type, dominated by compact ultrafine hematite, consist of various proportions of “very compact earthy” hematite, together with ultrafine “crystalline” hematite, with or without internal zoning (Figure 2). The relatively high tone of these oolitic-hematite facies (up to 68.5% Fe) is due to the dominance of the primary sedimentary oolites of massive/earthy hematite intimately mixed with ultrafine massive crystalline hematite with a matrix of largely earthy hematite (Pontifex, 2010). High grade hematite ore consists of a loose-packed aggregate of spheroidal to ovoidal oolites or pellets, with an average and fairly consistent size of about 0.4mm, composed entirely of earthy hematite albeit internally, concentrically zoned.

Sulfides among the lithotypes of the Roper group are localised. Some sandstone dominated by fine to medium grained quartz sand with extensive hematite and minor stringers of siderite and kaolin were observed to have threads of pyrite locally cutting across bedding planes (Pontifex, 2010). In general, minor pyrite is locally intergranular.

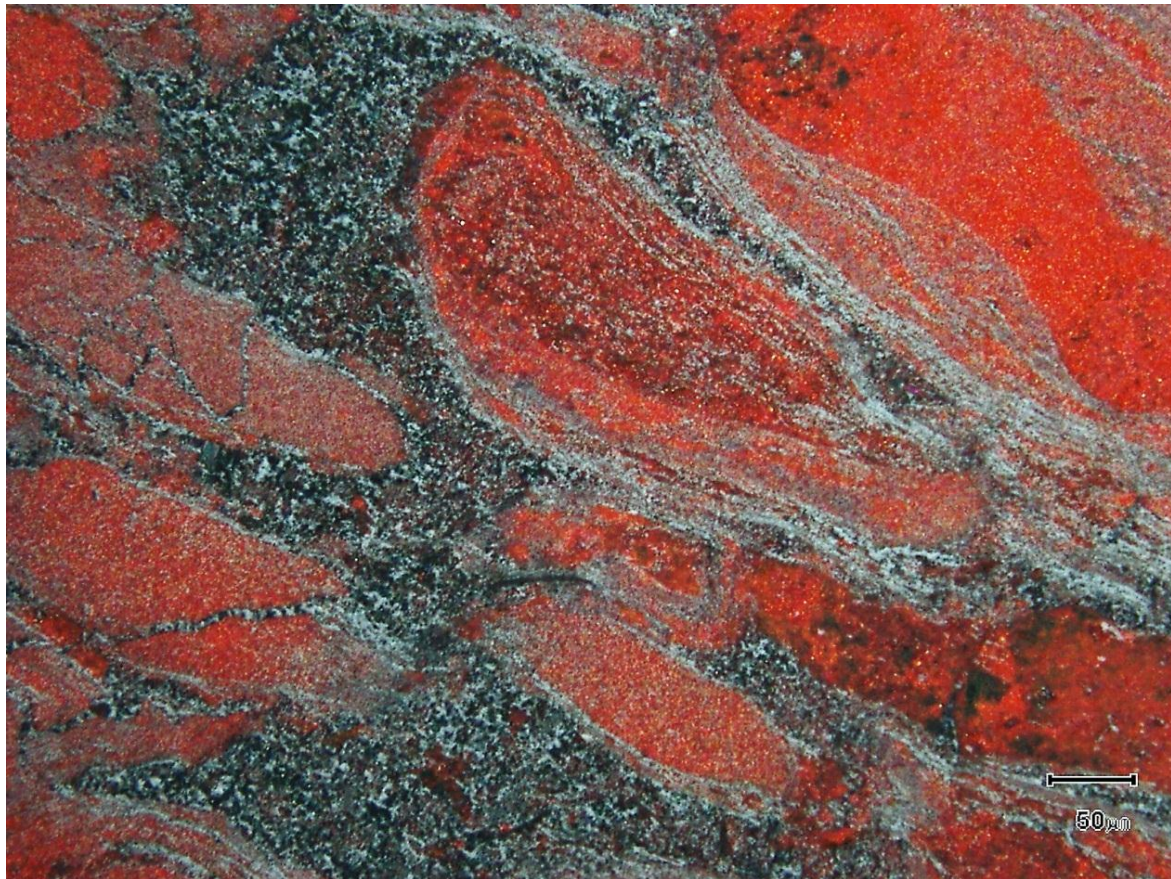


Figure 2: Oolitic Hematite Facies.
(elongated with ultrafine crystalline micaceous hematite between)

Geochemical testing to ascertain and predict the potential for and/or occurrence of AMD comprise of widely used Acid Base Accounting (ABA) sampling and test programs. ABA tests are commonly used as a screening tool and calculate the balance between acid-producing and acid-consuming components of the materials (Lapakko, 2002). However, Lapakko (1994) and Miller et al. (1997) observed that these tests present several uncertainties which relate to the reliability of measuring the neutralisation potential (NP), due to a combination of the mineralogical composition, particle size and test limitations.

Several AMD practitioners and regulatory agencies indicated the need for kinetic tests to properly characterise the acid potential (AP) of mine wastes. Kinetic tests are generally long-term tests in which samples of mine wastes are subject to dissolution, with the objective of estimating field drainage quality (Lapakko, 2002). These tests also assist in assessing the relative potential of mine wastes to produce acidic drainage (Nordstrom, 2009) and, in some cases, to determine the rates of mineral oxidation and dissolution.

Whilst many investigators have observed that while laboratory kinetic tests are useful (e.g. Nordstrom, 2011; Li, 2000), they are likely to over-estimate NP depletion rates for materials with low sulfide contents, since carbonate dissolution can be controlled by rinse volumes rather than acid generation. Consequently, it is preferable to conduct field kinetic tests as these incorporate site-specific conditions that are difficult to replicate in the laboratory. It is also widely acknowledged that up-scaling of laboratory data to replicate field conditions is complex, if not impossible.

This report details the geochemical testing and characterization of the main lithotypes at Roper Bar, particularly lithotypes within and around the vicinity of the prospect Areas F West, F East Direct Shipping Ore (DSO)/Beneficial Ore (BFO), E East BFO, E South BFO pit sites, and defines their potential for acid formation (PAF).

The test program involved laboratory testing of samples including mineralogical assessments, predictive Acid Base Accounting (ABA) and hydrogeochemical assessment of leachates produced. An analysis of sulfur distribution within the ore and waste was also undertaken on a total of 6,385 XRF sulfur assays or handheld Niton XRF readings at 1m downhole intervals in exploration drill holes within the proposed pits.

An indicative mass rock/ore ABA balance was developed to assess the potential of the site to produce acidic or alkaline effluents during mining and subsequent rehabilitation and closure.

1.2 Statutory Requirements

The EIS guidelines for the proposed RBIOP (NRETAS, 2012) requires an assessment of the AMD and metal leaching potential of the waste and ore materials to assess the risk of potential impacts to local and wider environments, particularly to ground and surface waters.

2 Study Approach

2.1 Scope of Study

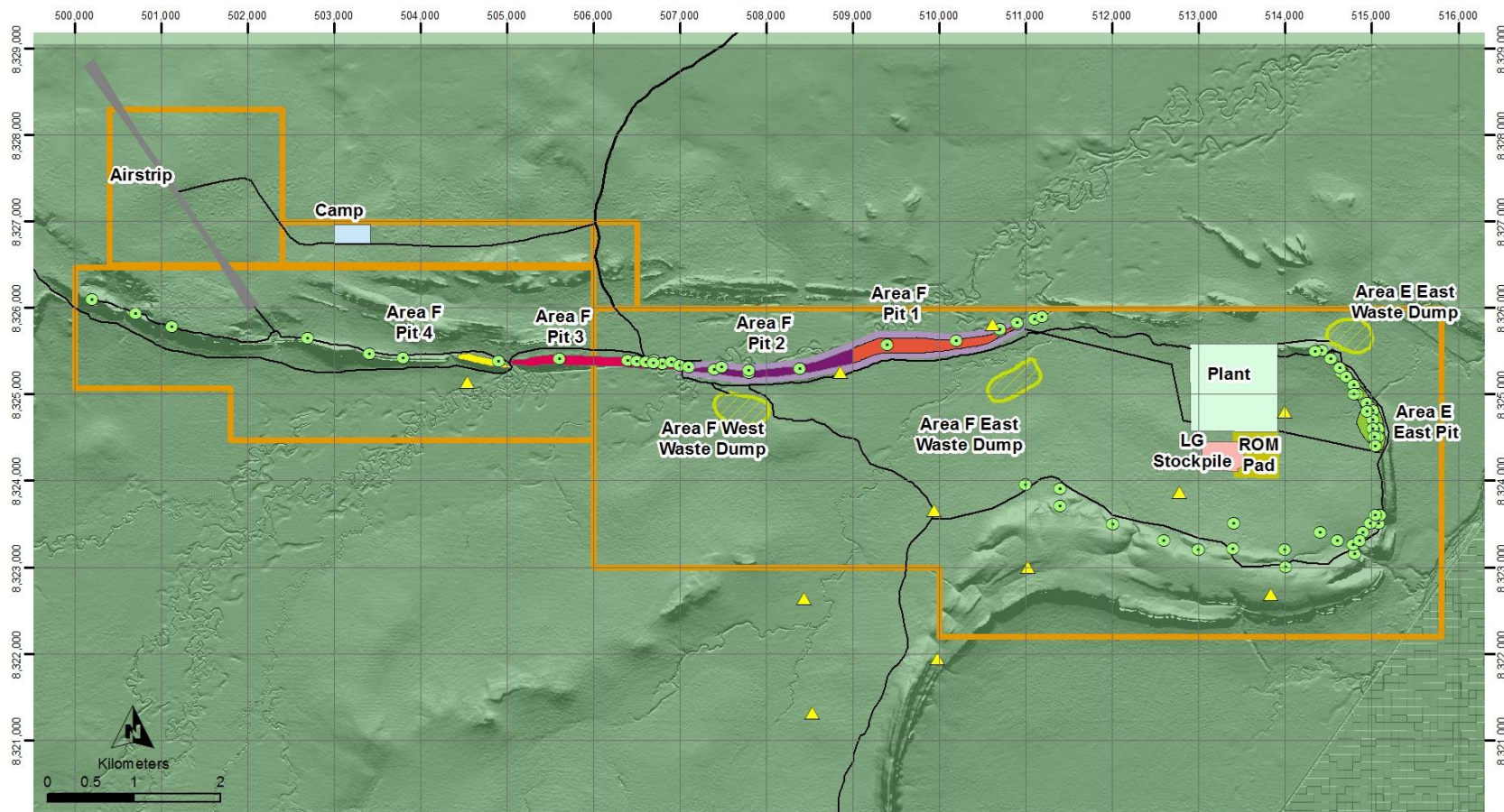
The objective is to geochemically characterise samples of materials that will be encountered during mining of the proposed mining pits. The scope of work included:

- Characterise selected drill-core rock samples in terms of their potential for acid forming (PAF) properties and enrichment and/or availability of metals to the environment.
- Evaluate results and assess the implications for mine operations with regards to waste rock management.
- Analyse the sulfur distribution among the waste rock and ore materials.

2.2 Sample Collection and Selection

A total of 204 samples (about 2.0kg each) were selected from a total of 58 exploration drill cores (Figure 3). Their coordinates and their lithological characterisation are indicated in Appendix A.

An analysis of sulfur distribution within the ore and waste rock was also undertaken on a total of 6,385 XRF sulfur assays or handheld Niton XRF readings at one meter downhole intervals from exploration drill holes within the proposed pit footprints.



- ▲ Proposed operation / Production Bores
- AMD Drill Hole Samples
- ▭ WDRL Proposed Mining Lease
- ▭ Proposed Mining Lease
- Proposed Haul Road

ARD Sample Distribution Locations

WesternDesert
RESOURCES



Name: ARD Sample Distributions
Coordinate System: GDA 1994 MGA Zone 53
Date Saved: 17/06/2012 1:35:20 PM
Client: Western Desert Resources Limited
Data: EcOz, WDRL,
Imagery: WDRL
Author: treilly

Figure 3: Location of Drill Holes used in the Assessment of Potential Acid Forming (PAF).

2.3 Testing and Calculations

The test methodologies used are summarised below and are detailed in Appendix B.

2.3.1 Mineralogical Assessment

The samples were analysed using X-ray powder diffraction (XRD) followed by scanning electron microscopy and energy-dispersive micro-analysis (SEM-EDS) techniques. A total of 46 samples, representing principal waste rock streams, were analysed for their mineralogical characteristics using SEM and EDS techniques. 51 samples were analysed using XRD technique. Exploration X-ray fluorescence (XRF) assessment of drill core samples was also included in this assessment.

2.3.2 Acid Base Accounting (ABA) and NAG Tests

The Potential for Acid Formation (PAF) of all waste rock materials was assessed by determining the pH and electrical conductivity (EC) of paste solutions, oxidation pH, Total-S and SO₄-S, acid-neutralization capacity (ANC), carbonate alkalinity as CaCO₃ and net-acid generation (NAG).

Whilst ABA and NAG tests have limitations, both tests in combination increase the reliability of acid generation prediction in waste and ore materials. NAG testing entails the addition of hydrogen peroxide (H₂O₂) to a sample to rapidly oxidise any sulfide minerals (DITR, 2007). Generally, a NAG reaction of less than 4.5 indicates that the sample is net acid-generating.

The tests selected for this assessment have been widely used and are based on accepted methodologies for the geochemical characterisation of mine waste materials (DITR, 2007; Scharer et al., 2000; Rose and Cravotta, 1998; Morin and Hutt, 1997; Miller et al., 1997 and Sobek et al., 1978).

2.3.3 Hydrogeochemical Assessment

Leachate tests employed in this study are based on accepted procedures for the characterisation of mine wastes, including leaching using de-ionised water, in accordance with Australian Standard Leaching Procedures (ASLP). Leach solutions attained from a total of 85 samples were analysed for pH, EC, Total Dissolved Solids (TDS), major ions (Ca, Mg, Na, K, HCO₃, Cl and SO₄) and trace metals (Al, As, Cd, Cr, Cu, Fe, Mn, Ni, Pb, U and Zn).

2.3.4 Multi-Element Analysis

A geochemical abundance index (GAI, Förstner et al., 1993) was used to assess enrichment of the samples by major elements:

$$GAI = \log[(Cn/(1.5*Bn)),2]$$

where Cn is the measured content of the nth element in the sample and Bn is the average-crustal-abundance of the element. Whilst the methodology is detailed in Appendix B, enrichment analysis is as follows:

GAI	Symbol	Relevance
0	AC	The content of the element is less than, or similar to, the average-crustal-abundance.
1	3F	A 3 - fold enrichment above the average-crustal-abundance.
2	6F	A 6 - fold enrichment above the average-crustal-abundance.
3	12F	A 12 - fold enrichment above the average-crustal-abundance.

4	24F	A 24 - fold enrichment above the average-crustal-abundance.
5	48F	A 48 - fold enrichment above the average-crustal-abundance.
>6	96F	A 96 - fold, or greater, enrichment above the average-crustal-abundance.

2.3.5 Calculated Parameters

The Maximum Potential Acidity (MPA) values (in kgH₂SO₄/tonne) of the waste rocks were calculated by multiplying the Sulfide-S values (in %) by 30.6. Because sulfur may occur in forms other than pyrite, e.g. non-acid generating gypsum, anhydrite, alunite, or other less-acid generating forms such as chalcocite, covellite, sphalerite and galena, using Total-S in the MPA calculation is a conservative approach (DITR, 2007). Sulfide-S values were calculated by subtracting Sulfate-S (%) from Total-S (%). The multiplication factor of 30.6 accounts for the reaction stoichiometry for the complete oxidation of pyrrhotite and pyrite by O₂ to Fe(OH)₃ and H₂SO₄ (Lei and Watkins, 2005 and Parker, 1999).

The Net Acid Producing Potential (NAPP) values (in kgH₂SO₄/ton) were calculated from the corresponding MPA and Acid Neutralisation Capacity (ANC) values: NAPP = MPA - ANC. The acid potential ratios (APR) were calculated from the relationship of ANC/MPA (Campbell, 2005 and Paktunc, 1999).

The acid potential ratio (APR) criteria for the NAF Category reflects the need to compensate for the availability of alkalinity forms for neutralisation of acid produced through pyrite-oxidation (Campbell 2005 and Price et al. 1997). Paktunc (1999) and Hutchinson and Ellison (1992) indicated that a sample with an APR < 1 is classified as PAF, while a sample with an APR > 3 is NAF. However, field observations at mining operations world-wide have shown that the potential for AMD production is very low for waste rocks with APRs > 2.

2.4 Classification Criteria

The balance between the rates of acid production by iron-sulfide mineral oxidation and host rock mineral neutralization will determine the acidity of drainage from mine wastes (Lapakko, 2002). Accordingly, in terms of their Acid Forming Potential (AFP), samples may be classified as Non Acid Forming (NAF) and Potential Acid Forming (PAF).

Because of the complexity of specific mineral assemblages and deposit specific characteristics, there are no standard criteria to classify mine wastes in terms of their AFP. However, several AMD practitioners and researchers (e.g. Campbell, 2005; Lei and Watkins, 2005; Paktunc, 1999 and Price et al., 1997) have indicated that calculated NAPP and APR present a starting point to classifying the AFP of mine waste materials. Others use NAG-pH in association with the NAPP to classify the acid generating potential of a sample. Table 1 lists the most accepted criteria for classifying AFP of mine waste materials.

Table 1: AFP Classification Criterion.

Category	Campbell, 2005 and DITR, 2007	Lei and Watkins, 2005	OSS-ACMRR*-DITR
Non-Acid Forming (NAF):	Sulfide-S < 0.3% For Sulfide-S ≥ 0.3%, a negative NAPP value and APR ≥ 2.0	NAPP < -20 APR >3	NAG-pH > 4.5 NAG <5-10
Potentially Acid Forming (PAF):	For Sulfide-S ≥ 0.3%, any positive NAPP value, negative NAPP value with an APR < 2.0	NAPP > 20 APR < 1	NAG-pH <4.5 NAG > 10
Zone of Uncertainty	NAPP: between -20 and +20; APR: between 1 and 3		
*Office of the Supervising Scientist and the Australian Centre for Mine Rehabilitation Research.			

Although different forms of sulfur may occur and because sulfur has different potentials for acid generation, the determination of sulfur concentration in lithotypes is essential to facilitate classification. Lithotypes with Sulfide-S concentrations less than 0.3% (Li, 2000 and Soregaroli and Lawrence, 1997) are unlikely to oxidise at rates fast enough to result in acidification (pH less than 4.0 to 5.0). This perspective assumes that gangue materials such as trace amounts of sulfide are not usually reactive (Campbell, 2005) and on weathering may not produce acidity due to buffering by gangue-phases, such as carbonates and or silicates (Campbell, 2005 and Alarcón León et al., 2004).

Inferred sulfide oxidation rates (SORs) are strongly influenced by the media (e.g. a wet or dry environment) in which sulfide-bearing mine wastes are located. For example, Alarcón León *et al.* (2004) indicated that in semi-arid to arid environments, depending on water content, oxidation of sulfides will occur at varying rates and produce different products. Similar observations were made by Borek (1994) and Watzlaf (1992). Recent studies (Jonsson et al 2006; Jeon et al., 2003) suggest that Fe^{3+} is the preferred sulfide oxidant at circum-neutral pH. However, during dry phases of wet-dry cycles, pyrite surfaces may be armoured against oxidation by various amorphous or poorly crystalline Fe^{3+} oxides, hydroxides or oxy(hydroxy) sulfate minerals (Alarcón León et al., 2004, Jambor et al., 2002 and Nordstrom, 1982).

Table 1 criterion, which reflects field experiences in Australia (Alarcón León and van der Westhuizen, 2011; Campbell, 2005 and DITR, 2007) and includes an APR > 2, in addition to a cut-off NAG-pH value of 4.5, was employed in the current assessment to classify the AFP of the samples. The NAG international and national approach entails:

NAG pH	NAG ($\text{kgH}_2\text{SO}_4/\text{t}$)	Geochemical Classification
≥ 4.5	0	Non-Acid Forming (NAF)
<4.5	≤ 5	Potentially Acid Forming - Lower Capacity (PAF-LC)
<4.5	>5-10	Potentially Acid Forming (PAF)

3 Mineralogical Analysis

3.1 XRD Analysis

Detailed XRD assessments are included in Appendix C. A summary of the XRD data for the different lithotypes appears in Tables 2 and 3, indicating dominance by silicates, oxides, phyllosilicates, ferroan-carbonates and sulfides (Table 2). The general mineralogical composition in all prospect areas, as shown in Table 2, is Quartz > Hematite > Siderite > Pyrite > Kaolinite > Muscovite > Goethite > Iron. Besides dominant silicate (as quartz) iron oxides such as hematite and goethite are also dominant. Silicate hydroxides, including muscovite and kaolinite, are also significant. Sulfides, principally pyrite, are contained as minor or trace concentrations. These are more significant in Area E East sample materials.

Table 2: XRD Concentrations.

Prospect Area	Proposed Pit Areas	Concentration
Area E East	Area E East	Quartz>Hematite>Siderite>Pyrite>Kaolinite>Muscovite>Goethite
Area E South	Area E South	Quartz>Siderite>Hematite>Muscovite>Kaolinite>Pyrite>Iron
Area F East	Area F East Pit 1	Quartz>Hematite>Clinochlore-ferroan≥Kaolinite>Olivine>Pyrite=Goethite
	Area F East Pit 2	Quartz>Muscovite≥Kaolinite>Hematite>Pyrite
	Area F East Pit 3	Quartz>Kaolinite>Muscovite>Siderite>Hematite
Area F West	Area F West	Quartz>Hematite>Kaolinite>Pyrite≥Muscovite

3.2 XRF Analysis

A summary of the element concentrations is provided in Table 4 and the bulk XRF analysis of samples, as attained during the exploration programs, are presented in Appendix D. Major element composition is in the order of Si > Fe > Al > Mg > Mn > K > Ca > Na.

The XRF, as found by the XRD assessment, confirms the sporadic presence of sulfsulfides, principally pyrite. With the exception of iron, trace metal element concentrations are relatively low.

Sample enrichment, as indicated by the values of the Geochemical-Abundance Index (GAI), is presented in Table 5. Overall GAI analysis is provided in Appendix E. Except for enrichment by iron, sulfur and manganese, most of the samples are not distinctively enriched with any particular element. Significant enrichment with sulfur (by about 96-fold) was observed in the samples from prospect Area E East, particularly among the oolites, sandstones and oolite sandstones at depths between 19 and 24m below ground level. Enrichment by the same elements was also observed in samples from the prospect Area F East – Pit 1 among the siltstones and sandstones at depths between 20 to 30m below ground level. Iron enrichment is typical in the oolites at depths between 28 to 31m below ground level. Clays and most of oxide zone materials, including weathered sandstones, in all prospect areas show no enrichment by any particular element.

3.3 SEM and EDS Analysis

3.3.1 SEM Analysis

SEM analysis is provided in Appendix E. Elemental concentration is in the order oxygen > carbon > iron > silicon, with varying minor and trace amounts of aluminium, calcium, magnesium and sulfur. About 95% of samples assessed, particularly the oolites, sandstones, sandstone oolites and the

Table 3: XRD Sample Analysis.

Sample ID	Concentration																							
	Albite	Microcline	Quartz	Clinochlore-ferroan	Muscovite-2M1	Hematite	Pyrite	Siderite	Kaolinite	Muscovite-3T	Goethite	Jarosite	Chamosite-1MIlb	Chamosite-1OIb	Hydronium jarosite	Pyroxene	Iron	Clinochlore-1MIlb-4	Olivine	Muscovite	Microline, intermediate	Muscovite-1M	Kaolinite-1Ad	Rutile, syn
Area E East																								
WR002			Major			Major	Trace	Major	Trace															
WR003			Major				Trace	Trace	Minor	Trace				Trace										
WR009			Major			Major					Minor													
WR012			Major			Minor	Minor	Major																
WR016			Major			Minor	Trace	Major				Trace												
WR021			Major	Minor	Trace	Major	Minor	Major																
WR022			Major			Major	Trace	Major																
WR032			Major			Major	Trace	Major	Minor	Trace														
WR034			Major	Minor	Trace	Major		Minor																
WR036			Minor			Major					Trace													
WR037			Major			Minor	Minor	Minor		Trace				Minor	Trace									
WR039			Major			Trace	Trace	Trace	Trace	Minor			Major											
WR040			Major			Major	Minor	Major	Trace															
WR043			Major			Trace	Trace	Minor	Major	Minor			Trace											
WR046			Major			Minor	Trace	Major																
WR049			Major	Trace		Minor	Trace	Trace				Trace												
WR055			Major			Major		Minor	Trace															
Area E South																								
WR074			Major			Trace	Trace	Major		Trace	Trace		Minor											
WR076			Major			Trace		Minor		Minor			Major											
WR081			Major		Trace	Minor		Major	Minor															
WR082			Major			Major		Major	Minor	Trace														
WR086		Trace	Major			Trace		Minor		Trace			Minor											
WR089			Major			Trace		Major	Trace								Trace							
WR090			Major			Minor		Major		Minor			Major											
WR094			Major			Minor	Trace	Major	Major	Minor														
Area F East Pit 1																								
WR097			Major			Major			Trace															
WR098			Major			Minor				Trace	Trace							Trace						
WR105			Major	Major	Minor	Trace	Trace		Major															
WR107			Major	Major	Minor	Minor			Major										Minor					
WR109			Major	Trace		Major																		
WR111			Major			Major		Trace										Trace	Minor					
Area F East Pit 2																								
WR118			Major						Minor											Minor	Minor			
WR124			Major	Trace		Major	Minor																	
WR132			Major						Minor											Minor	Minor			
Area F East Pit 3																								
WR147			Major		Trace				Minor															
WR153	Trace		Major					Major	Major	Minor				Trace										
WR156	Trace		Major						Minor												Minor	Minor		
WR157	Minor		Major					Minor	Minor	Minor				Minor		Trace								

Sample ID	Concentration																							
	Albite	Microcline	Quartz	Clinochlore-ferroan	Muscovite-2M1	Hematite	Pyrite	Siderite	Kaolinite	Muscovite-3T	Goethite	Jarosite	Chamosite-1M1lb	Chamosite-1O1b	Hydronium jarosite	Pyroxene	Iron	Clinochlore-1M1lb-4	Olivine	Muscovite	Microcline, intermediate	Muscovite-1M	Kaolinite-1Ad	Rutile, syn
WR160			Major			Trace			Minor											Minor	Minor			
WR171			Major				Trace		Minor											Minor	Minor			
WR175			Major			Trace				Minor													Minor	Minor
WR179			Major					Trace		Minor													Minor	Trace
WR181			Major					Trace		Minor													Minor	Trace
Area F West																								
WR184			Major			Major					Major													
WR185			Major		Minor	Trace	Trace		Major				Trace											
WR188			Major	Trace		Minor			Trace	Trace														
WR190			Major			Minor				Minor														
WR196			Major		Minor	Trace			Major		Minor													
WR201			Major	Minor		Major	Minor	Major							Minor									
WR204			Major			Major		Minor		Minor				Major										
Albite, ordered (NaAlSi3O8); Microcline (K(Si0.75Al0.25)4O8); Quartz (SiO2); Clinochlore-ferroan (Mg,Fe)6(Si,Al)4O10(OH)8); Muscovite-2M1 (KAl2(Si3Al)O10(OH,F)2); Hematite (Fe2O3); Pyrite (FeS2); Siderite (FeCO3); Kaolinite (Al2Si2O5(OH)4); Muscovite-3T ((K,Na)(Al,Mg,Fe)2(Si3.1Al0.9)O10(OH)2); Goethite (FeOOH); Jarosite (KFe3(SO4)2(OH)6); Chamosite-1M1lb ((Fe,Al,Mg)6(Si,Al)4O10(OH)8); Chamosite-1O1b ((Fe,Al,Mg,Mn)6(Si,Al)4O10(OH)8); Hydronium jarosite ((H3O)Fe3(SO4)2(OH)6); Pyroxene ((Mg0.962Fe0.038)(Ca0.999Mg0.04)(Si2O6)); Iron (Fe); Dickite (Al2Si2O5(OH)4); Cronstedtite (Fe3FeSiO4(OH)5); Afghanite (Na4.8Ca3.5K0.7Si6.1Al5.9O25(SO4)1.27Cl1.55(CO3)0.1-0.5(H2O)); Clinochlore-1M1lb-4 (Mg5Al(Si,Al)4O10(OH)8); Olivine (Fe0.2Mg1.8SiO4); Muscovite (KAl3Si3O10(OH)2); Microcline, intermediate (KAlSi3O8); Muscovite-1M (KAl2Si3AlO10(OH)2); Wollastonite-2M (CaSiO3); Albite, ordered (NaAlSi3O8); Kaolinite-1Ad (Al2Si2O5(OH)4); Rutile, syn (TiO2); Sodalite, syn (KNa3Al3Cl(SiO4)3)																								

Table 4: Summary of XRF Assessment in Exploration Samples.

Element (%)	Number of Samples	Average	Median	25th Percentile	75th Percentile	Maximum	Minimum
Al ₂ O ₃	18,866	4.664	3.790	1.64	7.1	26.200	0.190
As	13,541	0.005	0.004	0.002	0.007	0.330	0.002
Ba	13,541	0.006	0.001	0.001	0.011	0.705	0.005
CaO	18,866	0.053	0.030	0.01	0.08	12.700	0.010
Cl	13,047	0.017	0.012	0.008	0.018	0.260	0.005
Co	13,541	0.004	0.004	0.001	0.007	0.370	0.005
Cr	713	0.0004	0.001	0.001	0.001	0.047	0.001
Cr ₂ O ₃	12,828	0.002	0.001	0.001	0.005	0.455	0.005
Cu	13,541	0.0004	0.001	0.001	0.001	0.190	0.005
Fe	18,866	27.3	25.5	14.1	38.47	68.6	0.500
K ₂ O	18,866	0.254	0.100	0.04	0.28	4.320	0.010
MgO	18,866	1.248	1.000	0.17	1.9825	18.700	0.010
Mn	13,541	0.319	0.196	0.049	0.456	5.010	0.005
MnO	15,533	0.360	0.197	0.05	0.532	6.470	0.010
Na ₂ O	18,866	0.028	0.029	0.005	0.05	0.848	0.050
Ni	13,541	0.001	0.001	0.001	0.002	0.754	0.005
P	18,866	0.005	0.006	0.002	0.01	0.250	0.010
P ₂ O ₅	150	0.009	0.010	0.001	0.02	0.070	0.010
Pb	13,541	0.002	0.001	0.001	0.005	0.031	0.005
S	18,866	0.092	0.040	0.011	0.114	5.000	0.010
SiO ₂	18,866	46.6	46.8	29.4	64.5	97.8	1.3
Sn	10,427	0.0001	0.001	0.001	0.001	0.014	0.001
Sr	10,427	0.001	0.001	0.001	0.003	0.020	0.001
TiO ₂	18,866	0.199	0.160	0.06	0.31	1.760	0.010
V	13,541	0.002	0.002	0.001	0.004	0.049	0.005
Zn	18,866	0.001	0.001	0.001	0.003	1.415	0.005
Zr	10,427	0.012	0.011	0.005	0.018	0.069	0.001

sandy oolites, contain minor to trace quantities of sulfur. Minor elements including chromium, manganese, nickel and titanium are also contained in trace quantities among the sandstone and siltstones. Some of the siltstone samples (e.g. siltstones in Area E South) contained minor or trace quantities of sodium and chlorine within the discrete particles.

3.3.2 EDS Analysis

The bulk EDS analysis of the samples is provided in Appendix E. The element enrichment, as indicated by the values of the Geochemical-Abundance Index (GAI), is presented in Table 5.

Although some of the lithotypes are enriched with sulfur, carbon, iron and manganese, most samples are not distinctively enriched with any particular elements. While sulfur enrichment up to about 96-fold occurs in most of the sulfur hosting sandstones and oolites, iron enrichment was observed to predominantly occur in the oolites, particularly within a strata located at a depth of 10 to 50m below ground level in Areas E and F East.

Table 5: Element enrichment using the Geochemical Abundance Index, GAI.

Sample ID	Elements																
	Al	C	Ca	Cl	Cr	Fe	K	Mg	Mn	Na	Ni	O	P	S	Si	Ti	Zr
Area E East																	
WR002	-5	8	-4			2		-2	2			-1		7	-4		
WR003	-3	8		4	6	1	-3	-3	2	-3	6	-2		7	-2	-1	
WR006	-4	8	-4	5		1		-3		-3		-1		6	-1		
WR012	-3		-4			3		-1	3			-1		4	-2		
WR016	-5	8	-4			2		-2	3			-1		8	-3		
WR021	-4	8				2	-4	-3				-2		6	-4		
WR032	-3	8				2	-3	-4				-1		2	-4		
WR034	-4	8				2	-5	-3				-1		5	-3		
WR036	-5	8	-4	5		2	-3	-5		-1		-1		2	-4		
WR037	-3	8	-3			1		-2	2			-1		6	-3		
WR039	-3	8				1	-5	-2				-2		7	-3		
WR040	-5	8	-3			2		-2	2			-1		4	-3		
WR043	-3	8				1	-3	-3	3			-1		8	-2		
WR046	-4	7	-4			2	-3	-2	3			-1		8	-3		
WR049	-4	8				1	-5	-3		-4		-1		6	-3		
Area E South																	
WR074	-3	8				1	-1	-3	2			-2	5	7	-3		
WR076	-3	8	-4			1	-4	-2	3			-1	5	7	-2		10
WR078	-3	7				2	-1	-2	3			-1			-3		
WR082	-3	7	2			2		-1	2	-3		-1		3	-3	-3	
WR083	-5	7				3		-3		-3		-1		2	-4		
WR084	-3	8				2	-1	-1	2			-1	1	8	-3		
WR086	-3	8		5	7	1	-2	-3	3	-2	7	-1		6	-3	-2	
WR090	-3	8				1	-4	-2				-1		8	-3	4	9
WR094	-5	8	-3			2		-2	2			-1		4	-3		
Area F East Pit 1																	
WR097	-3			7		3	-1	1				-1		5	-2		
WR103	-2	7				1	-3	-2		-3		-1		7	-1		10
WR107	-1	6				1	-2	-1		-4		-1		7	-1	-2	
WR109	-4	7				3		0		-3		-1		2	-3		
Area F East Pit 2																	
WR118	-2	8					-1	-3	1			-2		6	-2	0	
WR132	-1	8	-5			-2	-1	-2				-1	5		-1	0	
Area F East Pit 3																	
WR145	-1	8				-1	-3	-3				-1			-1	-2	
WR153	-2	8	-4			1	-2	-2	3			-1		7	-2	-2	
WR156	-2	8				-2	-1	-3				-1		1	-2	-1	6
WR157	-2	8				1	-3	-3	3			-2		8	-2		
WR160	-2	8				1	-2	-4				-1		3	-2	-1	8
WR171	-1	8			7		-1	-2	3	-3	7	-1		5	-2	-1	
WR175	-2	9					-2	-3		-4		-2		7	-3		-2
WR179	-2	8					-1	-3				-2		7	-3	3	8
WR181	-2	8	-4				-1	-3	5			-1	5	7	-2	3	

Sample ID	Elements																
	Al	C	Ca	Cl	Cr	Fe	K	Mg	Mn	Na	Ni	O	P	S	Si	Ti	Zr
Area F West																	
WR183	-4	7	-3		5	2		-1	3		6	-1		6	-2		
WR184	-2					3			3			-1			-3		
WR185	-1					-1	-2	-2						4		-1	
WR190	-2					1	-4					-1		3		2	
WR196	-1					1	-2		2			-1		3	-1	-1	
WR201	-3	7	-4			2		-2				-1		4	-3		
WR204	-1		-4			2	-2	-1		1		-1		5	-2	-1	

4 Acid Base Chemistry

Detailed ABA test methodologies appear in Appendix B whilst the data assessment and laboratory certificates may be found in Appendices G and H.

4.1 Paste and Oxidation pH and Electrical Conductivity (EC)

Sample paste parameters, including pH and EC, are summarised in Table 6. The lowest paste pH average (5.38) is observed in samples from the prospect area E East and the highest (7.11) in samples from prospect Area F East Pit 2. Oxidation pH and EC replicate the paste pH behaviour with slight pH decreases in near surface (28m to 40m below ground level) sandstone, sandy oolites and siltstone samples from prospect Area E East.

Whilst the highest average paste pH was encountered in a lithotype from prospect Area F East Pit 2, a lower variability of pH (ranging from 4.1 to 7.8) was observed in samples from prospect Area E South. The highest paste and oxidation pH were recorded in the sandstone samples, located at depths between 36 to about 76m below ground level in prospect Area F East Pit 2.

The highest oxidation-pH (Table 6) occurs at depths between 23m and 25m below ground level in the oolites and strongly sideritic sandy oolites in prospect Area E South, indicating that this sequence has significant concentrations of readily available alkaline materials. Although the lower oxidation pH values were observed mainly in samples from prospect Areas E East, F East Pit 1 and F East Pit 3, the lowest oxidation pH occurred in the oolites and oolitic sandstones at depths between 19m and 21m below ground level in prospect Area E East.

Whilst the lower paste and oxidation pH values infer that about 40% of the samples contain sulfides that are reactive and have the potential to produce acidity if exposed to atmosphere, the 60% of samples with high pH values (>4.5) can be considered to have acid-neutralization capacity.

Table 6: Summary of Geochemical Parameters of Paste Materials.

	Fizz Rating	Paste pH	Oxidation pH	Electrical Conductivity (EC mS/cm)
Area E East (n=60)				
Median	1.00	5.40	2.90	0.89
Average	1.30	5.38	4.13	1.51
25th Percentile	1.00	4.60	2.60	0.50
75th Percentile	2.00	6.28	6.50	2.15
Maximum	2.00	7.40	8.00	4.99
Minimum	1.00	2.50	2.10	0.08
Area E South (n=35)				
Median	1.00	6.60	6.80	0.27
Average	1.31	6.40	6.34	1.00
25th Percentile	1.00	5.80	5.50	0.11
75th Percentile	2.00	6.90	7.40	0.50
Maximum	2.00	7.80	9.00	19.30
Minimum	1.00	4.10	2.90	0.06
Area F East Pit 1 (n=16)				
Median	1.00	6.20	4.65	0.62
Average	1.06	5.51	4.90	1.21
25th Percentile	1.00	3.78	2.43	0.30

	Fizz Rating	Paste pH	Oxidation pH	Electrical Conductivity (EC mS/cm)
75th Percentile	1.00	6.78	7.48	2.53
Maximum	2.00	7.30	8.80	3.59
Minimum	1.00	3.40	2.30	0.08
Area F East Pit 2 (n=33)				
Median	1.00	7.50	6.60	0.35
Average	1.03	7.11	5.72	0.48
25th Percentile	1.00	7.05	4.05	0.22
75th Percentile	1.00	7.75	7.05	0.68
Maximum	2.00	8.10	7.90	1.62
Minimum	1.00	4.50	2.50	0.06
Area F East Pit 3 (n=37)				
Median	1.00	6.50	4.70	0.83
Average	1.00	6.65	4.74	0.91
25th Percentile	1.00	6.30	2.80	0.45
75th Percentile	1.00	7.20	6.00	1.15
Maximum	1.00	7.90	8.90	2.75
Minimum	1.00	5.30	2.40	0.04
Area F West (n=23)				
Median	1.00	6.10	6.30	0.18
Average	1.09	6.04	6.02	0.56
25th Percentile	1.00	5.50	5.40	0.08
75th Percentile	1.00	6.40	6.90	0.65
Maximum	2.00	7.90	8.00	5.83
Minimum	1.00	3.80	2.50	0.05

4.2 Metal Sulfides

4.2.1 Sulfur Forms

The dominant sulfide species identified by visual methods, XRD, XRF and SEM in most of the samples is pyrite. As a general rule, the oxidation of pyrite and pyrrhotite is responsible for the majority of acid production by mine and low grade ore wastes (Stumm and Morgan, 1981). However, as explained in Section 2.4, neutralisation reactions and environmental weathering processes play a key role on the sulfide oxidation rates (SORs) and compositional characteristics of drainage originating from sulfide oxidation.

The oxidation of sulfide minerals consists of several reactions and depending on their morphology and reactivity characteristics; each sulfide mineral has a different oxidation rate. For example, marcasite and framboidal pyrite will oxidize quickly, whereas crystalline pyrite will oxidize slowly.

Total sulfur distribution and concentrations in the samples assessed varies with depth and lithological compositions. From the total of 204 samples, 55% of samples contain Total-S lower than 0.3% (Figure 4 and Appendix F), with a maximum concentration of 5.9% in the sandstones of the Kyalla Member (KYM) within the Area E East at an approximate depth of 37m below ground level (Figure 4).

Table 7 includes total sulfur concentrations in relation to prospect areas. The highest average concentration of sulfsulfur (1.6%) was observed in Area E East, whilst the lowest (0.2%) was observed in Area E South. Area F East Pit 1 also had a significant average sulfur concentration of 0.9%, ranging from 0.01% to 2.7%.

Table 7: Summary of Total-Sulfur and Sulfide-S Concentrations.

	Background S	Sulfate as SO ₄ ²⁻		Sulfur - Total as S	Sulfide-S
	(%)	mg/kg	%	%	%
Area E East	Number of Samples = 60				
Average	1.26	5378	0.168	1.58	1.41
Minimum	0.001	100	0.003	0.01	0.01
Maximum	5.00	26000	0.813	5.97	5.23
Median	1.18	2710	0.085	1.42	1.27
25th Percentile	0.13	630	0.020	0.22	0.2
75th Percentile	1.77	8032	0.251	2.09	1.97
Area E South	Number of Samples = 35				
Average	0.21	666	0.021	0.21	0.19
Minimum	0.01	100	0.003	0.01	0.002
Maximum	0.83	3780	0.118	1.36	1.31
Median	0.13	370	0.012	0.11	0.09
25th Percentile	0.03	160	0.005	0.02	0.02
75th Percentile	0.30	495	0.015	0.25	0.23
Area F East Pit 1	Number of Samples = 16				
Average	1.47	3669	0.115	0.855	0.74
Minimum	0.004	10	0.0003	0.01	0.01
Maximum	4.00	14100	0.441	2.71	2.33
Median	0.72	760	0.024	0.225	0.20
25th Percentile	0.33	100	0.003	0.018	0.01
75th Percentile	2.25	7775	0.243	2.16	1.80
Area F East Pit 2	Number of Samples = 33				
Average	0.52	500	0.016	0.258	0.242
Minimum	0.02	100	0.003	0.01	0.004
Maximum	1.01	3680	0.115	1.59	1.493
Median	0.52	140	0.004	0.1	0.096
25th Percentile	0.27	100	0.003	0.01	0.007
75th Percentile	0.77	310	0.010	0.14	0.136
Area F East Pit 3	Number of Samples = 37				
Average	0.62	1152	0.036	0.507	0.471
Minimum	0.01	100	0.003	0.01	-0.003
Maximum	4.03	5350	0.167	2.390	2.223
Median	0.23	850	0.027	0.26	0.231
25th Percentile	0.02	580	0.018	0.04	0.017
75th Percentile	0.40	1680	0.053	0.790	0.761
Area F West	Number of Samples = 23				
Average	0.05	1577	0.049	0.259	0.21
Minimum	0.01	100	0.003	0.01	0.003
Maximum	0.14	25800	0.806	3.35	2.544
Median	0.03	180	0.006	0.03	0.022
25th Percentile	0.02	100	0.003	0.01	0.007
75th Percentile	0.08	765	0.024	0.12	0.098
Note: Background sulphur indicates sulfur scan of samples attained during exploration.					

High average sulfur concentrations indicate that a significant proportion of the samples have the potential to produce acidity in contact with the atmosphere. However, in response to short-term induced weathering reactions, a significant number of samples fall within the acid neutralizing area indicating acidity produced is balanced by the readily available acid-consuming minerals such as carbonates and aluminosilicates (Figures 4 and 5).

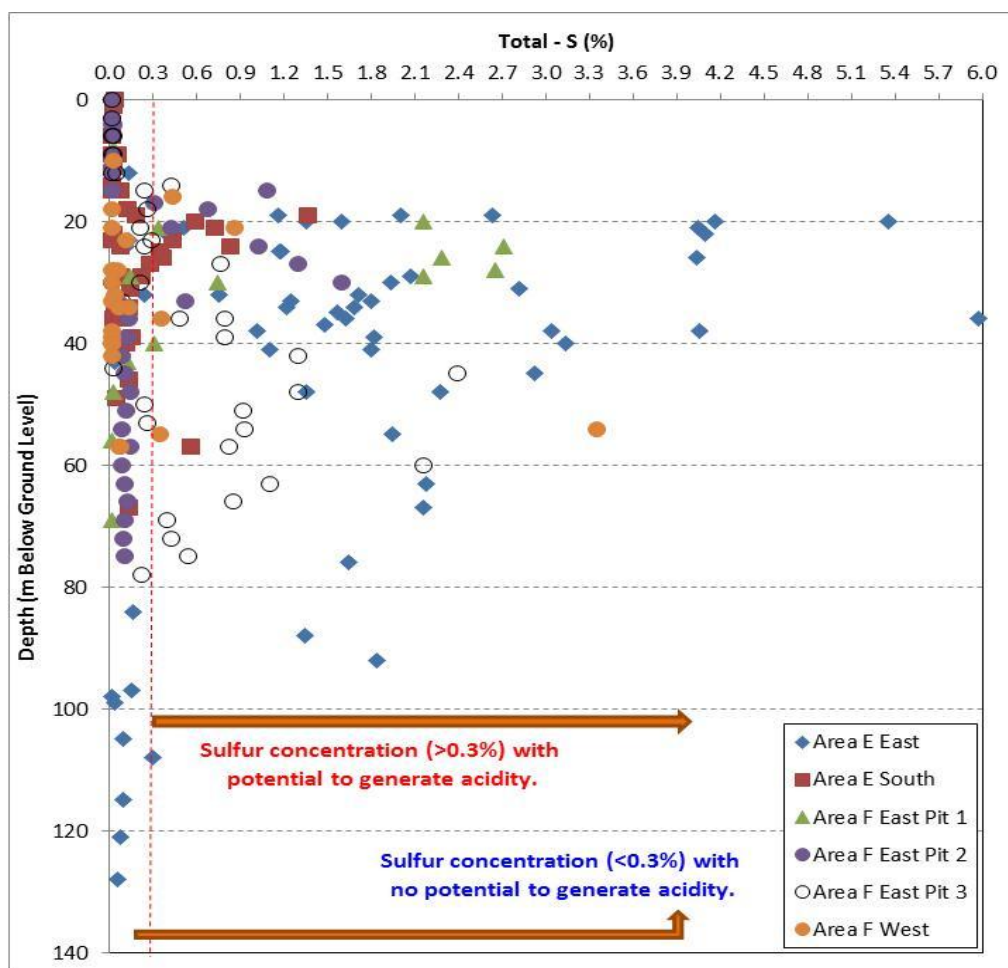


Figure 4: Total Sulfur Distribution with Depth.

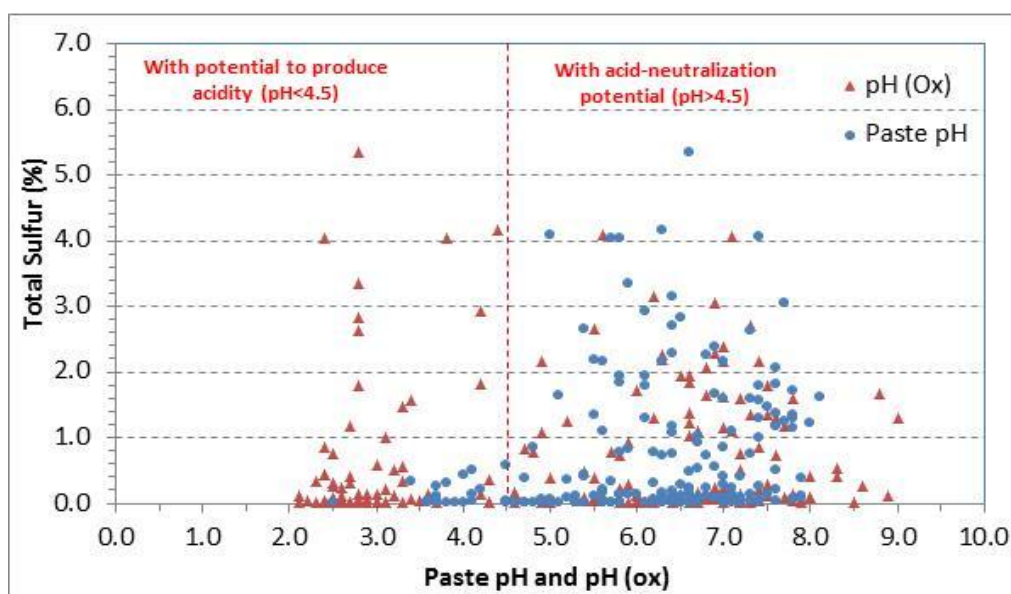


Figure 5: Total Sulfur Concentrations against Paste and Oxidation pHs.

4.2.2 Sulfur Distribution in Exploration Boreholes

Sulfur species, in the context of mass rock material as measured in samples from exploration boreholes, has various ranges with predominantly low concentrations (<0.1%) across all prospect areas. The average sulfur from a total of 18,866 samples was 0.09%, ranging from 0.01% to 5.00%. The median sulfur content is 0.01% (Table 8).

Table 8: Summary of Sulfur Distribution in Lithotypes from Exploration Boreholes.

Area F-West			
Category	Number of Samples	Average S%	Maximum S%
KYM_OX	11	0.04	0.19
KYM_FR	32	0.16	0.55
SIM_OX	140	0.03	0.49
SIM_FR	176	0.09	1.65
MSM_OX	117	0.08	1.04
MSM_FR	30	0.15	0.35
Area F-East			
KYM_OX	202	0.01	0.22
KYM_FR	423	0.18	5.66
SIM_OX	513	0.03	1.50
SIM_FR	2,044	0.08	5.00
MSM_OX	586	0.04	3.68
MSM_FR	817	0.11	1.76
Area E-East			
KYM_OX	11	0.20	0.40
SIM_OX	135	0.03	0.27
SIM_FR	30	0.05	0.24
MSM_OX	8	0.12	0.54
MSM_FR	9	0.80	4.03
Area E-South			
KYM_OX	233	0.02	0.77
KYM_FR	37	0.31	1.03
SIM_OX	574	0.02	0.26
SIM_FR	177	0.09	1.58
MSM_OX	8	0.02	0.04
Note: suffix "OX" = oxidised rock and suffix "FR" = fresh rock. Stratigraphic units referred to are KYM = Kyalla Member, SIM = Sherwin Iron Formation, MSM = Moroak Sandstone.			

The data indicates an average low level of sulfur, with sporadically high concentrations in each mining area, particularly at Areas E East and F East (Figures 6 to 8). An important observation from this assessment is that the upper levels of waste rock (which represents the early areas of mining) consist of oxidised rock, with lower levels of sulfur compared to concentrations in deeper fresh rocks. From a waste management perspective, these oxidised rocks are to be used to assist in the management of any issues that may arise from high sulfur zones encountered in the fresh rock.

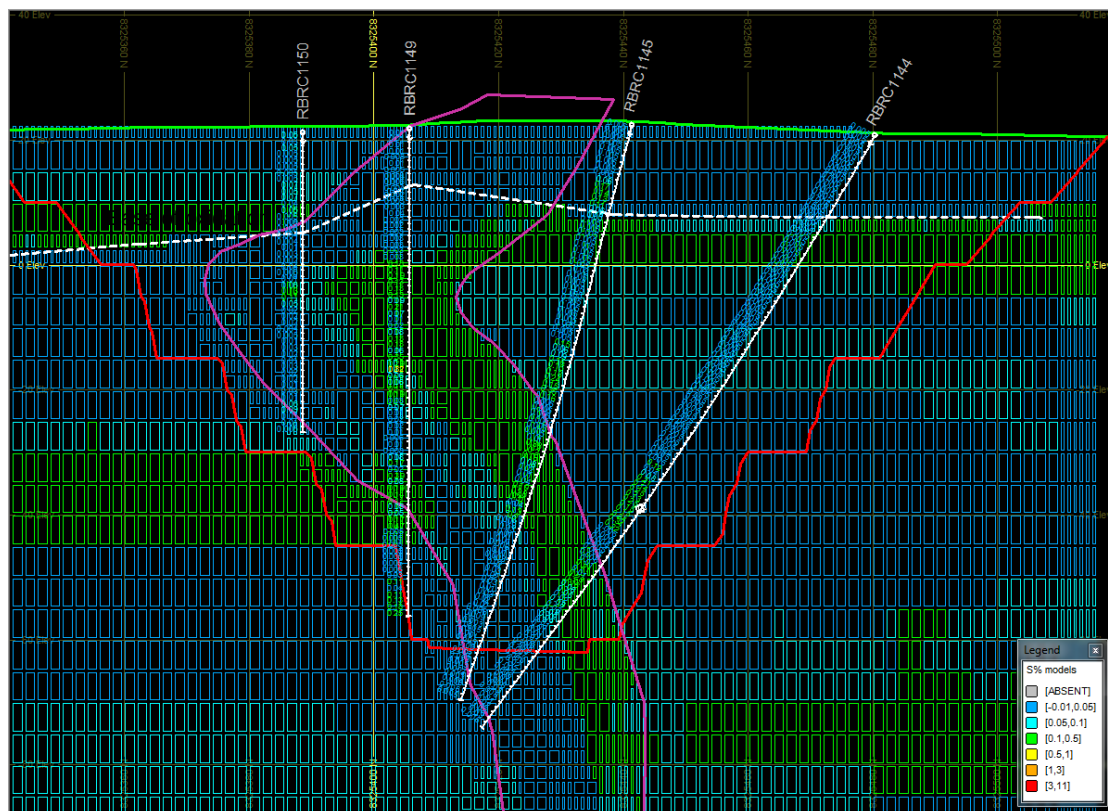


Figure 6: Area F-East Cross Section 508900E (S-N) showing downhole Sulfur Distribution.

Note: Figures 6, 7 and 8: Area between pink lines is the Sherwin Iron Formation (SIF), with the Kyalla Member to the left and the Moroak Sandstone to the right. Area above the white-dashed line is the Oxidation Zone.

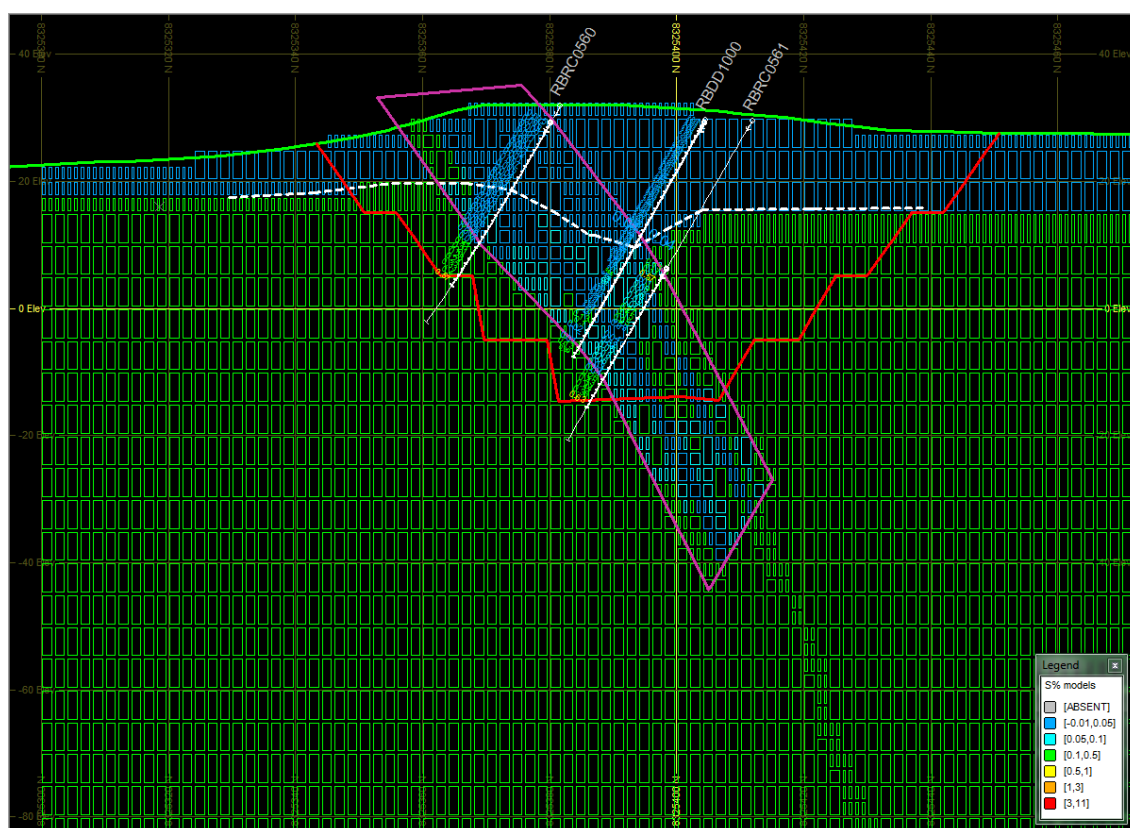


Figure 7: Area F-West Cross Section 505700E (S-N) showing downhole Sulfur Distribution.

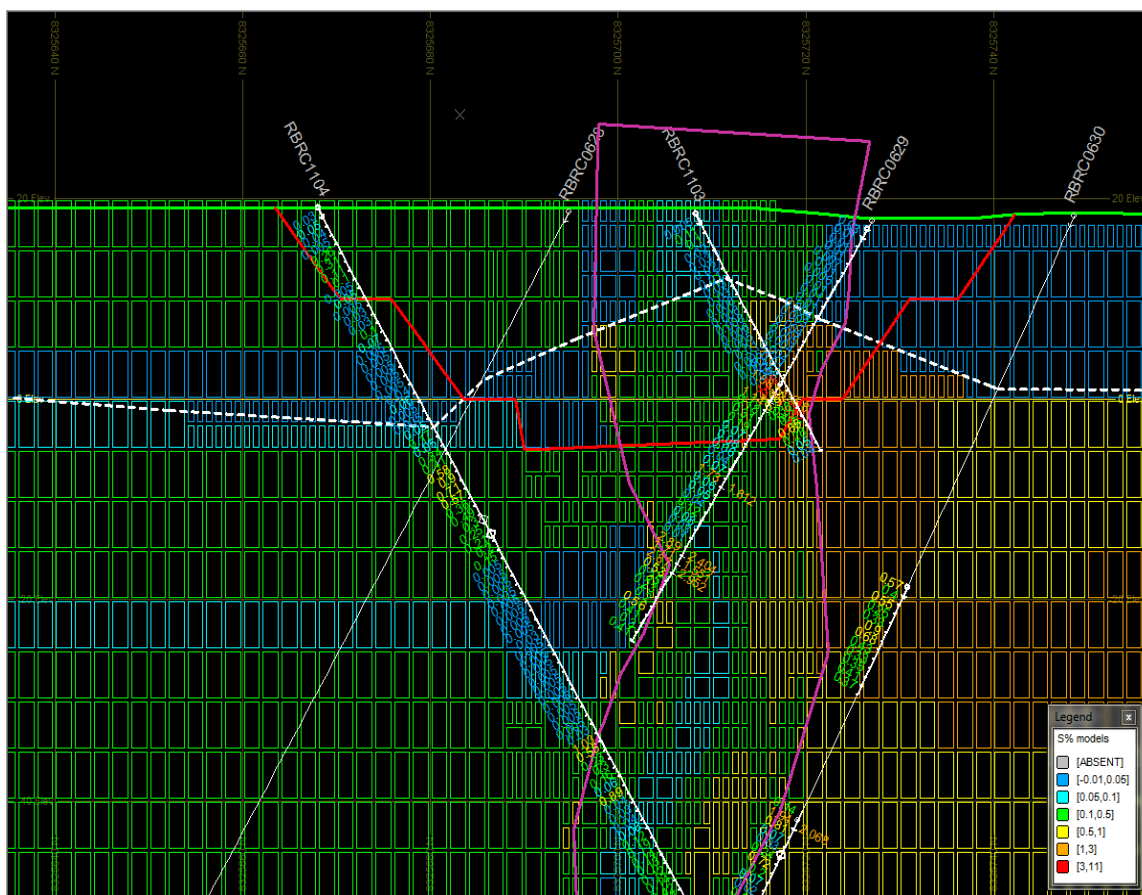


Figure 8: Area E-East Cross Section 510500E (S-N) showing downhole Sulfur Distribution.

4.3 Acid Consuming Characteristics

Neutralising materials play a key role in the oxidation of sulfides by providing a buffer to any acid being generated. Siderites, kaolinites and muscovites have been observed to be significant in most of the samples, particularly in samples deriving from Areas E South and E East, though with less frequency. Neutralisation potential of these minerals is significant with higher buffer pH values. Whilst the pH buffer capacity of the siderite (FeCO_3) ranges from 5.1 to 6.0, the neutralization potential for feldspars, micas and clays ranges from 0.3 to 12.5 $\text{kgCaCO}_3/\text{ton}$ (Jambor, 2003 and Blowes et al., 2003).

Overall ANC values among the various lithotypes assessed range from less than 0.5 to a maximum of 68.5 $\text{kgH}_2\text{SO}_4/\text{ton}$ (Appendix F). Most of the samples across all prospect areas contain low ANC values with an average of ~15 $\text{kgH}_2\text{SO}_4/\text{ton}$. However sporadic sandstones and oolites in all prospect areas, particularly those located at about 15 to 57m below ground level, present relatively high ANC concentrations with ranges between 21 to 68.5 $\text{kgH}_2\text{SO}_4/\text{ton}$ (Figure 9). Near surface clays and sandstones, to about 15m below ground level, frequently contain relatively low ANCs in the order of 0.45 to 10 $\text{kgH}_2\text{SO}_4/\text{ton}$.

The highest average ANC (22.75 $\text{kgH}_2\text{SO}_4/\text{ton}$) concentrations are found in lithotypes within prospect Area E South, whilst the lowest (4.8 $\text{kgH}_2\text{SO}_4/\text{ton}$) are in prospect Area F East Pit 1 (Table 9). Although some of the lithotypes, particularly those near surface sandy oolites and oolites would also show low ANC concentrations, from a waste management perspective, Area F East Pit 1 presents significant ANC hosting materials. Samples with ANCs in the order of 20 $\text{kgH}_2\text{SO}_4/\text{ton}$ to 50 $\text{kgH}_2\text{SO}_4/\text{ton}$ or above and Sulfide-S contents <0.3% and/or <0.5% (Figure 9) could be classified as acid consuming materials (ACMs), as these will generally produce alkaline waters (Miller, 1997 and Sobek et al., 1978).

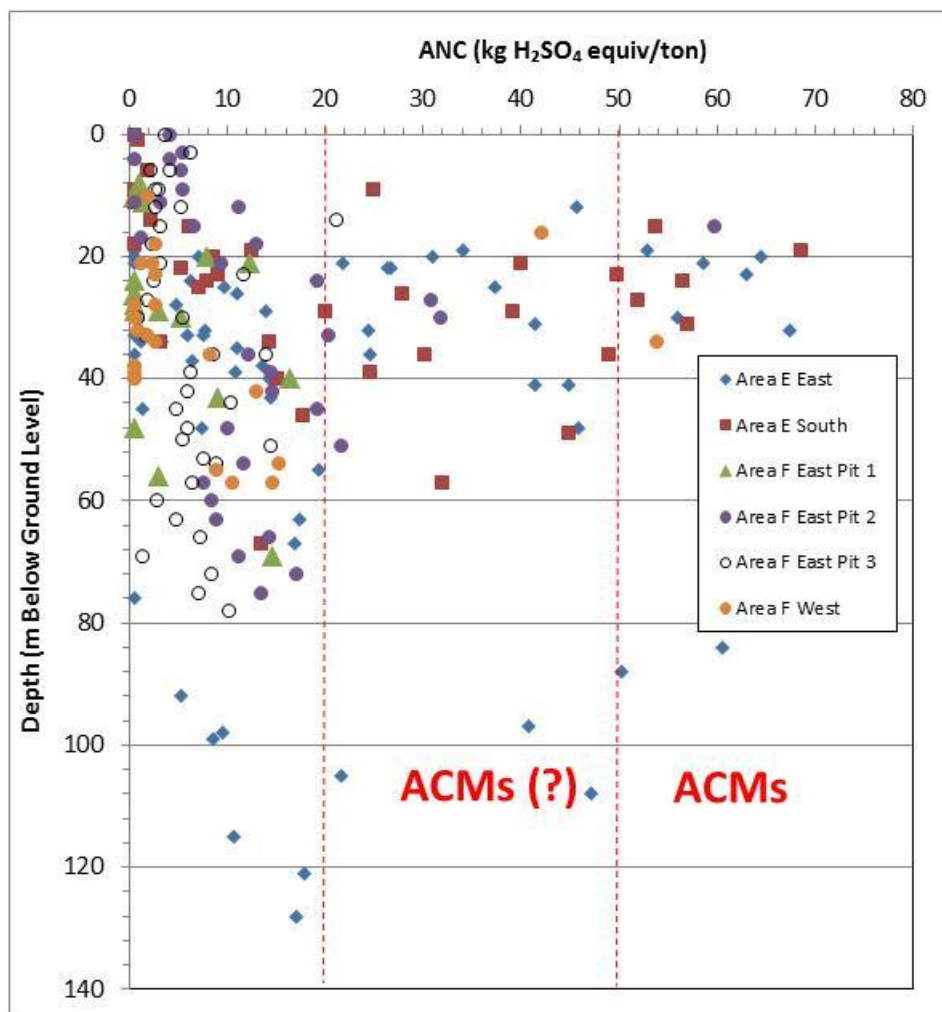


Figure 9: Acid Neutralization Capacity of Samples with Depth.

Table 9: Summary of Acid Neutralizing Capacity (ANC).

	ANC as CaCO ₃	ANC as H ₂ SO ₄
	%CaCO ₃	kgH ₂ SO ₄ equiv/t
Area E East	Number of Samples = 60	
Average	2.56	21.85
Minimum	0.10	0.50
Maximum	7.0	67.0
Median	1.80	14.35
25th Percentile	0.98	6.35
75th Percentile	4.20	38.25
Area E South	Number of Samples = 35	
Average	2.62	22.75
Minimum	0.10	0.50
Maximum	7.0	68.50
Median	2.00	15.10
25th Percentile	0.85	5.65
75th Percentile	4.4	39.6
Area F East Pit 1	Number of Samples = 16	
Average	0.48	4.80
Minimum	0.10	0.50
Maximum	2.0	16.0
Median	0.20	2.20
25th Percentile	0.10	0.50
75th Percentile	0.65	8.17

	ANC as CaCO ₃	ANC as H ₂ SO ₄
	%CaCO ₃	kgH ₂ SO ₄ equiv/t
Area F East Pit 2	Number of Samples = 33	
Average	1.29	12.62
Minimum	0.10	0.50
Maximum	6.10	59.7
Median	1.10	11.10
25th Percentile	0.60	5.40
75th Percentile	1.50	14.60
Area F East Pit 3	Number of Samples = 37	
Average	0.62	6.04
Minimum	0.10	0.80
Maximum	2.20	21.20
Median	0.50	5.40
25th Percentile	0.30	2.80
75th Percentile	0.80	7.60
Area F West	Number of Samples = 23	
Average	0.85	8.16
Minimum	0.10	0.50
Maximum	5.50	53.80
Median	0.30	2.60
25th Percentile	0.10	0.70
75th Percentile	1.00	9.65

4.4 Acid Formation Potential (AFP)

To define the acid formation potential (AFP) of the samples, the MPA, NAPP and APR values were calculated (refer Table 10, Section 2.3.5 and Appendix B). The detailed analysis of samples is included in Appendix F and summarised in Table 10. Table 11 presents an overall ABA balance in relation to lithologies and prospect areas distribution and can be summarised as follows:

- The majority of PAF samples in prospect Area E East (76%) are from between 0m to 100m below ground level, with the highest concentrations at depths between 0m to 50m depth (Tables 10 and 11). Sandstones (SST), Oolites (OO), Sandy Oolites (SOO) and Siltstones (SLT) of the Sherwin Iron Member (SIM) and Kyalla Mudstones (KYM) are those with the highest PAF sample concentrations. Clays (CY: 2% of samples) in this sequence are all NAF materials. While significant concentrations of OO (67%), SOO (50%) and siderite oolites (SIDOO) (100%) from the SIM and Moroak Sandstones (MSM) are NAF at greater depths (particularly below 50m), SLT (100%) and SST (67%) of the SIM and KYM are PAF materials. However, some of the samples classified as PAF materials, particularly the SST (33%) and the SOO (64%), have relatively high acid neutralising capacity (ANC) and on the basis of the classification criteria utilised here, these are "uncertain to be classified" and will need further assessment, including kinetic tests. All samples below 90m depth can be classified as NAF.
- Of the samples that were classified as PAF in prospect Area E South (i.e. 9% of total), near surface weathered SST (9%) and Oolite sandstones (OST: 50%) from the SIM Unit were the materials with highest PAF concentrations (Table 11). Below 50m depth, all samples are classified as NAF materials with only one SLT sample (~57m depth) from the MSM Unit presenting uncertain characteristics.
- Although the prospect Area F East has been divided into three Pits (1, 2 and 3), for the purposes of AMD characterisation, they are collectively referred to as prospect Area F East. About 41% of near surface (0m to 50m below ground level) samples of all Units, particularly those of the SIM and KYM Units, are classified as PAF materials. However, most of the sandstones and oolite PAF samples of the SIM and KYM Units are located at depths between 15m to ~36m below ground level, with some occasional horizons of siltstones and sandstones across the stratigraphical sequence to about 78m depth. Significant concentration of NAF

materials are at near surface, between 0m to 15m below ground level.

- A lower amount of PAF materials (total 18%) were observed in prospect Area F West. Most of the samples are scattered across the stratigraphical sequence, with higher concentrations between 40m to 50m below ground level. Sandstones and SOO of the SIM Unit, which compose about 50% of lithotypes within this horizon, present the highest concentrations of PAF materials. However, two samples, one at about ~16m depth (SST sample) and the other at about ~34m depth have relatively high ANC concentrations.
- Overall, there are markedly less PAF materials occurring in Areas E South (9%), F East Pit No 2 (33%) and F West (18%), with the identified samples mostly between 40m and 50m below surface.

4.5 Net Acid Producing Potential (NAPP) and Net Acid Generation (NAG)

NAG values range from less 0.1kgH₂SO₄/ton to a maximum of 154kgH₂SO₄/ton (Table 11). In general, the highest values correlate with the highest NAPP values (Figure 10). The NAPP values range between -61kgH₂SO₄/ton and 159.4kgH₂SO₄/ton (Appendix F). About 40% of the samples attained positive NAPP values. The strongly sideritic oolitic and siderite oolite samples attained highly negative NAPP values. The APR values range from 0.003 to values in the hundreds, although the average is 8.14. The lower ratios (<2.0) generally relate to samples having a positive NAPP. However, for about 10% of samples the NAPP values are negative yet have a ratio <2.0.

Whilst a significant proportion of samples from Areas E East, F East pit 1 and F East Pit 3 fall within the PAF zone, the great majority of samples from Areas E South and F West fall within the NAF and/or uncertain zones. If samples are assessed based on the criteria of Lei and Watkins (2005; refer Table 1), a significant proportion of samples from all prospect areas fall within the uncertainty zone, indicating that net balances between acid and neutralizing capacity of samples are either over- or under-estimated. This suggests that further assessment is required to characterize those samples.

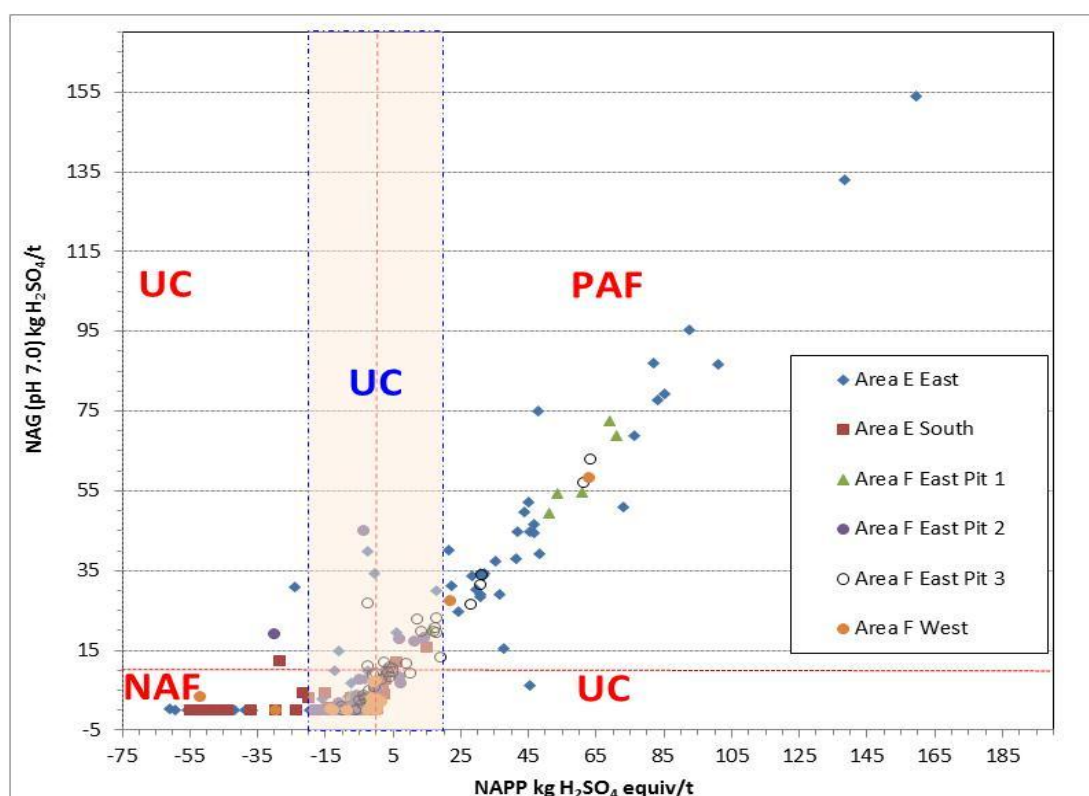


Figure 10: NAG Against NAPP for all Samples.

(Note: Shaded area: Zone of Uncertainty (UC) – refer Table 1).

In general, although Figure 10 illustrates a good correlation between NAPP and NAG ($\text{kgH}_2\text{SO}_4/\text{t}$) values for the PAF samples, NAG values do not provide a good acid-base account for NAF values because the tests are designed to determine the net acid generation rather than the net neutralization potential of the sample.

4.6 General Acid Base Classification

Using the proposed criteria explained in Section 2 and Table 1 and considering the $\text{APR} > 2$ and a NAG-pH of 4.5 cut-off classification, 52% of the samples can be classified as **Non-Acid Forming (NAF)** (Table 10).

Based on their Sulfide-S, NAPPs, NAG and APRs characteristics, 34% are classified as **Potentially Acid forming (PAF)**.

On the basis of all classification criteria, particularly on the discrepancies presented by NAPP and NAG characterisation, 14% of samples fall within a **zone of uncertainty (UC)** which triggers further assessment of these samples (Table 10).

Table 10: ABA Sample Assessment for the Prospect Areas at the WDRL.

Sample ID	Depth		Lithotype	Paste pH	Oxidation-pH	Final pH	Sulfate SO ₄ ²⁻		Total S	Sulfide S	ANC CaCO ₃	ANC H ₂ SO ₄	MPA	NAPP	NAG (pH 7.0)	APR	ABA/NAG Classification
	m From	m To		pH Unit			mg/kg	%	%	%	% CaCO ₃	kg H ₂ SO ₄ equiv/t					
Area E East																	
WR001	12	13	Sandstone	7.1	7.0		410	0.013	0.13	0.117	4.6	45.6	3.6	-42.0	<0.1	12.72	NAF
WR002	19	20	Oolite	5.4	2.4	6.2	1440	0.045	2.63	2.585	3.5	34.0	79.1	45.1	52.1	0.43	PAF
WR003	19	20	Sandstone	4.6	2.7	5.3	4260	0.133	1.16	1.027	<0.1	0.5	31.4	30.9	29.2	0.02	PAF
WR004	19	20	Oolite	4.8	2.4		11300	0.353	2.00	1.647	5.4	52.8	50.4	-2.4	39.8	1.05	PAF
WR005	20	21	Oolite	5.3	3.7	5.8	15100	0.472	4.16	3.688	3.2	31.0	112.9	81.9	86.9	0.27	PAF
WR006	20	21	Oolitic sandstone	3.7	2.1	3.3	26000	0.813	5.35	4.538	<0.1	0.5	138.8	138.3	133	0.00	PAF
WR007	20	21	Sandstone	4.6	2.7	6.0	3700	0.116	1.35	1.234	0.7	7.0	37.8	30.8	34.3	0.19	PAF
WR008	20	21	Oolite	4.5	2.6		8630	0.270	1.59	1.320	6.6	64.4	40.4	-24.0	30.9	1.59	PAF
WR009	21	22	Clay	6.1	7.2	6.5	100	0.003	0.01	0.007	<0.1	0.5	0.2	-0.3	<0.1	2.38	NAF
WR010	21	22	Oolite	4.9	3.0		18400	0.575	4.05	3.475	6	58.6	106.3	47.7	75.1	0.55	PAF
WR011	21	22	Sandy oolite	5.6	3.5		1380	0.043	0.51	0.467	2.2	21.8	14.3	-7.5	6.9	1.53	PAF
WR012	22	23	Sandstone	5.7	4.3	5.6	14100	0.441	4.09	3.649	2.7	26.7	111.7	85.0	79.2	0.24	PAF
WR013	22	23	Sandstone	4.1	4.6		1720	0.054	0.39	0.336	2.7	26.3	10.3	-16.0	2.7	2.56	NAF
WR014	23	24	Sandstone	7.4	7.9	6.7	460	0.014	0.13	0.116	6.4	63.0	3.5	-59.5	<0.1	17.81	NAF
WR015	24	25	Oolite	5.2	4.3		370	0.012	0.11	0.098	0.6	6.2	3.0	-3.2	1.7	2.06	NAF
WR016	25	26	Sandy oolite	5.8	4.9	5.8	2320	0.073	1.18	1.108	3.8	37.4	33.9	-3.5	7.8	1.10	UC
WR017	25	26	Sandstone	5.8	2.9		2060	0.064	1.17	1.106	1	9.6	33.8	24.2	24.6	0.28	PAF
WR018	26	27	Sandy oolite	4.8	2.4		12100	0.378	4.04	3.662	1.1	11.0	112.1	101.1	86.6	0.10	PAF
WR019	28	29	Oolite	6.7	7.2		100	0.003	0.02	0.017	0.5	4.7	0.5	-4.2	<0.1	9.10	NAF
WR020	29	30	Sandstone	5.0	2.6		4080	0.128	2.07	1.943	1.4	14.0	59.4	45.4	44.8	0.24	PAF
WR021	30	31	Oolite	5.6	2.6	5.9	3770	0.118	1.93	1.812	5.7	55.9	55.5	-0.4	34.2	1.01	PAF
WR022	31	32	Sandstone	5.9	2.8	7.0	3600	0.113	2.82	2.708	4.2	41.4	82.8	41.4	38.1	0.50	PAF
WR023	32	33	Sandy oolite	6.2	6.7		1000	0.031	0.24	0.209	6.9	67.4	6.4	-61.0	0.4	10.55	NAF
WR024	32	33	Sandy oolite	5.0	2.9		1150	0.036	0.75	0.714	2.5	24.4	21.9	-2.5	9.8	1.12	PAF
WR025	32	33	Sandstone	4.7	2.5		3080	0.096	1.71	1.614	0.8	7.7	49.4	41.7	44.9	0.16	PAF
WR026	33	34	Sandy oolite	5.4	6.2	6.5	400	0.013	0.07	0.058	0.6	5.9	1.8	-4.1	3.5	3.35	NAF
WR027	33	34	Sandstone	4.8	2.6	6.3	2340	0.073	1.25	1.177	0.8	7.6	36.0	28.4	33.8	0.21	PAF
WR028	33	34	Sandstone	4.7	2.3		8220	0.257	1.80	1.543	<0.1	0.5	47.2	46.7	46.7	0.01	PAF
WR029	34	35	Sandy oolite	5.1	2.5		5830	0.182	1.22	1.038	0.1	1.2	31.8	30.6	28.4	0.04	PAF
WR030	34	35	Sandstone	3.7	2.4		4440	0.139	1.68	1.541	0.3	3.3	47.2	43.9	49.6	0.07	PAF
WR031	35	36	Sandstone	4.5	2.7		8040	0.251	1.57	1.319	1.1	11.0	40.4	29.4	30.4	0.27	PAF
WR032	36	37	Siltstone	3.8	2.6	4.8	7360	0.230	1.62	1.390	2.5	24.6	42.5	17.9	29.9	0.58	PAF
WR033	36	37	Sandstone	3.6	2.1		23800	0.744	5.97	5.226	<0.1	0.5	159.9	159.4	154	0.00	PAF
WR034	37	38	Oolite	4.0	2.5	4.6	7090	0.222	1.48	1.258	0.6	6.4	38.5	32.1	34.2	0.17	PAF
WR035	38	39	Oolite	3.9	4.3		19100	0.597	4.06	3.463	1.4	13.6	106.0	92.4	95.5	0.13	PAF
WR036	38	39	Oolite	2.5	2.4	3.1	8720	0.273	1.01	0.738	<0.1	0.5	22.6	22.1	31.1	0.02	PAF
WR037	38	39	Sandstone	4.6	2.6	4.8	20400	0.638	3.04	2.403	<0.1	0.5	73.5	73.0	51	0.01	PAF
WR038	39	40	Siltstone	5.8	2.8		8640	0.270	1.82	1.550	1.1	10.8	47.4	36.6	28.9	0.23	PAF
WR039	40	41	Siltstone	5.6	2.5	6.0	6020	0.188	3.14	2.952	1.4	14.2	90.3	76.1	69	0.16	PAF
WR040	41	42	Siderite oolite	6.6	5.0	6.1	1310	0.041	1.10	1.059	4.6	44.8	32.4	-12.4	9.8	1.38	UC
WR041	41	42	Oolite	5.0	2.7	5.4	8030	0.251	1.80	1.549	4.2	41.4	47.4	6.0	19.6	0.87	PAF
WR042	43	44	Oolite	6.4	7.2		100	0.003	0.03	0.027	1.5	14.5	0.8	-13.7	<0.1	17.63	NAF
WR043	45	46	Siltstone	4.1	2.2	4.7	5140	0.161	2.92	2.759	0.1	1.4	84.4	83.0	77.9	0.02	PAF
WR044	48	49	Siltstone	5.8	3.1	6.6	2450	0.077	1.35	1.273	0.8	7.4	39.0	31.6	33.6	0.19	PAF
WR045	48	49	Oolite	5.4	2.7		2140	0.067	2.27	2.203	4.7	45.9	67.4	21.5	40.2	0.68	PAF
WR046	55	56	Sandy oolite	6.4	4.9	6.1	2470	0.077	1.94	1.863	2	19.4	57.0	37.6	15.6	0.34	UC
WR047	63	64	Sandstone	6.6	2.6	6.5	1450	0.045	2.18	2.135	1.8	17.3	65.3	48.0	39.1	0.26	PAF
WR048	67	68	Sandstone	6.2	2.7		2950	0.092	2.16	2.068	1.7	16.8	63.3	46.5	44.6	0.27	PAF
WR049	76	77	Oolite	3.7	2.5	3.9	15000	0.469	1.64	1.171	<0.1	0.5	35.8	35.3	37.4	0.01	PAF
WR050	84	85	Siderite oolite	6.3	7.0		100	0.003	0.16	0.157	6.2	60.5	4.8	-55.7	<0.1	12.60	NAF
WR051	88	89	Siltstone	5.7	3.3		1920	0.060	1.34	1.280	5.1	50.2	39.2	-11.0	14.8	1.28	PAF
WR052	92	93	Sandstone	4.2	5.8		6140	0.192	1.84	1.648	0.5	5.2	50.4	45.2	6.2	0.10	UC
WR053	97	98	Sandy oolite	7.2	8.0	6.6	420	0.013	0.15	0.137	4.2	40.8	4.2	-36.6	<0.1	9.74	NAF
WR054	98	99	Oolite	7.0	7.5		100	0.003	0.01	0.007	1	9.5	0.2	-9.3	<0.1	45.16	NAF
WR055	99	100	Oolite	6.4	7.3	7.7	150	0.005	0.03	0.025	0.9	8.5	0.8	-7.7	<0.1	10.97	NAF
WR056	105	106	Siltstone	6.1	7.0		540	0.017	0.09	0.073	2.2	21.7	2.2	-19.5	<0.1	9.70	NAF

Sample ID	Depth		Lithotype	Paste pH	Oxidation- pH	Final pH	Sulfate SO ₄ ²⁻		Total S	Sulfide S	ANC CaCO ₃	ANC H ₂ SO ₄	MPA	NAPP	NAG (pH 7.0)	APR	ABA/NAG Classification
	m From	m To		pH Unit			mg/kg	%	%	%	% CaCO ₃	kg H ₂ SO ₄ equiv/t					
WR057	108	109	Siltstone	6.8	7.0		660	0.021	0.30	0.279	4.8	47.2	8.5	-38.7	<0.1	5.52	NAF
WR058	115	116	Oolite	6.7	6.6		220	0.007	0.09	0.083	1.1	10.6	2.5	-8.1	3.4	4.17	NAF
WR059	121	122	Sandstone	6.4	6.9		290	0.009	0.07	0.061	1.8	17.8	1.9	-15.9	0.2	9.55	NAF
WR060	128	129	Sandstone	7.3	7.2		100	0.003	0.05	0.047	1.7	17.0	1.4	-15.6	<0.1	11.85	NAF
Area E South																	
WR061	0	1	Sandy oolite	6.1	6.2		160	0.005	0.03	0.025	<0.1	0.5	0.8	0.3	0.4	0.65	NAF
WR062	1	2	Sandstone	5.4	5.5	6.8	160	0.005	0.02	0.015	0.1	0.9	0.5	-0.4	4.6	1.96	NAF
WR063	6	7	Oolite	5.6	7.4		100	0.003	0.01	0.007	0.2	1.8	0.2	-1.6	<0.1	8.56	NAF
WR064	9	10	Sandy oolite	5.8	6.4		250	0.008	0.01	0.002	<0.1	0.5	0.1	-0.4	0.3	7.47	NAF
WR065	9	10	Sandstone	6.8	7.6		210	0.007	0.05	0.043	2.5	24.9	1.3	-23.6	<0.1	18.73	NAF
WR066	11	12	Sandy oolite	5.3	6.7		470	0.015	0.02	0.005	<0.1	0.5	0.2	-0.3	0.2	3.08	NAF
WR067	14	15	Oolite	5.6	7.4		110	0.003	0.01	0.007	0.2	2.2	0.2	-2.0	<0.1	10.96	NAF
WR068	15	16	Oolite	7	7.2	8.5	250	0.008	0.07	0.062	5.5	53.7	1.9	-51.8	<0.1	28.22	NAF
WR069	15	16	Oolitic sandstone	6.7	6.5	6.7	100	0.003	0.01	0.007	0.6	6.0	0.2	-5.8	2.0	28.52	NAF
WR070	18	19	Oolite	4.1	3.2	6.4	1100	0.034	0.12	0.086	<0.1	0.5	2.6	2.1	5.8	0.19	UC
WR071	19	20	Sandstone	6.6	5.4	6.7	450	0.014	0.18	0.166	1.3	12.4	5.1	-7.3	3.1	2.44	NAF
WR072	19	20	Sandstone	6.2	4.8		1600	0.050	1.36	1.310	7	68.5	40.1	-28.4	12.5	1.71	UC
WR073	20	21	Oolitic sandstone	6.6	2.9		3660	0.114	0.59	0.476	0.9	8.5	14.6	6.1	12.2	0.58	PAF
WR074	21	22	Sandstone	5.8	5.7	6.0	3780	0.118	0.72	0.602	4.1	40.0	18.4	-21.6	4.5	2.17	NAF
WR075	22	23	Sandstone	6.4	7.0		150	0.005	0.02	0.015	0.5	5.3	0.5	-4.8	<0.1	11.31	NAF
WR076	23	24	Sandstone	5.6	3.5	6.2	1470	0.046	0.43	0.384	0.9	9.0	11.8	2.8	7.9	0.77	PAF
WR077	23	24	Oolite	7.8	9.0		100	0.003	0.01	0.007	5.1	49.7	0.2	-49.5	<0.1	236.24	NAF
WR078	24	25	Strongly sideritic sandy oolite	7.2	8.0	7.6	390	0.012	0.07	0.058	5.8	56.5	1.8	-54.7	<0.1	31.94	NAF
WR079	24	25	Oolitic sandstone	5.5	3.2		2610	0.082	0.83	0.748	0.8	7.9	22.9	15.0	15.7	0.34	PAF
WR080	25	26	Sandstone	6.3	4.6		1180	0.037	0.34	0.303	0.8	7.0	9.3	2.3	4.2	0.75	UC
WR081	26	27	Siltstone	6.9	7.0	7.5	430	0.013	0.36	0.347	2.8	27.9	10.6	-17.3	<0.1	2.63	NAF
WR082	27	28	Oolite	6.9	6.8	6.3	520	0.016	0.28	0.264	5.3	51.9	8.1	-43.8	0.2	6.43	NAF
WR083	29	30	Oolite	6.4	6.6	8.9	570	0.018	0.22	0.202	2.0	20.0	6.2	-13.8	0.6	3.23	NAF
WR084	29	30	Sandy oolite	7.4	7.6	7.6	160	0.005	0.07	0.065	4	39.1	2.0	-37.1	<0.1	19.66	NAF
WR085	31	32	Oolitic sandstone	5.8	7.2		380	0.012	0.14	0.128	5.8	56.9	3.9	-53.0	<0.1	14.51	NAF
WR086	34	35	Siltstone	7.1	6.9	5.9	470	0.015	0.13	0.115	1.4	14.2	3.5	-10.7	0.5	4.02	NAF
WR087	34	35	Strongly sideritic sandy oolite	5.7	5.8	6.8	370	0.012	0.03	0.018	0.3	3.1	0.6	-2.5	2.6	5.49	NAF
WR088	36	37	Sandstone	6.8	7.5		100	0.003	0.02	0.017	3.1	30.2	0.5	-29.7	<0.1	58.48	NAF
WR089	36	37	Siderite oolite	7.4	8.6	7.5	150	0.005	0.07	0.065	5	49.0	2.0	-47.0	<0.1	24.52	NAF
WR090	39	40	Sandstone	6.7	5.9	6.3	230	0.007	0.15	0.143	2.5	24.5	4.4	-20.1	3	5.61	NAF
WR091	40	41	Siltstone	6.9	6.8		440	0.014	0.11	0.096	1.5	15.1	2.9	-12.2	0.4	5.13	NAF
WR092	46	47	Sandstone	6.7	7.3		440	0.014	0.13	0.116	1.8	17.7	3.6	-14.1	<0.1	4.98	NAF
WR093	49	50	Oolite	7.1	7.8	7.6	140	0.004	0.04	0.036	4.6	44.9	1.1	-43.8	<0.1	41.19	NAF
WR094	57	58	Siltstone	7.0	4.9	7.5	320	0.010	0.56	0.550	3.3	32.0	16.8	-15.2	4.3	1.90	UC
WR095	67	68	Siltstone	6.7	7.1		290	0.009	0.13	0.121	1.4	13.5	3.7	-9.8	<0.1	3.65	NAF
Area F East Pit 1																	
WR096	8	9	Oolitic sandstone	6.7	8.3	6.8	160	0.005	0.02	0.015	0.1	1.0	0.5	-0.5	<0.1	2.18	NAF
WR097	10	11	Oolite	6.3	6.4	7.2	100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	1.4	2.38	NAF
WR098	11	12	Sandstone	7	7.8	8.8	100	0.003	0.01	0.007	0.1	1.4	0.2	-1.2	<0.1	6.65	NAF
WR099	20	21	Oolite	4	2.4		7340	0.229	2.16	1.931	0.8	7.9	59.1	51.2	49.3	0.13	PAF
WR100	21	22	Oolite	6.8	4.9	7.2	850	0.027	0.33	0.303	1.2	12.3	9.3	-3.0	1.8	1.32	UC
WR101	24	25	Oolite	3.4	2.3	4.1	14100	0.441	2.71	2.269	0.1	0.5	69.4	68.9	72.6	0.01	PAF
WR102	26	27	Sandstone	3.7	2.5		9080	0.284	2.28	1.996	0.1	0.5	61.1	60.6	54.7	0.01	PAF
WR103	28	29	Sandstone	3.6	2.4	4.4	10100	0.316	2.65	2.334	0.1	0.5	71.4	70.9	68.7	0.01	PAF
WR104	29	30	Oolite	3.7	3.3		990	0.031	0.14	0.109	0.3	3.3	0.3	0.3	6.4	0.90	UC
WR105	29	30	Sandstone	6.4	2.4		12800	0.400	2.16	1.760	0.1	0.5	53.9	53.4	54.5	0.01	PAF
WR106	30	31	Sandstone	4.9	2.6		1900	0.059	0.74	0.681	0.5	5.2	20.8	15.6	20.1	0.25	PAF
WR107	40	41	Sandstone	6.3	4.4	8.9	670	0.021	0.31	0.289	1.7	16.4	8.8	-7.6	3.8	1.85	UC
WR108	43	44	Sandstone	7.3	7.8		310	0.010	0.12	0.110	0.6	9.0	3.4	-5.6	<0.1	2.67	NAF
WR109	48	49	Oolite	5	5.6	7.2	100	0.003	0.02	0.017	0.1	0.5	0.5	0.0	1.6	0.97	UC
WR110	56	57	Oolite	6.1	6.5		100	0.003	0.01	0.007	0.3	3.0	0.2	-2.8	1.1	14.26	NAF
WR111	69	70	Sandstone	6.9	8.8	8.4	100	0.003	0.01	0.007	1.5	14.6	0.2	-14.4	<0.1	69.40	NAF
Area F East Pit 2																	

Sample ID	Depth		Lithotype	Paste pH	Oxidation- pH	Final pH	Sulfate SO ₄ ²⁻		Total S	Sulfide S	ANC CaCO ₃	ANC H ₂ SO ₄	MPA	NAPP	NAG (pH 7.0)	APR	ABA/NAG Classification
	m From	m To					mg/kg	%									
WR112	0	1	Sandy oolite	5.6	6.7		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	0.5	2.38	NAF
WR113	0	3	Clay	7	7.4		100	0.003	0.01	0.007	0.4	4.2	0.2	-4.0	<0.1	19.96	NAF
WR114	3	6	Clay	7.4	7.9	7.1	140	0.004	0.01	0.006	0.6	5.5	0.2	-5.3	<0.1	31.95	NAF
WR115	4	5	Sandstone	7.1	2.5		160	0.005	0.02	0.015	0.4	4.2	0.5	-3.7	45.1	9.15	UC
WR116	4	5	Sandstone	4.7	5.5		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	5.5	2.38	NAF
WR117	6	9	Clay	7.2	7.7		100	0.003	0.01	0.007	0.5	5.3	0.2	-5.1	<0.1	25.19	NAF
WR118	9	12	Sandstone	7.6	7.2	7.8	100	0.003	0.01	0.007	0.6	5.4	0.2	-5.2	<0.1	25.67	NAF
WR119	11	12	Oolitic sandstone	6.2	6.7		100	0.003	0.01	0.007	0.3	3.2	0.2	-3.0	0.7	15.21	NAF
WR120	11	12	Oolitic sandstone	4.6	4.9		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	5.9	2.38	NAF
WR121	12	15	Sandstone	7.8	6.8		100	0.003	0.01	0.007	1.1	11.1	0.2	-10.9	1.8	52.76	NAF
WR122	15	16	Oolite	5.3	2.6		3680	0.115	1.08	0.965	6.1	59.7	29.5	-30.2	19.1	2.02	UC
WR123	15	18	Sandstone	7.6	6.6		200	0.006	0.01	0.004	0.7	6.5	0.1	-6.4	2.2	56.64	NAF
WR124	17	18	Oolite	4.5	3	5.8	1100	0.034	0.31	0.276	0.1	1.2	8.4	7.2	6.8	0.14	PAF
WR125	18	21	Sandstone	7	3		910	0.028	0.67	0.642	1.3	12.9	19.6	6.7	17.9	0.66	PAF
WR126	21	24	Sandstone	7.8	3.4		310	0.010	0.42	0.410	1	9.4	12.6	3.2	10.1	0.75	PAF
WR127	24	27	Sandstone	7.6	3.1		1060	0.033	1.02	0.987	2	19.1	30.2	11.1	17.4	0.63	PAF
WR128	27	30	Sandstone	7.5	4.2		2140	0.067	1.29	1.223	3.1	30.8	37.4	6.6	8.4	0.82	PAF
WR129	30	33	Sandstone	7.1	3		3110	0.097	1.59	1.493	3.2	31.7	45.7	14.0	18.4	0.69	PAF
WR130	33	36	Sandstone	7.2	3.9		740	0.023	0.52	0.497	2.1	20.3	15.2	-5.1	7.7	1.34	UC
WR131	36	39	Sandstone	7.5	6.5		160	0.005	0.13	0.125	1.2	12.2	3.8	-8.4	0.4	3.19	NAF
WR132	39	42	Sandstone	7.8	7	8.2	110	0.003	0.11	0.107	1.5	14.5	3.3	-11.2	0.2	4.45	NAF
WR133	42	45	Sandstone	7.8	7.3		100	0.003	0.08	0.077	1.5	14.6	2.4	-12.2	<0.1	6.21	NAF
WR134	45	48	Sandstone	7.6	7.2		140	0.004	0.10	0.096	2	19.2	2.9	-16.3	<0.1	6.56	NAF
WR135	48	51	Sandstone	7.9	5		120	0.004	0.14	0.136	1	10.0	4.2	-5.8	3.8	2.40	NAF
WR136	51	54	Sandstone	7.6	7.7		320	0.010	0.11	0.100	2.2	21.7	3.1	-18.6	<0.1	7.09	NAF
WR137	54	57	Sandstone	7.6	6.8		250	0.008	0.08	0.072	1.2	11.7	2.2	-9.5	0.2	5.30	NAF
WR138	57	60	Sandstone	7.4	6.5		290	0.009	0.14	0.131	0.8	7.5	4.0	-3.5	0.3	1.87	NAF
WR139	60	63	Sandstone	7.8	6		140	0.004	0.08	0.076	0.8	8.3	2.3	-6.0	0.8	3.59	NAF
WR140	63	66	Sandstone	7.7	5.2	8.4	100	0.003	0.10	0.097	0.9	8.8	3.0	-5.8	2.7	2.97	NAF
WR141	66	69	Sandstone	8	6.6		100	0.003	0.12	0.117	1.4	14.3	3.6	-10.7	0.2	4.00	NAF
WR142	69	72	Sandstone	8.1	7		100	0.003	0.10	0.097	1.1	11.2	3.0	-8.2	<0.1	3.78	NAF
WR143	72	75	Sandstone	7.4	7.1		100	0.003	0.09	0.087	1.7	17.0	2.7	-14.3	<0.1	6.39	NAF
WR144	75	78	Sandstone	7.7	6.9		120	0.004	0.10	0.096	1.4	13.5	2.9	-10.6	<0.1	4.58	NAF
Area F East Pit 3																	
WR145	0	3	Clay	7	6.6	6.7	130	0.004	0.01	0.006	0.4	3.6	0.2	-3.4	3.0	19.81	NAF
WR146	3	6	Clay	7.9	8.9		220	0.007	0.01	0.003	0.6	6.3	0.1	-6.2	<0.1	65.88	NAF
WR147	6	9	Clay	7	8.3		630	0.020	0.02	0.000	0.2	2.1	0.0	-2.1	<0.1	219.61	NAF
WR148	6	7	Sandy oolite	6.5	6.4	8.4	100	0.003	0.01	0.007	0.4	4.2	0.2	-4.0	1.5	19.96	NAF
WR149	9	12	Siltstone	6.6	5.8		720	0.023	0.02	-0.003	0.3	2.6	-0.1	-2.7	11.2	-33.99	NAF
WR150	9	10	Sandstone	6.3	5.5		100	0.003	0.01	0.007	0.3	2.9	0.2	-2.7	27	13.78	NAF
WR151	12	15	Siltstone	6.5	6.1		830	0.026	0.04	0.014	0.3	2.7	0.4	-2.3	5.1	6.27	NAF
WR152	12	13	Sandstone	7.2	6.4		100	0.003	0.01	0.007	0.5	5.3	0.2	-5.1	2.4	25.19	NAF
WR153	14	15	Sandstone	5.3	5.8	6.0	1830	0.057	0.42	0.363	2.2	21.2	11.1	-10.1	1.1	1.91	UC
WR154	15	18	Siltstone	6.4	5.8	7.2	850	0.027	0.24	0.213	0.3	3.1	6.5	3.4	9.6	0.47	PAF
WR155	18	21	Siltstone	6.3	5.8		940	0.029	0.26	0.231	0.2	2.4	7.1	4.7	9.6	0.34	PAF
WR156	21	24	Siltstone	6.5	5.9	7.2	800	0.025	0.21	0.185	0.3	3.2	5.7	2.5	12	0.57	PAF
WR157	23	24	Sandstone	5.9	4.7	6.2	850	0.027	0.29	0.263	1.2	11.6	8.1	-3.5	2.8	1.44	NAF
WR158	24	27	Siltstone	6.5	5.9		840	0.026	0.24	0.214	0.2	2.5	6.5	4.0	10.8	0.38	UC
WR159	27	30	Siltstone	7.3	6		2540	0.079	0.76	0.681	0.2	1.9	20.8	18.9	13.3	0.09	UC
WR160	30	33	Siltstone	6.5	6	7.2	1050	0.033	0.21	0.177	<0.1	0.8	5.4	4.6	10.5	0.15	UC
WR161	30	31	Oolite	5.6	6.7		100	0.003	0.01	0.007	0.5	5.4	0.2	-5.2	0.4	25.67	NAF
WR162	33	36	Siltstone	6.7	5.5		780	0.024	0.08	0.056	0.2	1.7	1.7	0.0	9.4	1.00	UC
WR163	36	37	Oolite	6.9	3.3		1680	0.053	0.48	0.428	1.4	14.0	13.1	-0.9	9.0	1.07	NAF
WR164	36	39	Siltstone	5.9	2.8		2240	0.070	0.79	0.720	0.9	8.6	22.0	13.4	19.8	0.39	PAF
WR165	39	42	Siltstone	7.3	2.8		940	0.029	0.79	0.761	0.6	6.2	23.3	17.1	19.9	0.27	PAF
WR166	42	45	Siltstone	6.6	2.8		3110	0.097	1.29	1.193	0.6	5.9	36.5	30.6	31.4	0.16	PAF
WR167	44	45	Oolite	7.2	8.5	7.3	100	0.003	0.02	0.017	1	10.3	0.5	-9.8	<0.1	19.95	NAF
WR168	45	48	Siltstone	5.8	2.4	6.8	5350	0.167	2.39	2.223	0.5	4.8	68.0	63.2	63.1	0.07	PAF
WR169	48	51	Siltstone	6.1	2.7		2340	0.073	1.29	1.217	0.6	5.9	37.2	31.3	33.9	0.16	PAF

Sample ID	Depth		Lithotype	Paste pH	Oxidation- pH	Final pH	Sulfate SO ₄ ²⁻		Total S	Sulfide S	ANC CaCO ₃	ANC H ₂ SO ₄	MPA	NAPP	NAG (pH 7.0)	APR	ABA/NAG Classification
	m From	m To		pH Unit			mg/kg	%	%	%	% CaCO ₃	kg H ₂ SO ₄ equiv/t					
WR170	50	51	Siltstone	6.0	3.6	6.7	630	0.020	0.24	0.220	0.5	5.4	6.7	1.3	7.9	0.80	UC
WR171	51	54	Siltstone	6.4	2.7	6.9	1880	0.059	0.92	0.861	1.5	14.4	26.4	12.0	22.9	0.55	PAF
WR172	53	54	Siltstone	5.7	3.8		1110	0.035	0.26	0.225	0.8	7.6	6.9	-0.7	5.8	1.10	NAF
WR173	54	57	Siltstone	6.6	3.1		2170	0.068	0.93	0.862	0.9	8.8	26.4	17.6	23.2	0.33	PAF
WR174	57	60	Siltstone	6.5	2.8		1460	0.046	0.82	0.774	0.6	6.4	23.7	17.3	20.6	0.27	PAF
WR175	60	63	Siltstone	6.4	2.5	6.9	2140	0.067	2.16	2.093	0.3	2.8	64.0	61.2	57.2	0.04	PAF
WR176	63	66	Siltstone	7.2	2.8		970	0.030	1.10	1.070	0.5	4.8	32.7	27.9	26.7	0.15	PAF
WR177	66	69	Siltstone	7.4	2.8		960	0.030	0.85	0.820	0.7	7.2	25.1	17.9	19.4	0.29	PAF
WR178	69	72	Siltstone	7.4	3.4		580	0.018	0.39	0.372	0.1	1.4	11.4	10.0	9.2	0.12	PAF
WR179	72	75	Siltstone	7.5	3.3	7.9	560	0.018	0.42	0.403	0.8	8.3	12.3	4.0	8.4	0.67	PAF
WR180	75	78	Siltstone	7.4	3.1		620	0.019	0.54	0.521	0.7	7.0	15.9	8.9	11.8	0.44	PAF
WR181	78	79.97	Siltstone	7.6	4.2	7.8	380	0.012	0.22	0.208	1	10.1	6.4	-3.7	3.7	1.59	NAF
Area F West																	
WR182	10	11	Sandstone	6.4	6.2		250	0.008	0.02	0.012	0.2	1.8	0.4	-1.4	3.1	4.83	NAF
WR183	16	17	Oolite	7.1	7.1	8.4	1090	0.034	0.43	0.396	4.3	42.0	12.1	-29.9	<0.1	3.47	NAF
WR184	18	19	Oolite	6.1	7.5	7.4	100	0.003	0.01	0.007	0.3	2.7	0.2	-2.5	<0.1	12.83	NAF
WR185	21	22	Sandstone	4.7	2.7	8.7	2200	0.069	0.86	0.791	0.2	2.4	24.2	21.8	27.4	0.10	PAF
WR186	21	22	Sandy oolite	5.6	5.4		100	0.003	0.01	0.007	0.1	1.2	0.2	-1.0	7.2	5.70	NAF
WR187	23	24	Sandstone	6.1	4.2	6.9	410	0.013	0.11	0.097	0.3	2.6	3.0	0.4	2.7	0.87	UC
WR188	28	29	Siltstone	6.8	6.3	8.3	140	0.004	0.05	0.046	0.3	2.6	1.4	-1.2	1.7	1.86	NAF
WR189	28	29	Sandstone	6.3	5.6		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	7.5	2.38	NAF
WR190	30	31	Sandstone	5.8	6.6	7.6	100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	0.6	2.38	NAF
WR191	32	33	Oolite	5.5	6.3		260	0.008	0.03	0.022	0.1	0.9	0.7	-0.2	0.3	1.34	NAF
WR192	33	34	Oolite	6.3	6.7		100	0.003	0.01	0.007	0.2	1.8	0.2	-1.6	0.4	8.56	NAF
WR193	34	35	Oolite	5.1	6.8	6	1030	0.032	0.13	0.098	0.3	2.6	3.0	0.4	0.3	0.87	UC
WR194	34	35	Siderite oolite	7.7	6.1		100	0.003	0.06	0.057	5.5	53.8	1.7	-52.1	3.5	30.91	NAF
WR195	36	37	Oolitic sandstone	6.3	4.6	6.8	890	0.028	0.35	0.322	0.8	8.2	9.9	1.7	2.1	0.83	UC
WR196	38	39	Sandstone	5.5	7.5	7.5	220	0.007	0.01	0.003	0.1	0.5	0.1	-0.4	<0.1	5.23	NAF
WR197	39	40	Siltstone	5.8	6.6		130	0.004	0.01	0.006	0.1	0.5	0.2	-0.3	0.2	2.75	NAF
WR198	40	41	Sandstone	5.7	6		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	0.7	2.38	NAF
WR199	40	41	Sandy oolite	5.6	6		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	0.2	2.38	NAF
WR200	42	43	Oolite	7.9	8		100	0.003	0.01	0.007	1.3	12.9	0.2	-12.7	<0.1	61.32	NAF
WR201	54	55	Oolite	3.8	2.5	5	25800	0.806	3.35	2.544	1.6	15.2	77.8	62.6	58.5	0.20	PAF
WR202	55	56	Oolite	5.2	5.4		2120	0.066	0.34	0.274	0.9	8.8	8.4	-0.4	0.9	1.05	UC
WR203	57	58	Oolite	6.4	6.9	6.8	640	0.020	0.06	0.040	1.5	14.6	1.2	-13.4	0.4	11.93	NAF
WR204	57	58	Sandstone	7.3	7.4	7.5	180	0.006	0.07	0.064	1.1	10.5	2.0	-8.5	<0.1	5.33	NAF
APR = Acid Potential Ratio; TS = Total Sulfide-S (calculated); MPA = Maximum Potential of Acidity [kg H ₂ SO ₄ /ton]; ANC = Acid Neutralising Capacity [kg H ₂ SO ₄ /ton]; NAPP = Net Acid Producing Potential [kg H ₂ SO ₄ /ton]; NAG = Net Acid Generation [kg H ₂ SO ₄ /ton]; NAG pH 7 = [kg H ₂ SO ₄ /ton]; NAG pH = pH units; NAF = Non-Acid Forming; PAF = Potential-Acid Forming; NAF in green = further assessment required preferable using kinetic tests.																	

Table 11: PAF Material Distribution with Depth.

Depth		Prospect Code	Lithotype	Proportion of Lithotype	% PAF Lithotype	% each PAF Lithotype	% of NAF Lithotype	% of Lithotype (uncertain)
From	To							
0	50	Area E East	SST	36%	29%	81%	19%	0%
			OO	31%	24%	79%	21%	0%
			CY	2%	0%	0%	100%	0%
			OST	2%	2%	100%	0%	0%
			SOO	16%	9%	57%	29%	14%
			SLT	11%	11%	100%	0%	0%
			SIDOO	2%	0%	0%	0%	100%
Total PAF Samples 76%								
50	100	Area E East	SST	30%	20%	67%	0%	33%
			OO	30%	10%	33%	67%	0%
			SOO	20%	0%	0%	50%	50%
			SLT	10%	10%	100%	0%	0%
			SIDOO	10%	0%	0%	100%	0%
Total PAF Samples 40%								
100	130	Area E East	SST	40%	0%	0%	100%	0%
			OO	20%	0%	0%	100%	0%
			SLT	40%	0%	0%	100%	0%
Total PAF Samples 0%								
0	50	Area E South	SST	33%	3%	9%	73%	18%
			OO	24%	0%	0%	88%	13%
			OST	12%	6%	50%	50%	0%
			SOO	12%	0%	0%	100%	0%
			SLT	9%	0%	0%	100%	0%
			SIDOO	3%	0%	0%	100%	0%
			SIDSOO	6%	0%	0%	100%	0%
Total PAF Samples 9%								
50	70	Area E South	SLT	100%	0%	0%	50%	50%
			Total PAF Samples 0%					
0	50	Area F East Pit 1	SST	50%	29%	57%	29%	14%
			OO	43%	14%	33%	17%	50%
			OST	7%	0%	0%	100%	0%
Total PAF Samples 43%								
50	70	Area F East Pit 1	SST	50%	0%	0%	100%	0%
			OO	50%	0%	0%	100%	0%
			Total PAF Samples 0%					
0	50	Area F East Pit 2	SST	67%	25%	38%	50%	13%
			OO	8%	4%	50%	0%	50%
			OST	8%	4%	50%	50%	0%
			CY	13%	0%	0%	100%	0%
			SOO	4%	0%	0%	100%	0%
Total PAF Samples 33%								
50	80	Area F East Pit 2	SST	100%	0%	0%	100%	0%
			Total PAF Samples 0%					
0	50	Area F East Pit 3	SST	16%	4%	25%	50%	25%
			OO	12%	4%	33%	67%	0%
			SLT	56%	40%	71%	0%	29%
			CY	12%	0%	0%	100%	0%
			SOO	4%	0%	0%	100%	0%
Total PAF Samples 48%								
50	80	Area F East Pit 3	SLT	100%	75%	75%	0%	25%
			Total PAF Samples 75%					
0	50	Area F West	SST	37%	5%	14%	71%	14%
			OO	32%	0%	0%	83%	17%
			OST	5%	0%	0%	0%	100%
			SOO	11%	5%	50%	50%	0%
			SLT	11%	0%	0%	100%	0%
			SIDOO	5%	0%	0%	0%	100%
Total PAF Samples 11%								
50	60	Area F West	SST	25%	0%	0%	100%	0%
			OO	75%	25%	33%	33%	33%
			Total PAF Samples 25%					

5 Hydro-Geochemistry of Laboratory Leachates

Leachable metals are potential sources of toxicity in drainage from metal mine wastes (Lapakko, 2002). Selected rock samples were crushed, leached and analysed for elements most likely to be dissolved from waste rocks and chemically available in the environment. A summary of the assessment is included in Table 12 whilst Appendix G includes detailed assessments and Appendix H the laboratory analytical results.

Average pH values of all leachates from 83 samples are slightly acidic (pH 6.3) and range from 3.0 to 8.2. The low average pH values (pH 5.4), including the lowest pH of 3.0 in the oolite sample solutions located between 37 to 38m below ground level, are associated to samples in prospect Area E East. The highest average pH (pH 7.3) was attained in sample solutions from the prospect Area F East Pit 2, indicating that these samples have very reactive alkaline materials. However, in these particular samples, total alkalinity as CaCO_3 was in low concentrations with a median of 5.0mg/L ranging from 2.0 to 5.0mg/L. Prospect areas E South, F East Pit 1, F East Pit 3 and F West also had average circumneutral pH values in the order of 6.4 to 6.8. Electrical conductivity (EC) and total dissolved solids (TDS) are somewhat correlated with the pH ranges (Figure 11).

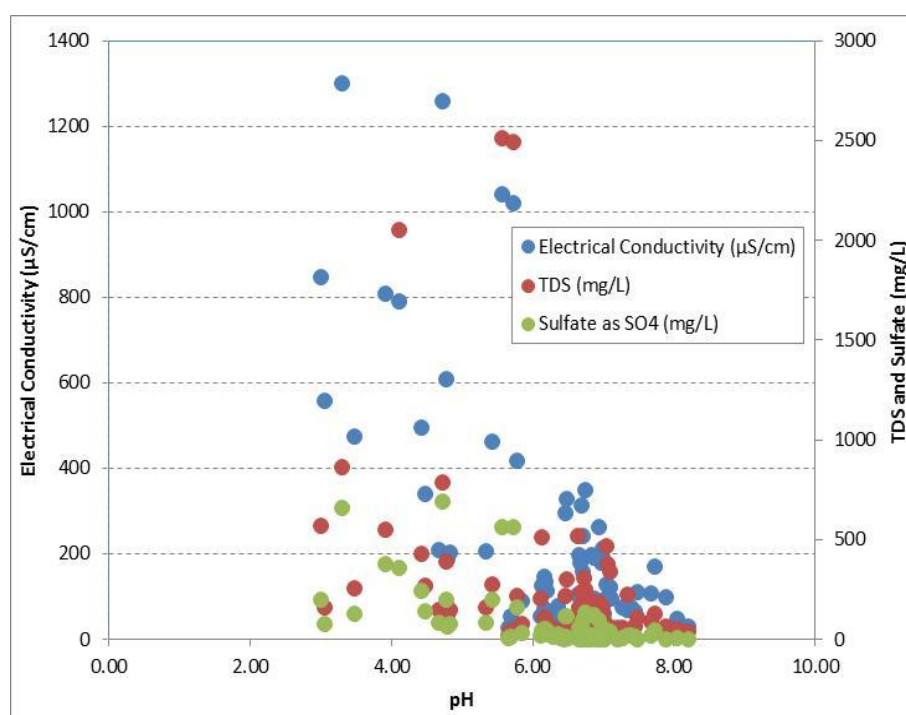


Figure 11: pH Against EC, TDS and Sulfate Concentrations.

Despite the low pH observed in samples from prospect Area E East, and as compared with the results from samples in other prospect areas, average calcium and magnesium concentrations were relatively high, ranging from 1.0 to 46mg/L for calcium and 3.0 to 107mg/L for magnesium. Potassium and aluminium concentrations were also relatively high, ranging from 1.0 to 32mg/L and 0.01 to 10.5mg/L respectively. Dissolution of these minerals indicates that samples have readily available carbonates and aluminosilicate minerals to buffer potential acid environments in the short term.

Concentrations of dissolved sulfate, chloride, iron, aluminium and manganese ranged from 1.0 to 692mg/L, 1.0 to 54mg/L, 0.1 to 178mg/L, 0.01 to 10.5mg/L and 0.001 to 22.3mg/L respectively. Generally, the highest concentrations of sulfate, iron, aluminium and manganese and most other metals were associated with low-pH samples (Table 12).

Table 12: Summary of Key Hydrogeochemical Parameters in Laboratory Leachates.

	pH Value	Electrical Conductivity	TDS	Total Alkalinity as CaCO3	Sulfate as SO4	Chloride	Calcium	Magnesium	Sodium	Potassium	Aluminium	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc	Uranium
	Unit	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Area E East																					
Average	5.4	430.5	414.2	6.1	179.7	4.0	9.2	31.2	2.7	5.7	1.47	0.002	0.0005	0.004	0.007	20.0	0.009	4.01	0.04	0.27	0.004
Median	5.6	262.0	186.0	7.0	94.0	3.0	4.0	19.0	2.0	2.5	0.07	0.002	0.0002	0.004	0.002	1.4	0.009	1.17	0.02	0.21	0.004
Maximum	7.1	1300.0	2510.0	11.0	692.0	11.0	46.0	107.0	7.0	32.0	10.50	0.004	0.0035	0.007	0.049	178.0	0.013	22.30	0.27	0.93	0.007
Minimum	3.0	19.0	44.0	1.0	2.0	1.0	1.0	3.0	2.0	1.0	0.01	0.001	0.0001	0.001	0.001	0.1	0.004	0.02	0.001	0.06	0.003
25th percentile	4.7	178.0	112.0	3.0	60.0	2.0	2.0	11.8	2.0	1.8	0.02	0.002	0.0001	0.002	0.001	0.3		0.15	0.01	0.14	0.003
90th Percentile	7.0	1084.0	1190.0	11.0	583.4	7.4	36.5	106.3	4.6	29.4	8.67	0.004	0.0032		0.031	73.1		15.22	0.16	0.57	
Area E South																					
Average	6.7	75.5	82.3	5.2	20.9	2.9	1.5	6.8	3.1	3.6	0.23	0.020	0.0002	0.001	<0.01	0.69	<0.01	0.50	0.004	0.08	<0.001
Median	6.7	69.0	55.5	6.0	16.0	3.0	1.5	6.0	3.0	2.0	0.14	0.005	0.0002	0.001	<0.01	0.42	<0.01	0.02	0.003	0.06	<0.001
Maximum	7.7	295.0	309.0	10.0	114.0	6.0	2.0	28.0	7.0	10.0	0.93	0.067	0.0002	0.001	<0.01	2.74	<0.01	3.62	0.01	0.19	<0.001
Minimum	5.7	13.0	18.0	1.0	2.0	1.0	1.0	1.0	2.0	1.0	0.03	0.002	0.0002	0.001	<0.01	0.05	<0.01	0.002	0.001	0.04	<0.001
25th percentile	6.5	40.8	32.0	2.0	8.5	1.5	1.0	3.0	2.0	2.0	0.04	0.002				0.18		0.011	0.002	0.05	
90th Percentile	7.4	133.0	230.7	10.0	58.0	5.2		17.2	4.6	10.0	0.83					2.11		3.48		0.18	
Area F East Pit 1																					
Average	6.4	198.1	397.4	6.4	95.4	7.6	4.7	19.6	8.6	2.0	3.43	<0.01	<0.005	<0.01	<0.01	17.28	<0.01	1.18	0.02	0.066	0.004
Median	6.8	99.0	83.0	5.0	11.0	4.0	5.0	9.0	5.0	1.5	3.11	<0.01	<0.005	<0.01	<0.01	6.38	<0.01	0.63	0.02	0.060	0.004
Maximum	7.9	790.0	2050.0	19.0	361.0	21.0	8.0	45.0	25.0	4.0	7.32	<0.01	<0.005	<0.01	<0.01	84.6	<0.01	3.47	0.02	0.130	0.006
Minimum	7.9	790.0	2050.0	19.0	361.0	21.0	8.0	45.0	25.0	4.0	7.32	<0.01	<0.005	<0.01	<0.01	84.6	<0.01	3.47	0.02	0.130	0.006
25th percentile	5.4	34.0	33.5	4.0	6.0	3.0	1.0	3.5	4.0	1.0	0.24	<0.01		<0.01	<0.01	0.86	<0.01	0.01		0.033	
90th Percentile	7.9	790.0	2050.0						25.0												
Area F East Pit 2																					
Average	7.3	98.6	87.2	4.6	9.6	14.0	<1	6.0	11.2	8.5	1.18	0.006	0.0001	0.003	<0.01	0.65	<0.01	0.067	<0.001	0.07	<0.001
Median	7.5	90.0	80.0	5.0	4.0	3.0	<1	6.0	7.0	9.0	0.54	0.006	0.0001	0.003	<0.01	0.26	<0.01	0.007	<0.001	0.06	<0.001
Maximum	8.2	211.0	160.0	6.0	34.0	42.0	<1	6.0	24.0	12.0	3.45	0.006	0.0001	0.005	<0.01	1.86	<0.01	0.250	<0.001	0.12	<0.001
Minimum	5.8	31.0	36.0	2.0	2.0	2.0	<1	6.0	4.0	4.0	0.18	0.005	0.0001	0.001	<0.01	0.09	<0.01	0.005	<0.001	0.04	<0.001

	pH Value	Electrical Conductivity	TDS	Total Alkalinity as CaCO3	Sulfate as SO4	Chloride	Calcium	Magnesium	Sodium	Potassium	Aluminium	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc	Uranium
	Unit	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
25th percentile	6.4	40.0	45.0	3.5	2.5	2.0	<1		4.5	5.0	0.25			0.001		0.15		0.005		0.04	
Area F East Pit 3																					
Average	6.8	140.1	111.1	2.6	38.3	13.0	4.0	4.4	15.4	13.1	0.49	0.002	<0.005	0.002	0.001	0.48	<0.01	0.290	0.01	0.11021	<0.001
Median	6.9	106.5	82.5	2.0	24.0	6.0	4.0	3.0	13.0	10.0	0.28	0.002	<0.005	0.002	0.001	0.41	<0.01	0.002	0.012	0.0985	<0.001
Maximum	7.4	327.0	300.0	5.0	122.0	54.0	4.0	12.0	44.0	29.0	2.40	0.003	<0.005	0.003	0.002	0.98	<0.01	2.90	0.014	0.268	<0.001
Minimum	6.2	31.0	22.0	1.0	1.0	2.0	4.0	1.0	2.0	2.0	0.02	0.002	<0.005	0.001	0.001	0.12	<0.01	0.001	0.004	0.036	<0.001
25th percentile	6.4	65.0	50.0	1.8	16.5	2.5	<1	2.0	3.8	7.0	0.12	0.002		0.002	0.001	0.17	<0.01	0.002	0.004	0.06875	<0.001
90th Percentile	7.4	319.5	267.0	5.0	120.0	47.6	<1		38.0	28.4	1.84					0.98	<0.01	2.364		0.2265	<0.001
Area F West																					
Average	6.8	81.9	192.7	7.4	31.4	1.7	2.3	8.6	3.4	4.3	<0.1	<0.01	<0.005	<0.01	<0.01	0.365	<0.01	0.17	<0.001	0.185	<0.001
Median	6.7	77.0	146.5	4.0	38.5	2.0	2.0	9.0	3.0	3.5	<0.1	<0.01	<0.005	<0.01	<0.01	0.365	<0.01	0.03	<0.001	0.155	<0.001
Maximum	7.7	171.0	509.0	25.0	54.0	3.0	3.0	14.0	5.0	9.0	<0.1	<0.01	<0.005	<0.01	<0.01	0.56	<0.01	0.86	<0.001	0.46	<0.001
Minimum	6.1	10.0	12.0	3.0	2.0	1.0	2.0	2.0	1.0	2.0	<0.1	<0.01	<0.005	<0.01	<0.01	0.17	<0.01	0.01	<0.001	0.06	<0.001
25th percentile	6.6	19.5	22.5	4.0	7.8	1.0	2.0	5.0	2.5	2.0	<0.1	<0.01	<0.005	<0.01				0.01	<0.001	0.075	<0.001
90th Percentile	7.7	169.6	504.7						5.0			<0.01	<0.005	<0.01							

5.1 Hydrogeochemical Evaluation of Leachates

According to their hardness (mg/L as CaCO_3), computed from calcium and magnesium concentrations, the majority of leachates can be classified as being very soft with only five samples ranging from moderately soft to very hard waters (Table 13). Dominance of very soft waters is indicative of low calcium and magnesium concentrations and therefore leachates have low buffering capacity and have the potential to influence on any water treatment and management processes.

Table 13: Leachate Hardness in Selected Rock Samples.

Classification Criteria (Davidson 1995)		WDRL Leachate Samples	%
< 50	Very Soft	25	83.33%
50 -100	Moderately Soft	2	6.67%
100 - 150	Slightly Hard	1	3.33%
150 - 200	Moderately Hard	1	3.33%
200 - 300	Hard	0	0.00%
> 300	Very Hard	1	3.33%
Total		30	100.00%

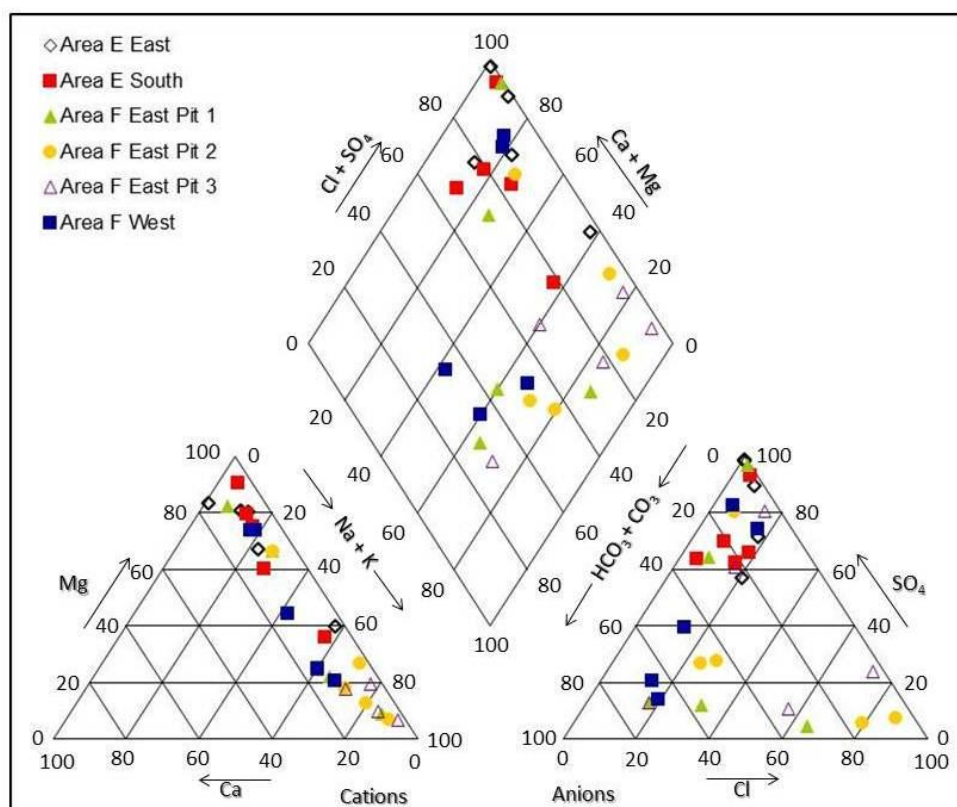


Figure 12: Leachate Hydrogeochemical Characterisation.

The relative proportions of major ions in leachates from rock samples are illustrated in Figure 12. Most of the samples from prospect Areas E East and E South produced sodium-potassium-bicarbonate type leachate and a significant number of samples from prospect Areas F East Pit 2 and Pit 3 produced sodium-potassium-sulfate-chloride leachate types. A low number of samples from prospect Areas F West and F East Pit 1 also produced sodium-potassium-bicarbonate leachate types. About 40% of samples produced leachates with no dominant anions or cations.

6 Mine Waste Rock/Ore Mass Balance

6.1 Conceptual Model

Based on the assessment outlined above and by applying a conservative approach, the implications for mine waste management indicates that careful management of ores and waste rocks will be required. Accordingly, an indicative waste rock ore mass balance of acid- and alkaline-producing material is presented in Table 14 (including assumptions) based on a block model developed by Smith and Brady (1990).

Table 14: Conceptual Model for the Mass ABA Balance.

Attribute	Assumptions
Sulfur/Sulfide concentrations	Total-sulfur bearing materials are highly localised and sporadic across the proposed mining stratigraphic profiles (Refer Figures 6, 7, 8 and 13 to 21).
	Sulfur bearing materials in exploration drill holes within the proposed pit footprints are highly localised and sporadic across the proposed mining stratigraphic profiles (refer Figures 6, 7, 8 and 13 to 21).
ANC (H ₂ SO ₄) Concentrations	Upper mine pit layers to about 15m below ground level are comprised by the oxidised zone, composed of various lithotypes with significant ANC (H ₂ SO ₄) characteristics. ANC concentrations are based on average values. Sulfur average concentrations are calculated in the same manner.
	Average thicknesses of about 12m are the proposed thickness of benches to be structured during mining. ANC (H ₂ SO ₄) and total sulfur (S%) concentrations are also based on average values calculated from all lithotype samples comprising the proposed bench.
Topography, Ripability and Geotechnical Considerations	The area (commonly known as 'acreage') for the stratigraphic location of the intervening samples have been approximated. If the drill hole is located to represent maximum cover, then the coverage area is small and a default of 1.0ha is probably appropriate (Smith and Brady, 1990).
	The Sherwin Iron ore proportional concentration defines the fraction spoil for each proposed bench. Normally this varies from 10 to 100%.
Volumetric Considerations	Refined volumes of waste and ore materials within the proposed benches were determined based on a four sided elongated polygon, with dimensions given by thickness of proposed benches. Surface areas of each bench were calculated in direct relation to the proposed pit wall slope. Proposed slopes of pit wall ranges from 35 to 45 degrees. Depth of pits was assumed to have an average of 51m at which the DSO/BFO is assumed to be fully recovered.
	Volumes were converted to mass by multiplying the volume of each stratigraphic unit by an average unit weight (kg/m ³) of the rock types present. For example, where sandstones are dominant the unit weight is 2,800kg/m ³ .
Validation and Further Monitoring	Particular validation processes would require the quantification of sulfur bearing materials, as these appear to exist within highly localized zones and may not extend across all benches, as assumed for this indicative mass balance (refer Figures 13 to 21).

6.2 Relevant Observations

The indicative mass balance (Table 15) shows that;

- In an overall mass balance only 30% of materials contain significant MPA concentrations.
- Most of the near-surface materials to a depth of about 20m across all proposed pits rendered positive NNP values, indicating of the presence of significant quantities of ANC materials (Figures 13 to 17).

- The top 51m in prospect Area F West render positive NNP values with high ANC materials at depths between 15m and 37m below ground level (Figures 13 and 17).
- Although a positive NNP was calculated for prospect Area E East, MPA materials are significant, particularly at depths between 15m to 23m and 25m to 77m below ground level (Figure 13 and 14). Lithotypes with significant ANC characteristics are located below 77m.
- With the exception of Area F East Pit 1, ANC materials are higher than MPA materials in all other pits indicating lower AMD potential for these pits.
- MPA materials in Area F East Pit 1 are significant at depths between 15m to 39m below ground level whilst in prospect Area F East Pit 3 MPA material are located between 39m and 51m extending to about 87m below ground level (Figures 13 and 16).

Table 15: Indicative Mass Waste Rock/Ore ABA Assessment.

Activity	Unit	Depth (m)		Thickness	Unit WT	Fraction	Volume	Ton (Rock/Ore) materials	Sulphide	ANC	Tons	Tons	NNP
		From	To	(m)	kg/m³	Spoiled	(m³)		%		MPA	ANC	Tons
Area E East													
Pit	MSM (90%), SIM (10%)	0	15	15	2,800	1	3,931,947	12,135,843.24	0.13	45.60	48,276	553,394	505,118
	SIM (80%), MSM (10%), KYM (10%)	15	27	12	2,675	0.5	2,831,002	8,347,726.46	1.97	32.00	251,098	133,564	-117,534
	SIM (30%), MSM (35%), KYM (35%)	27	39	12	2,675	0.6	2,673,724	7,883,963.88	1.73	33.70	250,127	159,414	- 90,714
	SIM (70%), KYM (30%)	39	51	12	2,675	0.5	2,123,251	6,260,794.84	2.00	22.40	191,772	70,121	-121,651
Totals						2.6	11,559,924.4	34,628,328.4	5.8	133.7	741,273.5	916,492.7	175,219.2
Area E South													
Pit	SIM (90%), KYM (10%)	0	15	15	2,800	1	61,473,958	189,737,631	0.02	4.47	110,313	848,393	738,079
	SIM (60%), MSM (30%), KYM (10%)	15	27	12	2,675	0.75	37,157,593	109,565,953	0.37	25.21	917,807	2,071,380	1,153,573
	SIM (90%), MSM (10%)	27	39	12	2,800	0.75	29,507,500	91,074,063	0.12	33.05	250,818	2,257,498	2,006,680
	MSM (90%), SIM (10%)	39	51	12	2,800	0.9	21,857,407	67,462,269	0.11	25.55	30.38	1,551,295	1,551,264
Totals						3.4	149,996,458.3	457,839,915.0	0.6	88.3	1,278,968.4	6,728,566.0	5,449,597.6
Area F East Pit 1													
Pit	MSM (90%), SIM (10%)	0.0	15.0	15.0	5,335	0.95	4,671,153	27,470,261.34	0.01	1.40	10,621	36,535	25,915
	SIM (90%), KYM (10%)	15.0	27.0	12.0	2,675	0.30	3,529,316	10,406,832.32	1.87	5.30	178,650	16,547	-162,103
	KYM (90%), SIM (10%)	27.0	39.0	12.0	2,675	0.50	2,802,692	8,264,249.19	1.42	2.30	179,865	9,504	-170,361
	MSM (90%), SIM (10%)	39.0	51.0	12.0	2,800	0.75	2,076,068	6,407,725.23	0.15	16.38	22,059	78,695	56,636
Totals						2.50	13,079,228.73	52,549,068.08	3.46	25.38	391,194.56	141,281.07	-249,913.49
Area F East Pit 2													
Pit	KYM (45%), SIM (40%), MSM (15%)	0.0	15.0	15.0	2,675	0.60	4,406,338	12,992,892	0.01	11.01	2,624	85,831	83,207
	KYM (70%), SIM (30%)	15.0	27.0	12.0	2,675	0.70	3,329,233	9,816,851	0.59	18.13	123,012	124,608	1,596
	KYM	27.0	39.0	12.0	2,800	0.75	2,643,803	8,160,022	0.73	31.70	136,334	194,005	57,670
	KYM	39.0	51.0	12.0	2,800	1.00	1,958,372	6,044,460	0.11	21.70	19,883	131,165	111,282
Totals						3	12,337,745	37,014,225	1	83	281,854	535,609	253,755
Area F East Pit 3													
Pit	TC (Clay) (60%), SIM (20%), MSM (20%)	0.0	15.0	15.0	2,800	1.00	3,672,325	11,334,528	0.02	6.3	5,946	71,408	65,462
	MSM	15	27	12.0	2,650	0.60	2,774,646	8,105,087	0.24	21.2	35,491	103,097	67,606
	SIM	27	39	12.0	2,650	0.50	2,203,395	6,436,392	0.39	14.00	38,209	45,055	6,846
	SIM (70%), KYM (30%)	39	51	12.0	2,650	0.50	1,632,145	4,767,698	1.00	10.30	73,165	24,554	-48,611
Totals						2.60	10,282,510.40	30,643,704.75	1.65	51.80	152,810.48	244,112.62	91,302.14
Area F West													
Pit	MSM	0	15	15	2,800	1.00	30,845,392	95,203,428	0.02	1.80	58,264	171,366	113,102
	SIM (90%), MSM (10%)	15	27	12	2,675	0.90	23,305,407	68,720,252	0.28	21.00	537,486	1,298,813	761,327
	SIM (90%), KYM (10%)	27	39	12	2,650	0.80	18,507,235	54,061,947	0.07	26.90	97,008	1,163,413	1,066,405
	SIM	39	51	12	5,335	0.75	13,709,063	80,620,681	0.01	12.90	18,502	780,005	761,503
Totals						3	86,367,097	298,606,308	0.4	62.6	711,261	3,413,597	2,702,336
Grand Totals						18	283,622,964	911,281,549	13.4	444.3	3,557,361	11,979,658	8,422,297

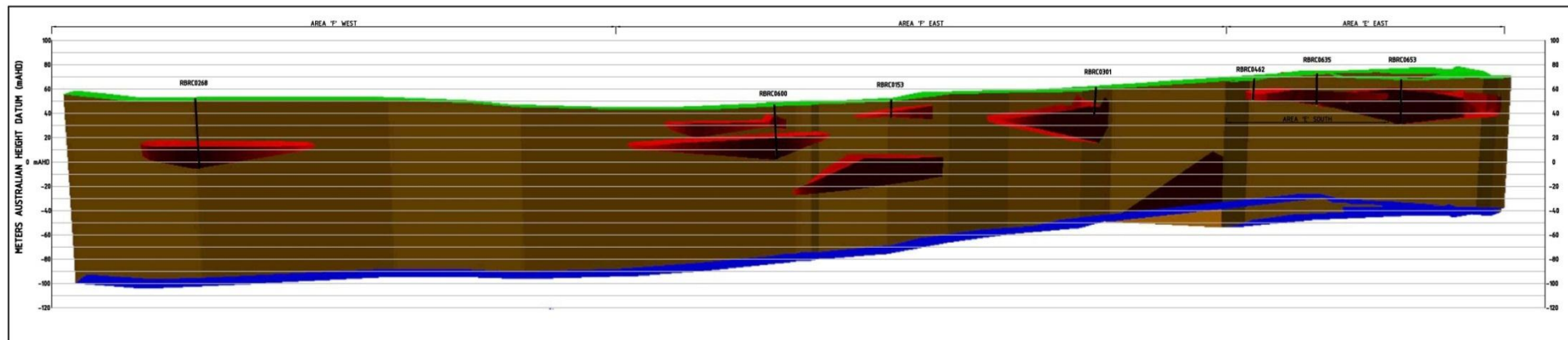


Figure 13: 3D West-East View Showing PAF Materials (red) with Depth across Mining Prospect.

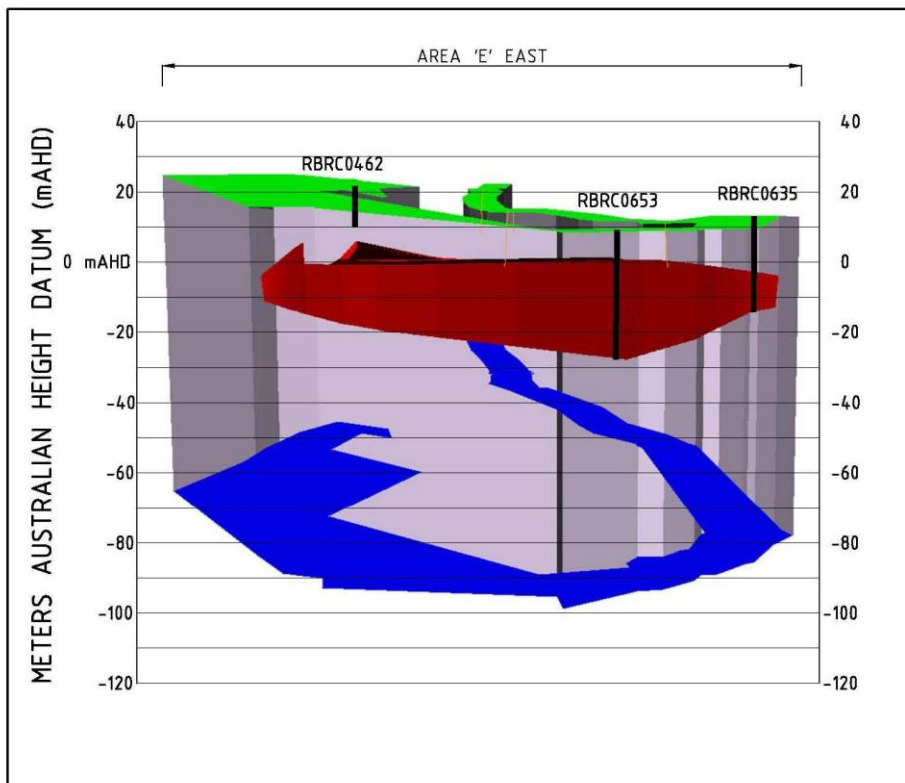


Figure 14: PAF Materials (red) with Depth at E-East.

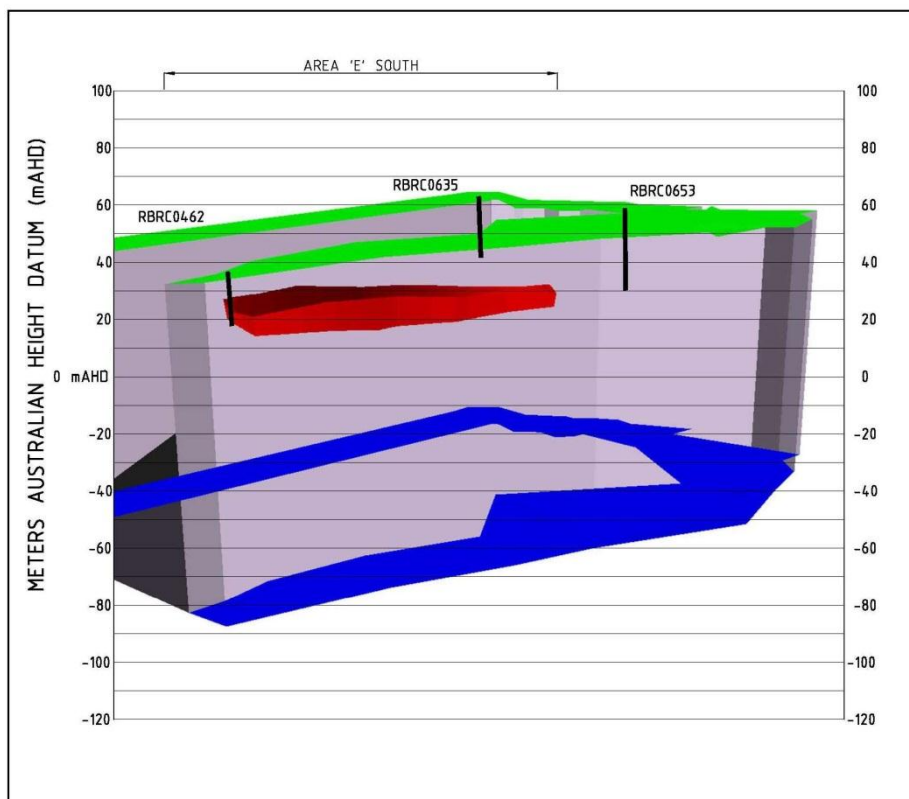


Figure 15: PAF Materials (red) with Depth at E-South.

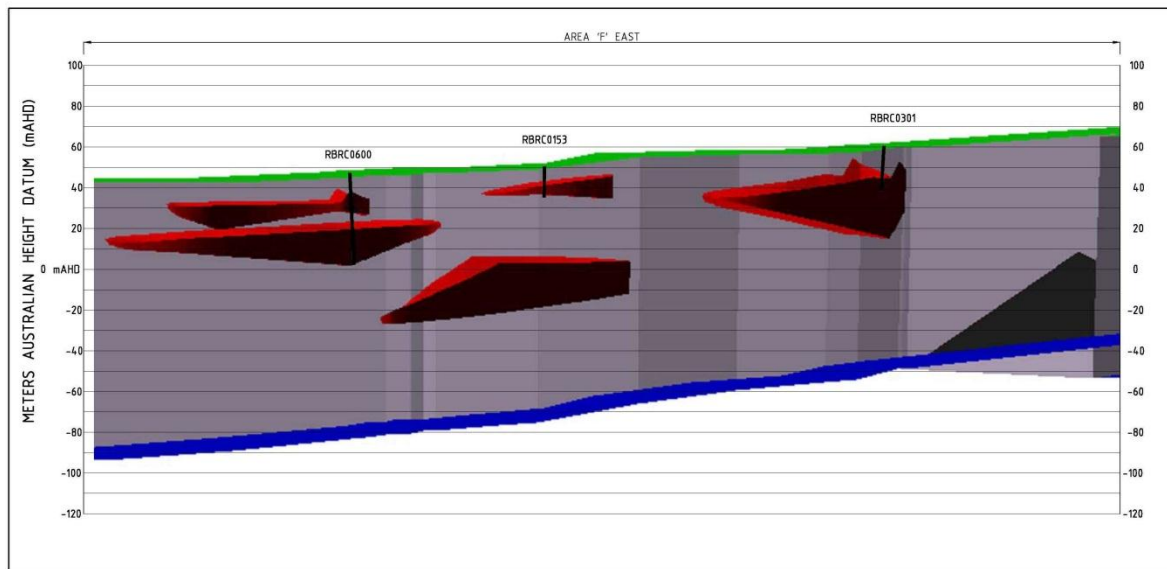


Figure 16: PAF Materials (red) with Depth at F-East.

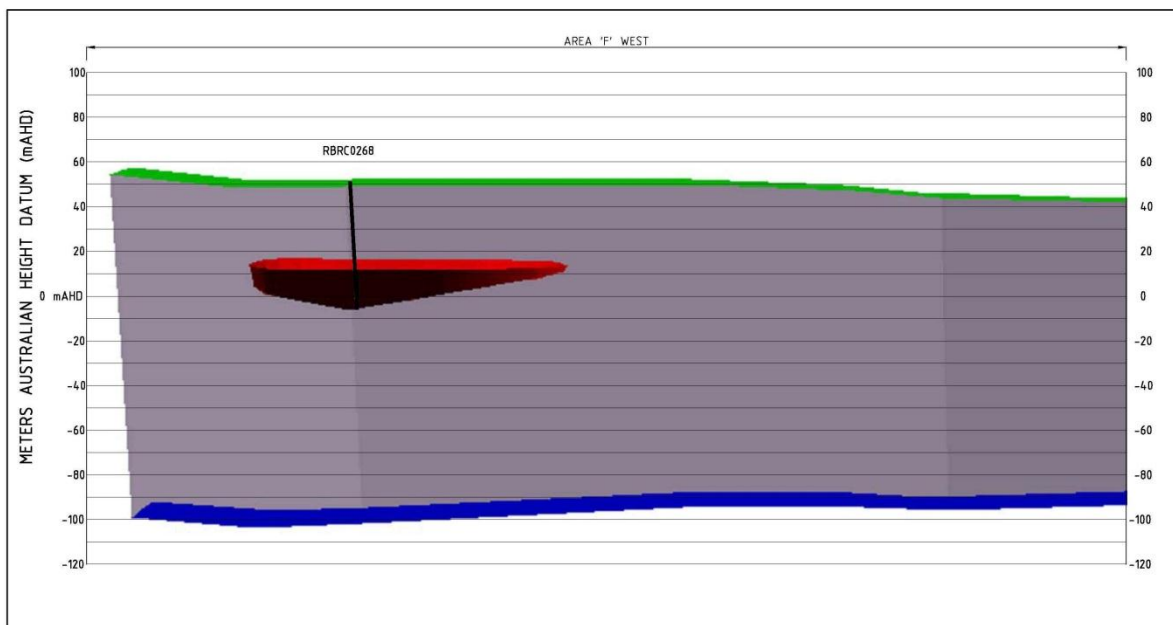


Figure 17: PAF Materials (red) with Depth at F-West.

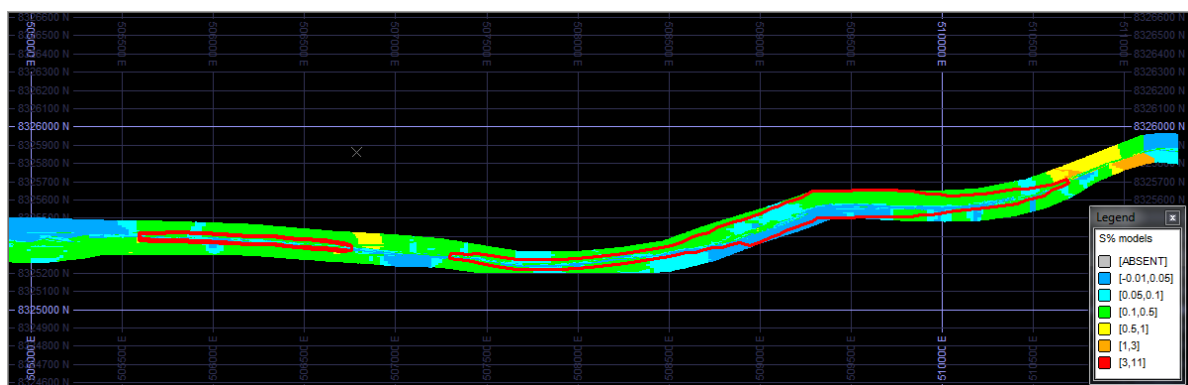


Figure 18: S-N Plan View of Sulfur Locations at -5mRL at E-East.

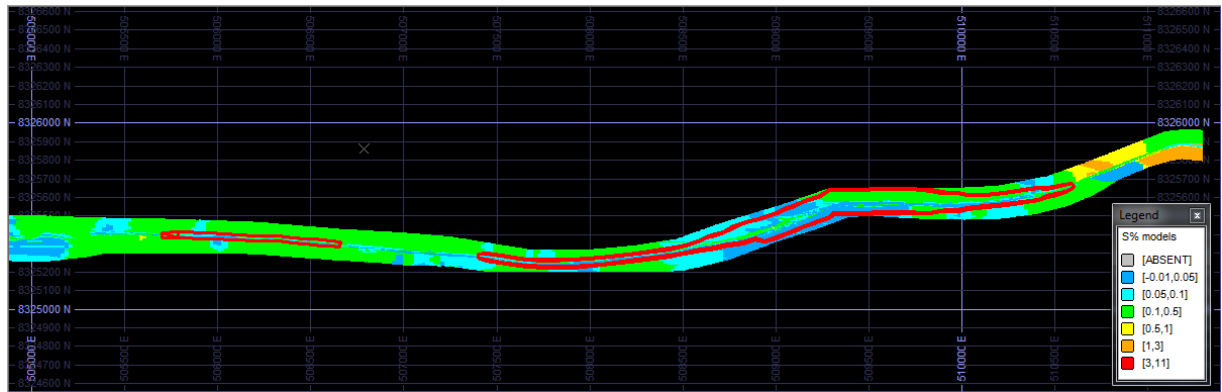


Figure 19: S-N View Plant of Sulfur Locations at -15mRL at E-East.

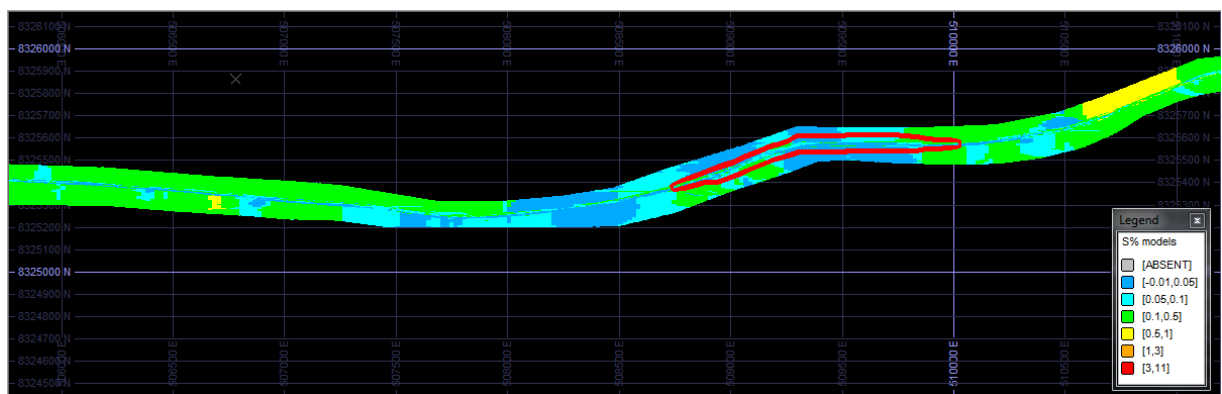


Figure 20: S-N View Plant of Sulfur Locations at -25mRL at E-East.

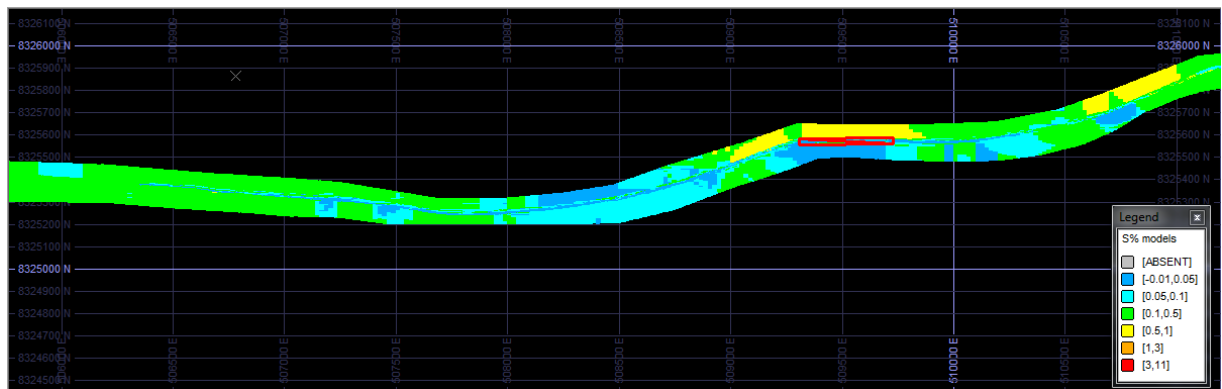


Figure 21: S-N View Plant of Sulfur Locations at -75mRL at E-East.

7 Summary

Comprehensive investigations and assessments are required to demonstrate that the risk of AMD has been appropriately identified and to enable adequate planning for management of materials, if required. The salient findings are:

Mineralogical assessment:

- The characteristic mineralogical composition across the site is Quartz > Hematite > Siderite > Pyrite > Kaolinite > Muscovite > Goethite > Iron. Sulfides, principally pyrite, are present in minor or trace concentrations except Area E East where concentrations are more significant.
- XRF analysis defines the samples as having elemental composition in the order of Si > Fe > Al > Mg > Mn > K > Ca > Na. Sporadic occurrences of sulfides, principally pyrite, are also significant.
- Sample enrichment, defined by the values of the Geochemical-Abundance Index (GAI), occurs by iron, sulfur and manganese only. Significant enrichment with sulfur, by about 96-fold, was observed in samples from Area E East, particularly among the oolites, sandstones and oolite sandstones at depths between 19m and 24m below ground level.
- SEM and EDS analysis also shows that elemental concentration is in the order oxygen > carbon > iron > silicon, with varying minor and trace amounts of aluminium, calcium, magnesium and sulfur. About 95% of samples assessed, particularly the oolites, sandstones, sandstone oolites and the sandy oolites, contain minor to trace quantities of sulfur.

Acid-base chemistry:

- The highest oxidation-pH occurs at depths between 23m and 25m below ground level among oolites and strongly sideritic sandy oolites in Area E South, indicating significant concentrations of readily available alkaline materials. The lower oxidation pH values were in samples from Areas E East, F East Pit 1 and F East Pit 3.
- Total sulfur distribution and concentrations varies with depth and lithological compositions. From the total of 204 samples, 55% of samples contain Total-S lower than 0.3%, with a maximum concentration of 5.97% in the sandstones of the Kyalla Member (KYM) in Area E East.
- The highest average concentration of sulfur (1.58%) was observed in Area E East, whilst the lowest (0.21%) was observed in E South. Area F East Pit 1 has a significant average sulfur concentration (0.86%) ranging from 0.01% to 2.70%.
- Sulfur concentrations in a total of 18,866 readings in samples from exploration drillholes indicate an overall low level, with sporadic high sulfur concentrations particularly at Areas E East and F East.
- ANC assessment of samples indicates that most of the samples in all prospect areas contain low ANC values with an average of ~15kgH₂SO₄/ton. However, sporadic sandstones and oolites in all prospect areas (particularly those located near the surface) presented relatively high ANC concentrations.
- The highest average ANC (22.75kgH₂SO₄/ton) concentrations were found in the lithotypes within Area E South, indicating that from a waste management perspective, this area contains significant ANC hosting materials.
- The majority of PAF samples in Area E East are located between the surface and 100m below ground level (~76%), with the highest concentrations at depths between up to 50m.

Sandstones, Oolites, Sandy Oolites and Siltstones contain the highest PAF concentrations. Clays in this sequence are NAF materials. Concentrations of PAF materials decrease with depth to about 40%.

- A total of 9% of samples in Area E South are classified as PAF mostly near the surface. All samples below 50m depth were classified as NAF, with only one sample (silt at a depth of ~57m) falling in the uncertain category.
- Area F East includes Pits 1, 2 and 3. About 41% of the near surface samples to a depth of about 50m below ground level are classified as PAF materials, with significant concentrations of PAF sandstones and oolites at depths between 15m and 36m below ground level. Significant concentrations of NAF materials are near the surface, up to 15m deep.
- A lower amount of PAF materials (~18%) occur in Area F West. Most of the samples are scattered across the stratigraphical sequence, with particular concentrations between 40m and 50m below ground level. Sandstones and sandstone oolites, which compose about 50% of lithotypes within this horizon, contain the highest concentrations of PAF materials.
- Siltstones, oolites and deep-bedded sandstones are predominantly NAF materials within Area F West. The shallow sideritic oolites and oolite sandstones fall in “uncertain to be classified” category.
- NAG values range from less 0.1kgH₂SO₄/ton to a maximum of 154kgH₂SO₄/ton and strongly correlate with the highest NAPP values.
- In general, using the proposed criteria:
 - 52% of the samples can be classified as **Non-Acid Forming (NAF)**.
 - 34% are classified as **Potentially Acid forming (PAF)**.
 - 14% of samples fall within the **zone of uncertainty (UC)**, which necessitates further assessment.

Hydrogeochemical assessment:

- Average pH values of leachates from 83 samples are slightly acidic (pH 6.3) and range from 3.0 to 8.2. The low average pH values are associated with samples from Area E East, whilst the highest average pH (pH 7.3) was observed in sample solutions from Area F East Pit 2, indicating these samples have very reactive alkaline materials.
- Despite the low pH observed in samples from Area E East, average calcium and magnesium concentrations are relatively high. Potassium and aluminium are also relatively high, indicating that these samples have readily available carbonates and aluminosilicate minerals to buffer potential acid environments in the short term.
- Generally, the highest concentrations of sulfate, iron, aluminium and manganese and most other metals were associated with low-pH samples.
- According to their hardness the majority of leachates can be classified as very soft, with only five samples ranging from moderately soft to very hard waters.
- Most of the samples from Areas E East and E South produced sodium-potassium-bicarbonate type waters, whilst a significant number of samples from Areas F East Pit 2 and Pit 3 produced sodium-potassium-sulfate-chloride leachate types.

Indicative Waste Rock ABA balance:

- In an overall mass balance, only 30% of materials contain significant MPA concentrations.
- Most of the near-surface materials to a depth of about 20m across all proposed pits rendered

positive NNP values, indicating the presence of significant quantities of ANC materials.

- The top 51m in Area F West render positive NNP values with high ANC materials at depths between 15m and 37m below ground level.
- Although a positive NNP was calculated for Area E East, MPA materials are significant, particularly at depths between 15m and 23m and between 25m and 77m below ground level. Lithotypes with significant ANC characteristics are located below 77m.
- With the exception of Area F East Pit 1, ANC materials are higher than MPA materials in all other pits indicating lower AMD potential for these pits.
- MPA materials in Area F East Pit 1 are significant at depths between 15m and 39m below ground level whilst in Area F East Pit 3 MPA material are located between 39m and 51m extending to about 87m below ground level.

8 Risk Assessment Framework

8.1 Definitions

Risk: The possibility of AMD impacting upon the larger environment and measured in terms of its likelihood and consequences.

Risk Management:

The Risk Management Process



Figure 22: Risk Management Process.

Risk Manager/s: Person/s responsible for AMD Risk Management Systems.

8.2 Establish Risk Context

The risk of AMD need to be properly understood and assessed based on its relevance in the context of the mining development and operating environment. Manmade, technical and natural processes should be taken into consideration for this process.

8.2.1 Manmade Processes

Refers to external and/or internal social processes and relationships with the wider community:

- External/Internal stakeholders.
- Legal, regulatory and financial consequences.
- Susceptibility to Mine Economic Forecasts and/or Project Sustainability and/or to external influences.
- AMD risk manager.

- Team roles and responsibilities.
- Technical expertise.
- Objectives, goals and strategies of the overall project.

8.2.2 Natural Processes

Refers to natural and environmental processes in relation to the wider mine development:

- Baseline environmental and geological conditions.
- Presence of any valued landforms, cultural and heritage items of significance, valued amenities and endemic or rare flora and fauna.
- Physical and chemical properties of waste/ore rock materials.
- Potential reactivity of sulphur and alkaline mineral materials.
- Water-solid interaction processes.

8.2.3 Technical Processes

- Design and construction of processing plant and operational infrastructure.
- Design and construction of solid and liquid waste infrastructure and disposal methodologies such as waste rock dumps (WRD).
- Contamination that could potentially be generated from solid and liquid waste structures and released into the wider environment.
- Environmental pathways through which contaminants can move or be transported within and outside of lease areas (e.g. groundwater, surface waters, etc.).

8.2.4 Risk Criteria

AMD risk criteria may be expressed in terms of:

- Environmental implications.
- Social perception implications.
- Iron ore resource recovery implications.
- Financial implications.

8.2.5 Risk Management Context (RMC)

The risk management context is identified in terms of the ability required to manage AMD risks.

8.3 Risk Identification

AMD risk identification need to be comprehensive and systematic, with all potential risks being considered, whether manmade or natural. Each risk needs to be identified in terms of the risk criteria as follows:

- Environmental risks including but not limited to:

- Oxidation of sulphides and factors triggering reactions.
- Climatic conditions.
- Release and transport of acid solutions and solutes.
- Tectonic/geotechnical activity (e.g. earthquakes, pit wall slips, waste rock dump collapse, etc.)
- Environmental receptors and pathways and effects on receiving environments.
- Assessment of endpoints at various ecological systems.
- Project specific risk:
 - Achievement of main objectives.
 - Achievement of key milestones.
 - Available resources such as technical/non-technical people, equipment, finance.
 - Available materials to be used for remediation processes and measures.
- Social risks:
 - Internal and external stakeholders.
 - Wider community.
- Financial risks:
 - Financial capabilities.
 - Financial back up by shareholders.

AMD risk identification shall be an ongoing process with regular quarterly workshops held with relevant team members. Risk manager shall be responsible for this AMD risk management process.

8.3.1 Existing Risk Data

If available, existing AMD risk data need to be used to commence the risk identification process. Sources should include but not limited to:

- Preliminary site geological investigations.
- Preliminary surface/groundwater investigations.
- Preliminary AMD investigations including Acid Base Accounting (ABA) tests.
- On-going kinetic testing at site.
- Generic examples from similar projects/activities.
- Typical risks identified by external authorities such as mine sites with AMD issues.
- Risk workshops

8.4 Analyse Risks

AMD risk analysis shall include AMD assessments and identified risks and consequences, and provide an input to decisions about AMD prevention, management and treatment. AMD risk analysis need to consider the source of a risk, its consequences, the likelihood of its occurrence, and should combine all three as a risk level rating.

Risks shall be analysed to determine the chance of the AMD risk occurrence (likelihood) and impact (consequences) from the risk should it occur. The following quantitative factors shall be assessed and addressed:

- **Adequacy of existing AMD control measures:** This shall be a quantitative measure of existing

AMD management systems and controls to determine if they are adequate to minimise the likelihood of residual risk occurrence.

Table 16: Adequacy of Existing Controls.

Adequacy of Existing Controls		
High	4	Our existing controls are adequate and will prevent or provide adequate warning of, and impending event.
Moderate	3	Our existing controls are reasonable and should provide some warning of an impending event.
Low	2	Our existing controls are not sufficient to provide adequate warning.
Nil	1	We have no controls in place in respect of this risk event.

- **Likelihood of occurrence:** This shall be a quantitative measure of the likelihood or probability of inherent AMD risk occurrence as below indicated.

Table 17: Likelihood of Occurrence.

Likelihood	Rating	Criteria
Improbable	1	Most unlikely to occur
Unlikely	2	Low frequency of occurrence is likely
Possible	3	Occurrence is possible
Likely	4	Occurrence is likely
Almost Certain	5	Occurrence is almost certain

- **Uncertainty Description:** This shall be a quantitative measure of whether the likelihood or probability of factors and materials with AMD risk occurrence has been analysed and predicted.

Table 18: Uncertainty Description.

Uncertainty Description		
High	4	My prediction is a guess.
Moderate	3	My prediction feels right, but I'm unsure.
Low	2	My prediction is based on experience, and is reasonable.
Nil	1	I have little or no doubt about the prediction

- **Consequence:** This shall be a quantitative measure of the consequence or impact should the AMD risk event occur. For example this should measure:

Table 19: Public Outrage Factor.

Public Outrage Factor		
High	4	Public pressure sufficient to halt the project, attract local and non-local opponents, cause lengthy delays and increase environmental investigations.
Moderate	3	Public pressure sufficient to attract only local persons, cause delays and increase environmental investigations.
Low	2	Public pressure from local people which can be resolved without delays.
Nil	1	None, if very little public reaction expected.

- **Level of Risk:** The likelihood and consequence AMD risk shall be combined to give an overall level of risk, based on the table overleaf.

8.4.1 Risk Likelihood

The quantitative factors above shall be used to determine the likelihood ratings and ultimately the level associated with the AMD risk.

8.4.2 Consequence Rating

The impact or consequence rating shows the impact on the project of the risk occurring. Each risk shall be individually rated as per the following table:

Table 20: Consequence Rating.

Consequence	Rating	Description					
		Mortality	Health	Environment	Cost	Production	Community Concern
Catastrophic	5	Many	Lethal	Very extensive	Very high	Several months	Very high
Major	4	A few	Toxic	Extensive	High	Several weeks	High
Moderate	3	One	Temporary illness	Localised	Moderate	A week	Moderately high
Minor	2	Severe injury	Irritation	Low	Low	A few days	Low
Insignificant	1	Injury	Mild irritation	Insignificant	Insignificant	One day	Insignificant

8.4.3 Hazard Rating and Uncertainty Factor

The risk Level rating shall be determined from the following table, using the risk Likelihood and risk Consequence ratings allocated to a risk:

Table 21: Hazard Rating/Risk Consequence.

Risk Likelihood		Risk Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
		1	2	3	4	5
Improbable	1	Low (1)	Low (2)	Low (3)	Low (4)	Significant (5)
Unlikely	2	Low (2)	Low (4)	Low (6)	Significant (8)	High (10)
Possible	3	Low (3)	Low (6)	Significant (9)	High (12)	High (15)
Likely	4	Low (4)	Low (8)	Significant (12)	High (16)	High (20)
Almost Certain	5	Low (5)	Significant (10)	High (15)	High (20)	High (25)

Risk Level	
Low	Low risk, monitor to ensure it does not change to significant or high
Moderate	Moderate risk, mitigation plan may be considered.
Significant	Significant risk, mitigation plan may be required.
High	High risk, mitigation planning is required.

The uncertainty factor shall be determined from the following table, using the uncertainty with likelihood and uncertainty with consequence:

Table 22: Uncertainty Factor.

Uncertainty with likelihood		Uncertainty with Consequence			
		High, H	Moderate, M	Low, L	Nil, N
		4	3	2	1
High, H	4	16	12	8	4
Moderate, M	3	12	9	6	3
Low, L	2	8	6	4	2
Nil, N	1	4	3	2	1

	High Uncertainty
	Moderate Uncertainty
	Low Uncertainty
	No Uncertainty

8.4.4 Hazard/Risk Rating

The hazard/risk rating shall be determined from the following table, using the public outrage factor and hazard rating:

Table 23: Hazard/Risk Rating.

Public outrage Factor		Hazard Rating			
		High, H	Significant, S	Moderate, M	Low, L
		13-25	7-12	5-6	1-4
High, H	4	52-100	28-48	20-14	4-16
Significant, S	3	39-75	21-36	15-18	3-12
Moderate, M	2	26-50	14-24	10-12	2-8
Low, L	1	13-25	7-12	5-6	1-4

	High Risk
	Significant Risk
	Moderate Risk
	Low Risk

8.5 Evaluate Risks

The AMD risk manager shall be responsible for evaluating risks, and determining what risk treatment is to be applied.

8.5.1 Risk Treatment Priority (RTP)

Risk Manager shall assign each risk a RTP according to the following table:

Table 24: Risk Treatment Priority.

Treatment Priority	Rating	Definition
Low	1	Monitoring and reviewing
Medium	2	All Significant level risks. Treatment completion date has been specified, but execution as resources are available.
High	3	High level risks whose consequences are rated as Major or Moderate. Treatment shall be scheduled for completion before the risk event is likely to occur.
Critical	4	High level risks whose consequences are rated as Catastrophic. Risk Treatment activity shall be scheduled on the project Critical Path, with completion before the event is likely to occur (if possible).
Closed	5	Risk Closed.

8.6 Risk Treatment

Risk treatment involves identifying the range of options for treating AMD risks, assessing the options, and preparing and implementing risk treatment plans.

8.6.1 Risk Treatment Options

The risk manager in consultation with relevant internal stakeholders shall decide on one or more of the following treatments for each quantified risk:

- **Accept the risk:** No action shall be required to reduce the likelihood or the consequence of the AMD risk occurring. This option shall only be adopted for AMD risks having low impact consequences and low likelihood of occurrence.
- **Monitor the risk:** The risk manager shall not proactively mitigate the AMD risk, but monitor it to see whether it is more or less likely to occur as time goes on. This option may be adopted for serious AMD risks that are not likely to occur.
- **Mitigate the risk:** In most cases, this shall be the approach taken. Proactive steps shall be taken if an AMD risk has been identified to ensure that the likelihood or consequence (impact) of the risk is minimised in the event it does occur. When required, a system or procedure shall be put in place (or improved) to mitigate the risk.

8.7 Risk Mitigation

The risk manager in consultation with Senior Managers shall be responsible for approving the AMD risk mitigation activities. The AMD risk mitigation shall include existing procedure or developing new procedures which:

- Reduce the likelihood of occurrence and/or
- Reduce the consequences.

AMD risk mitigation shall take into account the costs associated with proposed actions, effectiveness of proposed mitigation methodologies and the time required implementing them. All mitigation activities shall be reviewed regularly to determine their impact on the risk and their effectiveness.

- **High Level Risks:** shall have a risk mitigation strategy for each high level AMD risk that is identified, to ensure the risk is managed successfully.
- **Significant Level Risks:** shall be evaluated to determine if the impact is severe enough to warrant the creation of an AMD risk mitigation strategy, or if existing systems are sufficient.

- **Low Level Risks:** shall be evaluated to determine if they should be listed as assumptions or recognised as a potential for problems. Low level AMD risks do not normally require a risk mitigation strategy.

For every high and significant AMD risk the strategy shall include a contingency for options available to the project in the event the risk eventuates.

8.8 Monitor and Review

The risk manager shall be responsible for monitoring and reviewing all AMD risks. Changes in risk likelihood or consequence may result in change to a risk's level rating. Any risk whose level changes shall be re-evaluated by the relevant risk manager.

AMD risk ratings shall be frequently updated to reflect the effect of control or mitigation strategies. The risk manager shall conduct reviews to ensure that mitigation strategies are effective.

Communication and consultation is essential to effective risk management. The risk manager shall ensure that all stakeholders involved in the risk management process have effective means of communication in place, and that appropriate consultation forums are established to ensure that AMD risks are identified, assessed, and treated and reported up to the next level of Management as efficiently as is practicable.

8.9 Risk Assessment

A detailed assessment of risk for the management of sulfide mine wastes is presented overleaf:

Table 25: Risk Assessment for the Management of Sulfide Mine Wastes.

	Likelihood:	Almost certain	5	Consequence:	Catastrophic	5	Uncertainty and adequacy of Existing Controls	High	4		Public Outrage Factor	High	4	Residual Risk		
		Likely	4		Major	4		Moderate	3			Moderate	3			
		Moderate	3		Moderate	3		Low	2			Minor	2			
		Unlikely	2		Minor	2		Nil	1			Insignificant	1			
		Rare	1		Insignificant	1										
Ref	Risk Description: what/how/where/term?	Operations/ Post Mining	Likelihood		Consequences		Uncertainty Factor	Hazard Rating	Hazard Priority	Public outrage Factor	Risk Rating	Risk Priority	Management Strategy/Proposed controls	Likelihood	Consequence	Hazard Rating
Rating	Uncertainty	Rating	Uncertainty													
0	CLIMATE (e.g. Rainfall, drought, flooding, erosion, etc)															
1	Dry season: effect on WRD capping (e.g. cracking, wind erosion, etc.)	Operations	3	2	3	2	4	9	Significant	3	27	Significant	Constant monitoring and implement high level surface contact covers such as vegetation cover.	2	2	4
2	Wet season: Effect on WRD capping (e.g. Erosion, runoff, subsidence etc.)	Operations	4	2	4	2	4	16	High	3	48	High	a) Constant monitoring; b) adopt geotechnical remediation measures including delineation of the flow lines from the top to the bottom of the dump; c) implement surface contact cover such as vegetation cover.	3	3	9
3	Flooding of WRD	Operations	3	2	4	2	4	12	Significant	4	48	High	a) Constant monitoring; b) up to date water balances; c) implement flood controlling bunds, d) dewatering programs, etc.	2	3	6
4	Flooding of pits	Operations	4	1	4	1	1	16	High	4	64	High	a) Constant monitoring; b) up to date water balances; c) implement water treatment facilities, c) irrigation of treated water exceedances, d) pit dewatering programs.	3	3	9
5	Overtopping from flooded pits	Operations	3	2	3	2	4	9	Significant	4	36	Significant	a) Constant monitoring; b) up to date water balances; c) implement water treatment facilities, c) irrigation of treated water exceedances.	2	3	6

6	ECOLOGICAL															
7	Degradation of biota/vegetation in waterways	Operations	2	2	2	2	4	4	Low	2	8	Moderate	a) Constant monitoring of source of contamination, b) Prevention of contaminated effluents entering into the surface/groundwater systems.	2	2	4
8	Failure of re/vegetated covers	Operations	3	2	4	1	2	12	Significant	3	36	Significant	a) Constant monitoring of seepages, outflows, etc.; b) soils cover assessment for nutrients and where needed supplement nutrients to weathered and crushed PAF materials; and c) implement neutralisation programs.	2	2	4
9	GEOTECHNICAL and/or PROCESSING ACTIVITIES															
10	WRD structure and environmental setting	Operations	2	1	2	1	1	4	Moderate	2	8	Moderate	a) Implement adequate designs in discrete areas, b) on completion, implement covers to propagate vegetation grow.	2	1	2
11	WRD collapsing	Operations	3	3	4	2	6	12	Significant	3	36	Significant	Constant geotechnical monitoring and, where needed, implement remediation programs such as surface remoulding, dewatering, etc.	2	3	6
12	Open Pits and environmental setting	Operations	2	1	2	1	1	4	Moderate	2	8	Moderate	a) Design pits so that risks to people, environment and animals are minimised, b) implement safety measures such as provision of bund walls, fencing, warning and vegetation growth to minimise risks.	2	2	4
13	Subsidence of pit walls and PAF containment structures	Operations	3	2	3	1	2	9	Moderate	4	36	Significant	Adopt high level of compaction methodologies and prevent water ponding on the top surfaces of the waste rock dumps.	2	3	6
14	Pit walls failure/collapse of PAF bearing materials (e.g. pore pressures)	Operations	3	2	3	2	4	9	Significant	4	36	Significant	a) Constant geotechnical monitoring, b) identify nature of the strata and implement remediation programs including blanketing of pit faces with clays , c) limit human and animal access to the site by implementing bun wall around the perimeter of the pit	3	3	9
15	Mine infrastructure (e.g. processing plant)	Operations	2	2	4	2	4	8	Significant	3	24	Significant	a) Implement adequate waste management processes, b) implement monitoring programs to define whether management processes are adequate, c) where needed modify solid/liquid waste handling procedures.	2	2	4

16	OXIDATION OF EXPOSED SULFIDES PIT WALLS/WRD/PROCESSING PLANT															
17	Exceedance of PAF wastes/low grade ore	Operations	3	2	4	2	4	12	Significant	3	36	Significant	a) Ongoing monitoring and geochemical and physical characterisation and quantification of waste rock/low-grade ores, b) remediation measures as for the Sulfide Waste/ Mine Waste Management Plan.	2	3	6
18	Lack of NAF materials	Operations	4	2	4	2	4	16	High	3	48	High	a) Ongoing monitoring and geochemical and physical characterisation and quantification of waste rock/low-grade ores, b) remediation measures as for the Sulfide Waste/ Mine Waste Management Plan.	3	3	9
19	Seepage from Pits, ROMs and WRDs	Operations	4	1	3	1	1	12	Significant	4	48	High	a) Ongoing monitoring, b) implementation of sumps to collect and remediate contaminated seepages, c) neutralisation of acid effluents.	3	3	9
20	Exceedance of leachates from WRD and pit walls	Operations	3	1	4	1	1	12	Significant	4	48	High	a) Ongoing monitoring, b) implementation of sumps to collect and remediate contaminated seepages, c) implement covers in WRD to prevent water/oxygen infiltration into PAF materials, d) neutralisation of acid effluents.	2	3	6
21	Acidity of Leachates	Operations	3	1	4	1	1	12	Significant	4	48	High	a) Ongoing monitoring, b) implementation of sumps to collect and remediate contaminated seepages, c) neutralisation of acid effluents.	2	4	8
22	Loading in leachates	Operations	3	1	4	1	1	12	Significant	4	48	High	a) Ongoing monitoring, b) implementation of sumps to collect and remediate contaminated seepages, c) neutralisation of acid effluents.	3	3	9
23	Deposition of salts	Operations	2	2	4	2	4	8	Significant	4	32	Significant	a) Ongoing monitoring, b) implementation of sumps to collect and remediate contaminated seepages, c) neutralisation of acid effluents.	2	2	4
24	WATERBODIES															
25	Groundwater contamination by AMD	Operations	3	2	4	2	4	12	Significant	4	48	High	a) Continuous monitoring of both quality and groundwater levels, b) collection and treatment of acid and solute loaded waters, c) implement irrigation programs of treated/remediated waters.	2	3	6

26	Surface water contamination by AMD affected waters	Operations	4	2	4	2	4	16	High	4	64	High	a) Continuous monitoring of both quality and groundwater levels, b) collection and treatment of acid and solute loaded waters, c) implement irrigation programs of treated/remediated waters.	3	3	9
27	Process AMD waters and exceedances	Operations	2	2	4	2	4	8	Moderate	2	16	Significant	a) Continuous monitoring of both quality and quantity of exceedance waters, b) collection and treatment of acid and solute loaded waters, c) implement irrigation programs of treated/remediated waters.	2	3	6
28	Pit water quality	Operations	4	2	3	2	4	12	Significant	3	36	Significant	a) Continuous monitoring of both quality and quantity (pit water balances) of pit waters, b) implement passive (e.g. wetlands to treat acid waters) and/or active (e.g. add alkaline chemicals to raise water pH) AMD remediation measures.	3	3	9
29	Pit AMD water exceedance	Operations	3	2	4	2	4	12	Significant	3	36	Significant	a) Continuous monitoring of both quality and quantity (pit water balances) of pit waters, b) implement passive (e.g. wetlands to treat acid waters) and/or active (e.g. add alkaline chemicals to raise water pH) AMD remediation measures.	2	3	6
30	Pore water pressures in pit walls and WRD	Operations	3	3	3	3	9	9	Significant	2	18	Significant	Implement continuous geotechnical monitoring programs and where needed and pit/wall depressurisation programs	2	4	8
31	CLOSURE AND REHABILITATION															
32	Natural analogues to confine long term AMD structures	Post-mining	2	1	3	1	1	6	Moderate	2	12	Moderate	Investigate all components of a pre-mine landform and implement as soon as advantageous pilot/analogue sites to understand long term landform system behaviour.	2	1	2
33	Mine waste rock structure containing PAF materials (e.g. slopes, benches, etc.)	Post-mining	3	2	3	2	4	9	Significant	3	27	Significant	Implement adequate compaction methodologies to slop the piles so as these blend with the natural environment and prevent high degrees of infiltration and runoff.	2	3	6
34	Sustainability of selected capping materials to contain and prevent	Post-mining	2	2	4	2	4	8	Significant	3	24	Significant	Select adequate cover materials so as these are characterised with good water retention capabilities and assist by preventing infiltration to deeper domains and	2	2	4

	accelerated PAF material weathering												triggering revegetation.			
35	Final landforms and sustainability of PAF implemented remediation measures	Post-mining	2	2	4	2	4	8	Moderate	4	32	Significant	Final landform would aim to reconstruct similar distributions of slope angles, slope lengths, vegetation patterns to those landforms that were in place prior to mining.	2	2	4
36	Pit stability and weathering of PAF materials	Post-mining	2	2	4	1	2	8	Significant	3	24	Significant	a) design pits so that risks to people, environment and animals are minimised, b) implement safety measures such as provision of bund walls, fencing, warning and vegetation growth to minimise risks.	2	1	2
37	Contained pit water quality	Post-mining	2	2	4	1	2	8	Significant	3	24	Significant	a) Continuous monitoring of both quality and quantity (pit water balances) of pit waters, b) implement passive (e.g. wetlands to treat acid waters) and/or active (e.g. add alkaline chemicals to raise water pH) AMD remediation measures.	2	2	4
38	Overflow/underflow contamination from both WRD and pits	Post-mining	4	1	4	2	2	16	High	4	64	High	a) Ongoing monitoring, b) implementation of sumps to collect and remediate contaminated seepages, c) implement covers in WRD to prevent water/oxygen infiltration into PAF materials, d) neutralisation of acid effluents.	3	2	6
39	Revegetation sustainability	Post-mining	2	1	4	2	2	8	Significant	4	32	Significant	Vegetation, where possible, will be native and covers would be adapted to conditions of those landforms that were in place prior to mining.	2	2	4
40	Demolition and removal of infrastructure (e.g. processing plant and AMD containment facilities)	Post-mining	2	2	4	1	2	8	Significant	4	32	Significant	Monitoring, collection of spillages, solid wastes, and where needed, remediation measures such as neutralisation would be in place before disposal of contaminated solid and liquid wastes.	2	2	4

9 Mine Waste Management

The overall management option for the RBPA is designed to promote better environmental practice and continuous environmental improvement and awareness of AMD issues at the site.

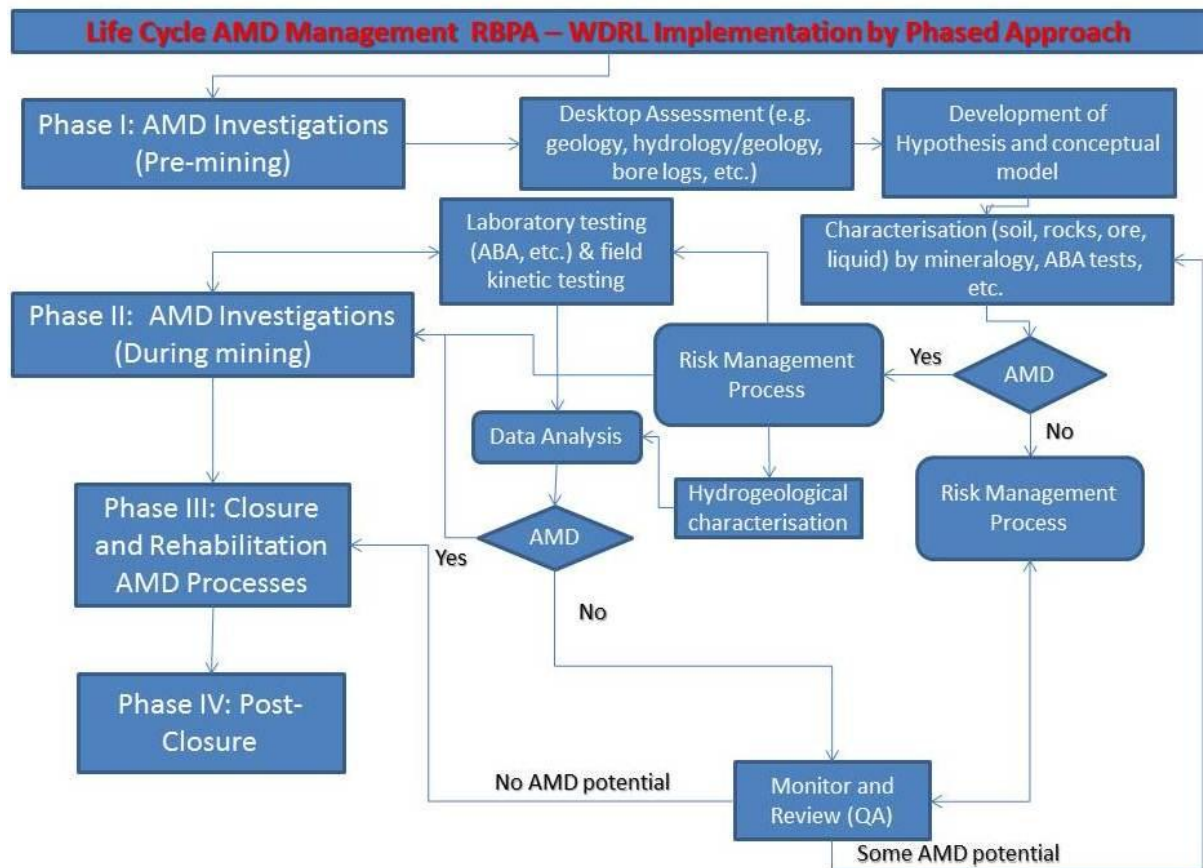


Figure 23: Life Cycle AMD Management.

Figure 23 details the proposed life cycle for AMD management at the WDRL starting at the pre-mining site condition and extends to post-closure of the mine site. It is expected that AMD management processes will be constantly reviewed and improved as implied in the AMD management implementation by a phased approach.

Specific practical AMD management entails:

- Since current predictions indicate that about 70% of materials contain higher ANC capacities, waste rocks to be managed and disposed of will be subject to:
 - Site control and monitoring of excavated materials whilst developing the pit structures which will also be carefully engineered and monitored.
 - Upfront engineering/scientific approaches to identify/predict, prevent, remediate and monitor potential AMD formation.
 - Assessment and performance evaluation of selected methodologies for the on-going identification/prediction, prevention, treatment and remediation of AMD. Rehabilitation and closure of the mine will be the driver for this assessment.
 - On-going risk assessment to define impacts on the local ecosystems and downstream environments.

Specific approaches selected to adequately manage the potential for AMD formation during the construction phase in the RBIO, WDRL includes:

- Continuous and detailed geochemical characterisation of waste/ore materials including:
 - Identification and review of available site collated data.
 - Targeted drilling at narrower spacing to define whether predicted and identified PAF materials, particularly those defined as highly localised, are extent across the bulk and ore body and waste rock materials. Findings will assist in improving delineation of both PAF/NAF waste and ore materials and define further management processes.
 - Refine geochemical characterisation plan. A refined geochemical characterisation plan may include:
 - Refine block model to improve waste rock/ore body delineation on regards to NAF/PAF characterisation.
 - Define NAF/PAF characterisation in exposed and properly delineated low grade ore bodies.
 - Define selective and targeted sampling procedures for NAF/PAF characterisation.
 - In-field characterisation/screening for PAF of both waste and ore body. The in-situ paste pH is a simple method for determining readily available acidity and alkalinity and indicates the immediate reactivity of sulphides and acid neutralising minerals present in the samples and this shall be the principal screening test. In this context:
 - A paste pH > 5.0 suggest the presence of reactive carbonates.
 - A paste pH < 5.0 suggests that the materials contain acidity from prior acid generation.
 - Specific paste pH screening methodology and steps will be defined and implemented before mine operations starts.
 - Where feasible and practical water sampling in the excavated area would be carried out to define natural weathering features.
 - Where materials shows low paste-pHs, representative samples will be send to the laboratory for full ABA assessment and results will be used for the overall mass waste rock ABA evaluation.
 - Where PAF materials are encountered, materials will be segregated and where possible prevent wider interaction with the atmosphere, particularly by rainfall. If disposal of these materials due to operational activities is postponed, materials will be provisionally encapsulated with NAF materials to then adequately be disposed of.
 - Implementation of kinetic tests to investigate SoRs and potential quality of drainage from mine waste structures, and this will entail:
 - Short term tests pre-mining kinetic tests. Although a detailed methodology to implement the test is in progress, a preferred kinetic tests approach will include the implementation of field test columns and pads for each materials of concern.
 - Monitoring of weathering conditions, drainage chemistry and loadings.
 - Long term kinetic tests. Investigation phase.
 - Refine the overall Waste Rock Management Plan.
- During-mining PAF waste rock management activities:
 - Implement long term kinetic tests. This will include:
 - Continuing pre-mine field kinetic tests and setting up new field test pads and monitoring sites on project components to study materials of concern.
 - Monthly basis monitoring of weathering conditions, drainage chemistry and loadings.
 - Prediction of post-closure drainage chemistry which will be periodically repeated.
 - Refine waste management approaches and included conceptual models to suit new observations and findings.

- The conceptual model for the disposal of PAF waste/low grade ore materials (Figure 24) include:

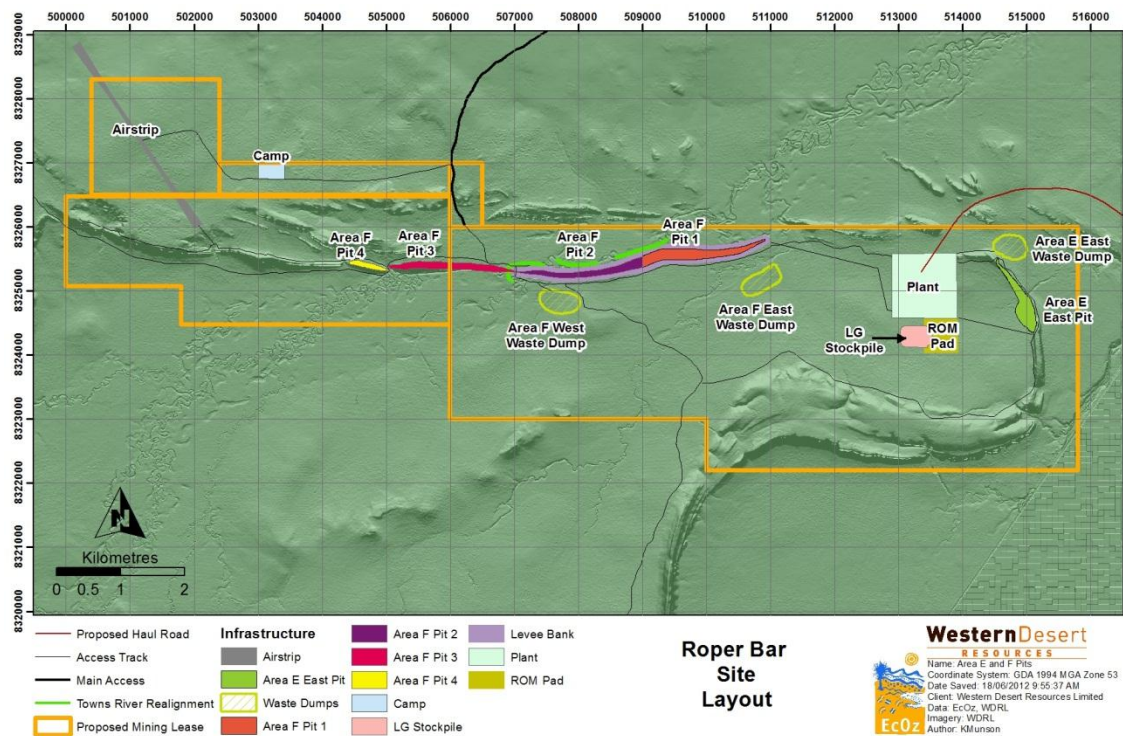


Figure 24: Locations of WRDs.

- Initial excavated NAF materials will be used to construct engineered beds and/or cells for the disposal by encapsulation of PAF materials. Encapsulation of PAF materials with high NAF materials will be accomplished as shown in the conceptual model below (Figure 26).
- Mine engineered waste rock dump (Figure 25) will include drainage systems, sediment traps, seepage diversion barriers and collection ponds, and embankments to prevent surface waters entering the waste rock dumps containing PAF materials.
- Identification of clay and highly weathered NAF materials to be used to construct an impermeable base for the Waste Rock Dump and for providing a landscaped cap during rehabilitation with the view to minimize ingress of oxygen and infiltration of rain. Significant weathered NAF rock materials, excluding those that are potentially acid forming, would be considered to be used for constructing pads and walls.
- Inhibition of oxygen and water into PAF materials is to be achieved by engineered dry covers (Figures 25 and 26). The applicability of store-release cover types as an option is being currently investigated.
- Monitoring will include surface water structures conveying and containing waters from ore and waste rock dumps. Shallow and deep bores for ground water monitoring will be constructed up and downstream of these facilities.

If ongoing waste characterisation identifies increased concentrations of PAF materials, a further approach of PAF management will include an updated PAF encapsulation model (Figure 26, Appendix I). However, this approach will need to be further investigated and engineered.

Post-mining, closure and rehabilitation: Mine waste handling will include processes and methodologies to prevent or minimize exposure of PAF materials to the atmosphere. Processes and methodologies which may include pit back filling, subaqueous disposal of reactive waste in mine voids

and/or in-pit disposal of waste rocks with alkaline materials addition will be described and developed as necessary and consulted with the relevant authorities.

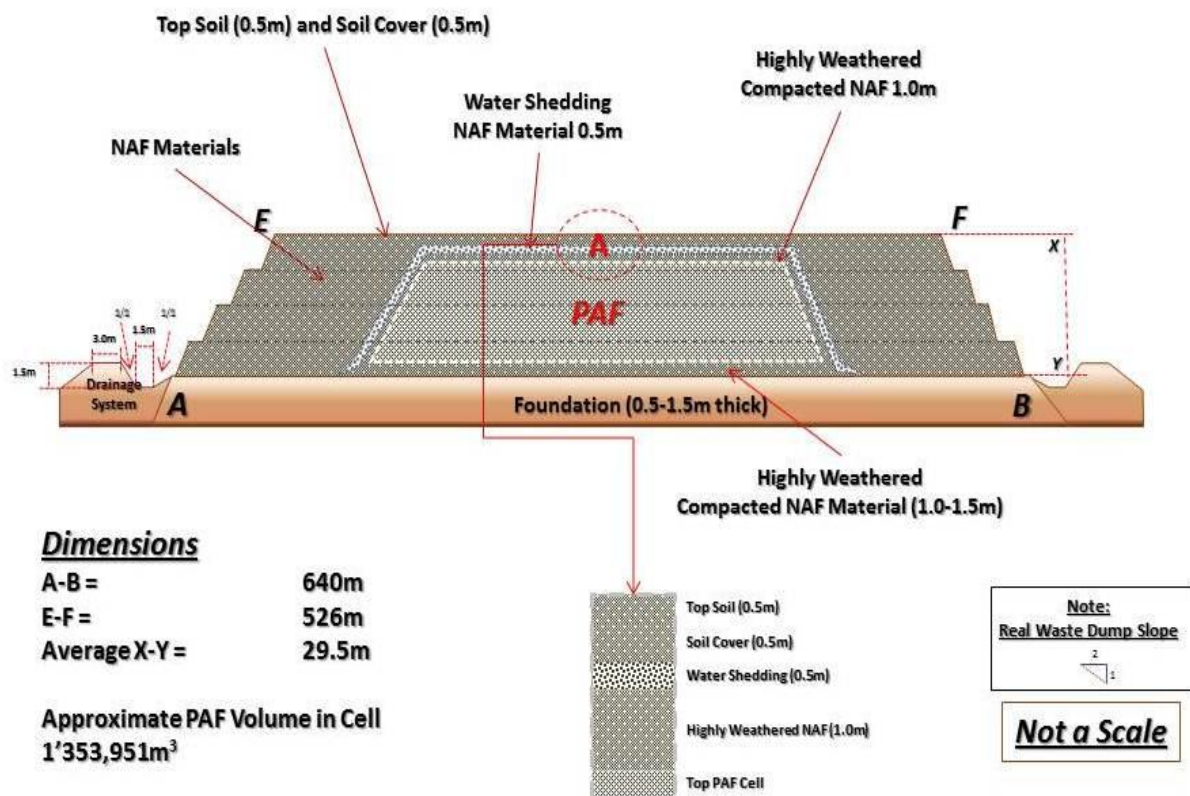


Figure 25: Option 1 Schematic Proposed Waste Rock Dump Arrangement.

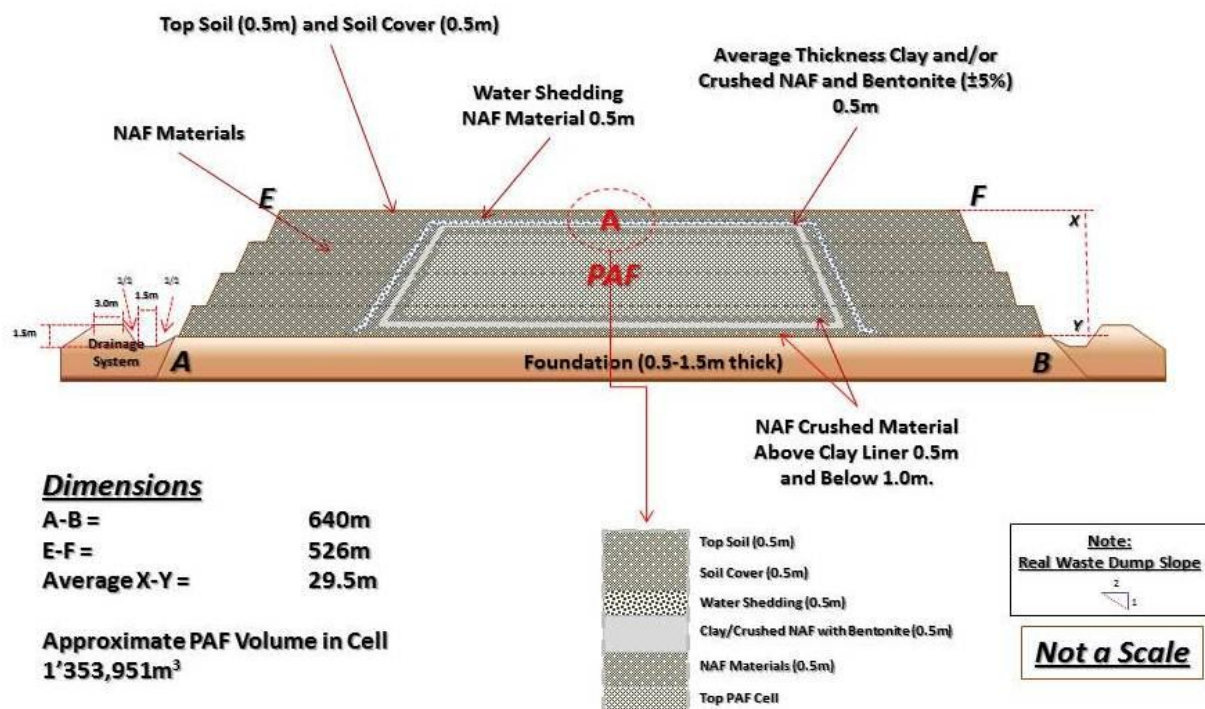


Figure 26: Option 2 Schematic Proposed Waste Rock Dump Arrangement.

Note: Waste Rock Dumps will be constructed with adequately engineered drainage systems, sediment traps, seepage diversion barriers and collection ponds, lysimeters to quantify infiltration rates, and embankments. Crushed NAF materials will be mixed with clays to prevent ingress of oxygen and water into the PAF materials.

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Appendix A

**Sample IDs, Lithological Descriptions, Sample Locations
and Selected Tests**

ALS Sample number	WDRL Sample ID	VDM Sample ID	Proposed Pit ID	Depth (m)	mTo	Source	Lithotype 1	Lithotype 1	Lithotype 2	Lithotype 2	ABA Tests	Leachate Analysis	XRD	SEM
Area E East														
EP1108259072	34653	WR001	Area E East Pit	12	13	Core	SST	Sandstone	SIDOO	Siderite oolite	✓			
EP1108946042	3661	WR002	Area E East Pit	19	20	Core	OO	Oolites and hematite enrichment			✓	✓	✓	✓
EP1201090001	WR144400	WR003	Area E East Pit	19	20	Core	SST	Sandstone			✓	✓	✓	✓
EP1201090002	WR144500	WR004	Area E East Pit	19	20	Core	OO	Oolites and hematite enrichment			✓			
EP1108946053	6673	WR005	Area E East Pit	20	21	Core	OO	Oolites and hematite enrichment			✓	✓		
EP1201090003	WR144403	WR006	Area E East Pit	20	21	Core	OST	Oolitic sandstone			✓	✓	✓	✓
EP1201090004	WR144503	WR007	Area E East Pit	20	21	Core	SST	Sandstone			✓	✓		
EP1108259085	60907	WR008	Area E East Pit	20	21	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓			
EP1108946044	4165	WR009	Area E East Pit	21	22	Core	CY	Clay	OO	Oolites and hematite enrichment	✓	✓	✓	
EP1108259045	30309	WR010	Area E East Pit	21	22	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓			
EP1108946008	3368	WR011	Area E East Pit	21	22	Core	SOO	Sandy oolite	OST	Oolitic sandstone	✓			
EP1201090005	WR144406	WR012	Area E East Pit	22	23	Core	SST	Sandstone	OO	Oolites and hematite enrichment	✓	✓	✓	✓
EP1201090006	WR144506	WR013	Area E East Pit	22	23	Core	SST	Sandstone	OO	Oolites and hematite enrichment	✓			
EP1108946017	6999	WR014	Area E East Pit	23	24	Core	SST	Sandstone	OST	Oolitic sandstone	✓	✓		
EP1108259071	33587	WR015	Area E East Pit	24	25	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓			
EP1108259080	31317	WR016	Area E East Pit	25	26	Core	SOO	Sandy oolite	OST	Oolitic sandstone	✓	✓	✓	✓
EP1108259082	60010	WR017	Area E East Pit	25	26	Core	SST	Sandstone			✓			
EP1201090007	WR144409	WR018	Area E East Pit	26	27	Core	SOO	Sandy oolite	OST	Oolitic sandstone	✓			
EP1201090008	WR144509	WR019	Area E East Pit	28	29	Core	OO	Oolites and hematite enrichment			✓			
EP1108946048	6061	WR020	Area E East Pit	29	30	Core	SST	Sandstone			✓			
EP1108946055	4554	WR021	Area E East Pit	30	31	Core	OO	Oolites and hematite enrichment				✓	✓	✓
EP1108259073	34664	WR022	Area E East Pit	31	32	Core	SST	Sandstone			✓	✓	✓	
EP1108946005	7004	WR023	Area E East Pit	32	33	Core	SOO	Sandy oolite			✓			
EP1108946043	3672	WR024	Area E East Pit	32	33	Core	SOO	Sandy oolite			✓			
EP1108946045	4172	WR025	Area E East Pit	32	33	Core	SST	Sandstone			✓			
EP1108259086	60913	WR026	Area E East Pit	33	34	Core	SOO	Sandy oolite	OO	Oolites and hematite enrichment	✓	✓		
EP1108259096	62312	WR027	Area E East Pit	33	34	Core	SST	Sandstone			✓	✓		
EP1201090009	WR144412	WR028	Area E East Pit	33	34	Core	SST	Sandstone			✓			
EP1201090010	WR144512	WR029	Area E East Pit	34	35	Core	SOO	Sandy oolite			✓			
EP1108259016	60015	WR030	Area E East Pit	34	35	Core	SST	Sandstone			✓			
EP1108259047	32285	WR031	Area E East Pit	35	36	Core	SST	Sandstone			✓			
EP1108259033	30458	WR032	Area E East Pit	36	37	Core	SLT	Siltstone	OO	Oolites and hematite enrichment	✓	✓	✓	✓
EP1108259050	60918	WR033	Area E East Pit	36	37	Core	SST	Sandstone			✓			
EP1108946009	6689	WR034	Area E East Pit	37	38	Core	OO	Oolites and hematite enrichment			✓	✓	✓	✓
EP1201090011	WR144415	WR035	Area E East Pit	38	39	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓			
EP1201090012	WR144515	WR036	Area E East Pit	38	39	Core	OO	Oolites and hematite enrichment	CY	Clay	✓	✓	✓	✓
EP1108946004	5759	WR037	Area E East Pit	38	39	Core	SST	Sandstone			✓	✓	✓	✓
EP1108946041	3680	WR038	Area E East Pit	39	40	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1108259030	34671	WR039	Area E East Pit	40	41	Core	SLT	Siltstone	SST	Sandstone	✓	✓	✓	✓
EP1108946037	6069	WR040	Area E East Pit	41	42	Core	SIDOO	Siderite oolite			✓	✓	✓	✓
EP1201090013	WR144418	WR041	Area E East Pit	41	42	Core	OO	Oolites and hematite enrichment			✓	✓		
EP1201090014	WR144518	WR042	Area E East Pit	43	44	Core	OO	Oolites and hematite enrichment			✓			
EP1108259005	62269	WR043	Area E East Pit	45	46	Core	SLT	Siltstone			✓	✓	✓	✓
EP1108259018	60124	WR044	Area E East Pit	48	49	Core	SLT	Siltstone			✓	✓		
EP1108259037	33597	WR045	Area E East Pit	48	49	Core	OO	Oolites and hematite enrichment			✓			
EP1108259051	61406	WR046	Area E East Pit	55	56	Core	SOO	Sandy oolite			✓	✓	✓	✓
EP1108259079	30322	WR047	Area E East Pit	63	64	Core	SST	Sandstone			✓	✓		
EP1108259006	61407	WR048	Area E East Pit	67	68	Core	SST	Sandstone			✓			
EP1108259043	61867	WR049	Area E East Pit	76	77	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓	✓	✓	✓
EP1108259052	61527	WR050	Area E East Pit	84	85	Core	SIDOO	Siderite oolite	SIDSOO	Strongly sideritic sandy oolite	✓			
EP1108259061	34673	WR051	Area E East Pit	88	89	Core	SLT	Siltstone	OO	Oolites and hematite enrichment	✓			
EP1108946010	5365	WR052	Area E East Pit	92	93	Core	SST	Sandstone			✓			
EP1108946018	7013	WR053	Area E East Pit	97	98	Core	SOO	Sandy oolite	OST	Oolitic sandstone	✓	✓		
EP1108259014	34674	WR054	Area E East Pit	98	99	Core	OO	Oolites and hematite enrichment			✓			
EP1108259022	61786	WR055	Area E East Pit	99	100	Core	OO	Oolites and hematite enrichment			✓	✓	✓	
EP1108259053	61528	WR056	Area E East Pit	105	106	Core	SLT	Siltstone	OO	Oolites and hematite enrichment	✓			
EP1108259074	61408	WR057	Area E East Pit	108	109	Core	SLT	Siltstone	SIDOO	Siderite oolite	✓			
EP1108946001	5794	WR058	Area E East Pit	115	116	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓			
EP1108946011	7014	WR059	Area E East Pit	121	122	Core	SST	Sandstone	SOO	Sandy oolite	✓			
EP1108946050	6163	WR060	Area E East Pit	128	129	Core	SST	Sandstone			✓			
Area E South														
EP1201090015	WR144421	WR061	Area E South Pit	0	1	Core	SOO	Sandy oolite			✓			
EP1201090016	WR144521	WR062	Area E South Pit	1	2	Core	SST	Sandstone	SLT	Siltstone	✓	✓		
EP1108259081	34677	WR063	Area E South Pit	6	7	Core	OO	Oolites and hematite enrichment			✓			
EP1108259097	62322	WR064	Area E South Pit	9	10	Core	SOO	Sandy oolite			✓			
EP1108946012	5367	WR065	Area E South Pit	9	10	Core	SST	Sandstone			✓			
EP1108259015	35170	WR066	Area E South Pit	11	12	Core	SOO	Sandy oolite	SST	Sandstone	✓			
EP1108259017	60024	WR067	Area E South Pit	14	15	Core	OO	Oolites and hematite enrichment			✓			
EP1108259039	61870	WR068	Area E South Pit	15	16	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓	✓		
EP1108259046	30466	WR069	Area E South Pit	15	16	Core	OST	Oolitic sandstone			✓	✓		
EP1108946013	6382	WR070	Area E South Pit	18	19	Core	OO	Oolites and hematite enrichment	OST	Oolitic sandstone	✓	✓		
EP1108259027	32295	WR071	Area E South Pit	19	20	Core	SST	Sandstone	SLT	Siltstone	✓	✓		
EP1108259056	62324	WR072	Area E South Pit	19	20	Core	SST	Sandstone			✓			
EP1108259062	34679	WR073	Area E South Pit	20	21	Core	OST	Oolitic sandstone	SOO	Sandy oolite	✓			
EP1108946014	7017	WR074	Area E South Pit	21	22	Core	SST	Sandstone	SIDOO	Siderite oolite	✓	✓	✓	✓
EP1201090017	WR144424	WR075	Area E South Pit	22	23	Core	SST	Sandstone	OST	Oolitic sandstone	✓			
EP1201090018	WR144524	WR076	Area E South Pit	23	24	Core	SST	Sandstone	SLT	Siltstone	✓	✓	✓	✓
EP1108259020	61872	WR077	Area E South Pit	23	24	Core	OO	Oolites and hematite enrichment			✓			
EP1108259095	62089	WR078	Area E South Pit	24	25	Core	SIDSOO	Strongly sideritic sandy oolite	SOO	Sandy oolite	✓	✓		✓
EP1108946020	6699	WR079	Area E South Pit	24	25	Core	OST	Oolitic sandstone	SST	Sandstone	✓			
EP1108259024	31336	WR080	Area E South Pit	25	26	Core	SST	Sandstone			✓			
EP1108259076	61873	WR081	Area E South Pit	26	27	Core	SLT	Siltstone	SIDOO	Siderite oolite	✓	✓	✓	
EP1108946021	7019	WR082	Area E South Pit	27	28	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓	✓	✓	✓

ALS Sample number	WDRL Sample ID	VDM Sample ID	Proposed Pit ID	Depth (m)	mTo	Source	Lithotype 1	Lithotype 1	Lithotype 2	Lithotype 2	ABA Tests	Leachate Analysis	XRD	SEM
EP1108259001	34729	WR083	Area E South Pit	29	30	Core	OO	Oolites and hematite enrichment		Siltstone	✓	✓		✓
EP1201090019	WR144427	WR084	Area E South Pit	29	30	Core	SOO	Sandy oolite	SLT	Siltstone	✓	✓		✓
EP1201090020	WR144527	WR085	Area E South Pit	31	32	Core	OST	Oolitic sandstone			✓			
EP1108259057	62330	WR086	Area E South Pit	34	35	Core	SLT	Siltstone	OST	Oolitic sandstone	✓	✓	✓	✓
EP1108946006	6387	WR087	Area E South Pit	34	35	Core	SIDSOO	Strongly sideritic sandy oolite			✓	✓		
EP1108946022	7021	WR088	Area E South Pit	36	37	Core	SST	Sandstone	OO	Oolites and hematite enrichment	✓			
EP1108946049	6081	WR089	Area E South Pit	36	37	Core	SIDOO	Siderite oolite			✓	✓	✓	
EP1108259028	30472	WR090	Area E South Pit	39	40	Core	SST	Sandstone	SLT	Siltstone	✓	✓	✓	✓
EP1108259090	61604	WR091	Area E South Pit	40	41	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1108946003	6954	WR092	Area E South Pit	46	47	Core	SST	Sandstone			✓			
EP1108946023	7022	WR093	Area E South Pit	49	50	Core	OO	Oolites and hematite enrichment			✓	✓		
EP1108946046	4573	WR094	Area E South Pit	57	58	Core	SLT	Siltstone	SIDOO	Siderite oolite	✓	✓	✓	✓
EP1108259004	61417	WR095	Area E South Pit	67	68	Core	SLT	Siltstone	QZT	Quartzite	✓			
Area F East Pit 1														
EP1108946051	6332	WR096	Area F East Pit 1	8	9	Core	OST	Oolitic sandstone	SST	Sandstone	✓	✓		
EP1108946025	6175	WR097	Area F East Pit 1	10	11	Core	OO	Oolites and hematite enrichment			✓	✓	✓	✓
EP1108259009	32307	WR098	Area F East Pit 1	11	12	Core	SST	Sandstone	OST	Oolitic sandstone	✓	✓	✓	
EP1108946026	6961	WR099	Area F East Pit 1	20	21	Core	OO	Oolites and hematite enrichment			✓			
EP1108946054	6395	WR100	Area F East Pit 1	21	22	Core	OO	Oolites and hematite enrichment	OST	Oolitic sandstone	✓	✓		
EP1108259002	35536	WR101	Area F East Pit 1	24	25	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓	✓		
EP1108946039	6338	WR102	Area F East Pit 1	26	27	Core	SST	Sandstone			✓			
EP1108946019	6339	WR103	Area F East Pit 1	28	29	Core	SST	Sandstone			✓	✓	✓	✓
EP1201090028	WR144539	WR104	Area F East Pit 1	29	30	Core	OO	Oolites and hematite enrichment			✓			
EP1201090027	WR144439	WR105	Area F East Pit 1	29	30	Core	SST	Sandstone			✓			
EP1108259012	61429	WR106	Area F East Pit 1	30	31	Core	SST	Sandstone			✓			
EP1108946030	7056	WR107	Area F East Pit 1	40	41	Core	SST	Sandstone			✓	✓	✓	✓
EP1201090031	WR144445	WR108	Area F East Pit 1	43	44	Core	SST	Sandstone			✓			
EP1108259058	62608	WR109	Area F East Pit 1	48	49	Core	OO	Oolites and hematite enrichment			✓	✓	✓	✓
EP1108946032	6293	WR110	Area F East Pit 1	56	57	Core	OO	Oolites and hematite enrichment			✓			
EP1201090039	WR144457	WR111	Area F East Pit 1	69	70	Core	SST	Sandstone			✓	✓	✓	
Area F East Pit 2														
EP1108259048	60033	WR112	Area F East Pit 2	0	1	Core	SOO	Sandy oolite	SST	Sandstone	✓			
EP1108946038	6172	WR113	Area F East Pit 2	0	3	Core	CY	Clay	SST	Sandstone	✓			
EP1201090022	WR144530	WR114	Area F East Pit 2	3	6	Core	CY	Clay	SST	Sandstone	✓	✓		
EP1108259060	32304	WR115	Area F East Pit 2	4	5	Core	SST	Sandstone	SOO	Sandy oolite	✓			
EP1108259025	61640	WR116	Area F East Pit 2	4	5	Core	SST	Sandstone	SOO	Sandy oolite	✓			
EP1108259091	61607	WR117	Area F East Pit 2	6	9	Core	CY	Clay	GVL	Gravel	✓			
EP1108259084	60505	WR118	Area F East Pit 2	9	12	Core	SST	Sandstone	SLT	Siltstone	✓	✓	✓	✓
EP1201090023	WR144433	WR119	Area F East Pit 2	11	12	Core	OST	Oolitic sandstone	SOO	Sandy oolite	✓			
EP1201090024	WR144533	WR120	Area F East Pit 2	11	12	Core	OST	Oolitic sandstone	OO	Oolites and hematite enrichment	✓			
EP1108259092	61609	WR121	Area F East Pit 2	12	15	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108946047	5963	WR122	Area F East Pit 2	15	16	Core	OO	Oolites and hematite enrichment			✓			
EP1108259010	35511	WR123	Area F East Pit 2	15	18	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108259026	31346	WR124	Area F East Pit 2	17	18	Core	OO	Oolites and hematite enrichment			✓	✓	✓	
EP1108259089	61543	WR125	Area F East Pit 2	18	21	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1201090026	WR144536	WR126	Area F East Pit 2	21	24	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108946027	4978	WR127	Area F East Pit 2	24	27	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108259067	61428	WR128	Area F East Pit 2	27	30	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108946028	6107	WR129	Area F East Pit 2	30	33	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108259007	62665	WR130	Area F East Pit 2	33	36	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1201090029	WR144442	WR131	Area F East Pit 2	36	39	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108259055	61892	WR132	Area F East Pit 2	39	42	Core	SST	Sandstone	SLT	Siltstone	✓	✓	✓	✓
EP1108259011	60321	WR133	Area F East Pit 2	42	45	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108259041	60324	WR134	Area F East Pit 2	45	48	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1201090033	WR144448	WR135	Area F East Pit 2	48	51	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108259040	60055	WR136	Area F East Pit 2	51	54	Core	SST	Sandstone			✓			
EP1108259066	60058	WR137	Area F East Pit 2	54	57	Core	SST	Sandstone			✓			
EP1201090038	WR144554	WR138	Area F East Pit 2	57	60	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108946033	6294	WR139	Area F East Pit 2	60	63	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108259008	31444	WR140	Area F East Pit 2	63	66	Core	SST	Sandstone	SLT	Siltstone	✓	✓		
EP1108946035	6314	WR141	Area F East Pit 2	66	69	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1201090041	WR144460	WR142	Area F East Pit 2	69	72	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1108259038	61558	WR143	Area F East Pit 2	72	75	Core	SST	Sandstone	SLT	Siltstone	✓			
EP1201090044	WR144563	WR144	Area F East Pit 2	75	78	Core	SST	Sandstone	SLT	Siltstone	✓			
Area F East Pit 3														
EP1108946024	7023	WR145	Area F East Pit 3	0	3	Core	CY	Clay			✓	✓	✓	✓
EP1201090021	WR144430	WR146	Area F East Pit 3	3	6	Core	CY	Clay			✓			
EP1108259078	62006	WR147	Area F East Pit 3	6	9	Core	CY	Clay	GVL	Gravel	✓			
EP1108259077	61881	WR148	Area F East Pit 3	6	7	Core	SOO	Sandy oolite	SST	Sandstone	✓	✓		
EP1108259042	61608	WR149	Area F East Pit 3	9	12	Core	SLT	Siltstone	CY	Clay	✓			
EP1108259035	61882	WR150	Area F East Pit 3	9	10	Core	SST	Sandstone			✓			
EP1108259075	61541	WR151	Area F East Pit 3	12	15	Core	SLT	Siltstone	CY	Clay	✓			
EP1108259036	32778	WR152	Area F East Pit 3	12	13	Core	SST	Sandstone			✓			
EP1108946015	6393	WR153	Area F East Pit 3	14	15	Core	SST	Sandstone			✓	✓	✓	✓
EP1108259088	61542	WR154	Area F East Pit 3	15	18	Core	SLT	Siltstone	CY	Clay	✓	✓		
EP1108259049	60039	WR155	Area F East Pit 3	18	21	Core	SLT	Siltstone	CY	Clay	✓			
EP1201090025	WR144436	WR156	Area F East Pit 3	21	24	Core	SLT	Siltstone	SST	Sandstone	✓	✓	✓	✓
EP1108259044	60594	WR157	Area F East Pit 3	23	24	Core	SST	Sandstone			✓	✓	✓	✓
EP1108259019	61427	WR158	Area F East Pit 3	24	27	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1108259013	30484	WR159	Area F East Pit 3	27	30	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1108946002	7053	WR160	Area F East Pit 3	30	33	Core	SLT	Siltstone	SST	Sandstone	✓	✓	✓	✓
EP1108259064	31352	WR161	Area F East Pit 3	30	31	Core	OO	Oolites and hematite enrichment			✓			
EP1108946052	6340	WR162	Area F East Pit 3	33	36	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1108259032	61652	WR163	Area F East Pit 3	36	37	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓			

ALS Sample number	WDRL Sample ID	VDM Sample ID	Proposed Pit ID	Depth (m)	mTo	Source	Lithotype 1	Lithotype 1	Lithotype 2	Lithotype 2	ABA Tests	Leachate Analysis	XRD	SEM
EP1108946029	5787	WR164	Area F East Pit 3	36	39	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1201090030	WR144542	WR165	Area F East Pit 3	39	42	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1108259031	60047	WR166	Area F East Pit 3	42	45	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1201090032	WR144545	WR167	Area F East Pit 3	44	45	Core	OO	Oolites and hematite enrichment			✓	✓		
EP1108946031	6971	WR168	Area F East Pit 3	45	48	Core	SLT	Siltstone	SST	Sandstone	✓	✓		
EP1108946040	7061	WR169	Area F East Pit 3	48	51	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1201090034	WR144548	WR170	Area F East Pit 3	50	51	Core	SLT	Siltstone			✓	✓		
EP1108259029	31436	WR171	Area F East Pit 3	51	54	Core	SLT	Siltstone	SST	Sandstone	✓	✓	✓	✓
EP1201090035	WR144451	WR172	Area F East Pit 3	53	54	Core	SLT	Siltstone			✓			
EP1201090036	WR144551	WR173	Area F East Pit 3	54	57	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1201090037	WR144454	WR174	Area F East Pit 3	57	60	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1108259021	62436	WR175	Area F East Pit 3	60	63	Core	SLT	Siltstone	SST	Sandstone	✓	✓	✓	✓
EP1108946034	7069	WR176	Area F East Pit 3	63	66	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1108946016	6296	WR177	Area F East Pit 3	66	69	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1201090040	WR144557	WR178	Area F East Pit 3	69	72	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1201090042	WR144560	WR179	Area F East Pit 3	72	75	Core	SLT	Siltstone	SST	Sandstone	✓	✓	✓	✓
EP1201090043	WR144463	WR180	Area F East Pit 3	75	78	Core	SLT	Siltstone	SST	Sandstone	✓			
EP1201090045	WR144466	WR181	Area F East Pit 3	78	79.97	Core	SLT	Siltstone	SST	Sandstone	✓	✓	✓	✓
Area F West														
EP1201090046	WR144566	WR182	Area F West Pit	10	11	Core	SST	Sandstone			✓			
EP1108259065	31456	WR183	Area F West Pit	16	17	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓	✓		✓
EP1108259087	61453	WR184	Area F West Pit	18	19	Core	OO	Oolites and hematite enrichment			✓	✓	✓	✓
EP1108946007	7084	WR185	Area F West Pit	21	22	Core	SST	Sandstone			✓	✓	✓	✓
EP1201090047	WR144469	WR186	Area F West Pit	21	22	Core	SOO	Sandy oolite	OO	Oolites and hematite enrichment	✓			
EP1201090048	WR144569	WR187	Area F West Pit	23	24	Core	SST	Sandstone			✓	✓		
EP1201090049	WR144472	WR188	Area F West Pit	28	29	Core	SLT	Siltstone			✓	✓	✓	
EP1201090050	WR144572	WR189	Area F West Pit	28	29	Core	SST	Sandstone			✓			
EP1201090051	WR144475	WR190	Area F West Pit	30	31	Core	SST	Sandstone	OO	Oolites and hematite enrichment	✓	✓	✓	✓
EP1201090052	WR144575	WR191	Area F West Pit	32	33	Core	OO	Oolites and hematite enrichment			✓			
EP1108259003	61343	WR192	Area F West Pit	33	34	Core	OO	Oolites and hematite enrichment			✓			
EP1201090053	WR144478	WR193	Area F West Pit	34	35	Core	OO	Oolites and hematite enrichment			✓	✓		
EP1108259063	62977	WR194	Area F West Pit	34	35	Core	SIDOO	Siderite oolite	OO	Oolites and hematite enrichment	✓			
EP1108259068	62493	WR195	Area F West Pit	36	37	Core	OST	Oolitic sandstone			✓	✓		
EP1108259083	60287	WR196	Area F West Pit	38	39	Core	SST	Sandstone	SLT	Siltstone	✓	✓	✓	✓
EP1108259034	61732	WR197	Area F West Pit	39	40	Core	SLT	Siltstone	CY	Clay	✓			
EP1108259059	62991	WR198	Area F West Pit	40	41	Core	SST	Sandstone	OO	Oolites and hematite enrichment	✓			
EP1108259023	62992	WR199	Area F West Pit	40	41	Core	SOO	Sandy oolite			✓			
EP1108259069	62998	WR200	Area F West Pit	42	43	Core	OO	Oolites and hematite enrichment			✓			
EP1108259070	63003	WR201	Area F West Pit	54	55	Core	OO	Oolites and hematite enrichment	SIDOO	Siderite oolite	✓	✓	✓	✓
EP1108259054	61752	WR202	Area F West Pit	55	56	Core	OO	Oolites and hematite enrichment			✓			
EP1108259093	61758	WR203	Area F West Pit	57	58	Core	OO	Oolites and hematite enrichment	SST	Sandstone	✓	✓		
EP1108259094	61765	WR204	Area F West Pit	57	58	Core	SST	Sandstone			✓	✓	✓	✓

Appendix B

Geochemical Test Methodologies

ACID-BASE-CHEMISTRY AND SALINITY TESTWORK

The acid-base chemistry and salinity of the mine-waste-bedrock samples is normally assessed by determining:

- pH and Electrical-Conductivity (EC) on sample slurries.
- Total-Sulphur (Total-S) and Sulphate-Sulphur ($\text{SO}_4\text{-S}$).
- Acid-Neutralisation-Capacity (ANC).
- Net-Acid-Producing-Potential (NAPP).
- Net-Acid-Generation (NAG).

Relevant details of the testwork methods employed are discussed briefly below. Further details are presented elsewhere (e.g.; Morin and Hutt 1997; BC AMD Task Force 1989 and corresponding laboratory reports).

Paste-pH-(1:2) and Paste-EC-(1:2) Tests

Measurements of pH and EC are normally performed on slurries prepared using deionised water, and a solid:water ratio of 1:2 (w/w). The sample slurries are allowed to age in contact with the air for 24 hours, prior to measuring pH and EC.¹

The resulting pH-(1:2) and EC-(1:2) values provide a measure of the inherent acidity/alkalinity and an indication of the salinity content of the samples.²

Total-S and $\text{SO}_4\text{-S}$ Tests

The Total-S values are measured by LECO combustion (@ 1300°C) with detection of evolved $\text{SO}_2(\text{g})$ by infra-red spectroscopy.

The $\text{SO}_2\text{-S}$ values are determined by the Na_2CO_3 -Extraction Method (Lenahan and Murray-Smith 1986).³ The difference between the Total-S and $\text{SO}_4\text{-S}$ values indicates the Sulphide-S (strictly Non-Sulphate-S) content.

Acid-Neutralisation Capacity

The ANC values of the samples are determined by a procedure based on that of Sobek *et al.* (1978). This procedure is essentially the "standard" method employed for estimating the ANC values of mine-waste materials (Morin and Hutt 1997; BC AMD Task Force 1989).

The samples are normally reacted with dilute HCl for 2 hours at 80-90°C followed by back titration with NaOH to a pH=7 end-point to determine the amount of acid consumed.⁴

The simmering step for 2 hours differs slightly from the heating treatment of the Sobek *et al.* procedure wherein the test mixtures are heated to near boiling until reaction is deemed to be complete (gas evolution not visually apparent), followed by boiling for one minute. In terms of dissolution of carbonate, primary-silicate and oxyhydroxide minerals, this variation to the Sobek *et al.* method is inconsequential.

The Sobek *et al.* (1978) procedure exposes mine-waste samples to both strongly-acidic conditions (e.g. pH of 1-2), and a near-boiling temperature. Provided excess acid is added, this method ensures that carbonate-minerals (including ferroan and manganoan varieties) are dissolved quantitatively, and that at least traces of ferro-magnesian silicates (e.g. amphiboles, pyroxenes, chlorites, micas, etc.), and feldspars, are dissolved. However, under circum-neutral

(pH 6-8) conditions required for minewaste and environmental management, the dissolution of ferro-magnesian silicates is kinetically extremely slow (e.g. see review-monograph by White and Brantley [1995]).

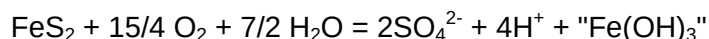
Near pH=7, the dissolution rates (under 'steady-state' conditions, and in the absence of inhibiting alteration-rims) of mafic-silicates and feldspars generally correspond to H_2SO_4^- consumption rates 'of-the-order' $10^{-11}/10^{-12}$ moles/m²/s (White and Brantley 1995). As a guide, for minerals of sub-mm grading, such silicate-dissolution rates correspond to Sulphide-Oxidation Rates (SORs) ranging up to 'of-the-order' 1^{-10} mg SO_4 /kg/week (0.1-1.0 kg H_2SO_4 /tonne/year).⁵ Maintenance of circum-neutral-pH through dissolution/hydrolysis of primary-silicates is therefore restricted to both "mineral-fines", and slow rates of pyrite weathering.

Despite the aggressive-digestion conditions employed, the ANC values determined by the Sobek *et al.* (1978) method allow an informed, initial "screening" of mine-waste materials in terms of acid-consuming and pH-buffering properties, especially when due account is taken of gangue mineralogy (Morin and Hutt 1997). Jambor *et al.* (2000, 2002) have presented a compendium of 'Sobek-ANC' values for specific classes of primary-silicates, and assists interpretation of the ANC values recorded for mine-waste materials of varying mineralogy.

NAPP Calculations

The NAPP values of the samples are calculated from the Total-S, SO_4 -S and ANC values, assuming that all of the Non-Sulphate-S occurs in the form of pyrite.⁶ The NAPP calculations serve as a starting point in the assessment of the acid-formation potential of sulphide-bearing materials.

The complete oxidation of pyrite may be described by:



It may be shown that, if the Sulphide-S (in %S) occurs as pyrite, then the amount of acid (in kg H_2SO_4 /tonne) produced through complete-oxidation is given by $30.6 \times \%S$.

Note: The above treatment of oxidation-reaction stoichiometry is restricted to oxidation by 'atmospheric- O_2 ' which is the dominant oxidant at circum-neutral-pH. A different oxidation-stoichiometry applies under acidic conditions (e.g. pH less than 3-4) where soluble-Fe(III) forms prevail, and then function as the chief oxidant.

NAG Tests

The NAG Test is a direct measure of a sample's potential to produce acid through sulphide oxidation, and also provides an indication of the reactivity of the sulphides, and the availability of the alkalinity-forms contributing to the ANC (AMIRA 2002; Miller *et al.* 1997, 1994).

In this test, the sample is reacted with H_2O_2 to rapidly oxidise contained sulphides, and allow the produced acid to react with the acid-neutralising materials (e.g. carbonates).

The NAG Test supplements the NAPP-based assessment of the acid-formation potential of mine-waste materials (Morin and Hutt 1997).

The procedure employed in this study is based on that for the 'Static-NAG Test' (AMIRA 2002; Miller *et al.* 1994, 1997). The Start-pH of the 15 % (w/w) H_2O_2 solution (prepared from A.R.-grade H_2O_2) was adjusted to pH=4.5 using dilute NaOH.

In addition, the boiling treatment to decompose residual, unreacted- H_2O_2 following overnight reaction was carried out in two stages (boiling for 2 hours initially, cooling and addition of 1 mL of 0.02 M- CuSO_4 to the test mixtures, followed by boiling again for 2 hours). The addition of Cu(II) salts catalyses the decomposition of residual H_2O_2 , and thereby prevents "positive-blank" values being obtained (O'Shay *et al.* 1990).⁷

Prior to the boiling steps, the pH values of the test-mixture suspensions are measured, and invariably correspond to an "overnight-period" of reaction. Such pH values reflect buffering under ambient conditions without accelerated dissolution of gangue-phases through boiling to decompose any unreacted- H_2O_2 . In the interpretation of NAG testwork data, it is important to take note of the pH values recorded prior to the boiling steps, especially for mine-waste samples that have both Sulphide-S contents less than 1 %, and ANC values less than 10 kg H_2SO_4 /tonne (as typically recorded for a felsic/mafic-gangue that is void of carbonates). Furthermore, oxidation by H_2O_2 is generally at least 10^3 faster than the SORs recorded during 'kinetic' testing (e.g. Weathering-Columns) of mine-waste samples. If circum-neutral conditions are to prevail during NAG testwork, then the rate of acid consumption by gangue-phases must be proportionately faster (rates for 'ambient-weathering'), and is essentially restricted to pH-buffering by carbonates (calcites, dolomites and ankerites) that are not unduly ferroan. This aspect must also be borne in mind when interpreting NAG testwork data; especially for mine-waste materials that contain "trace-sulphides" in a carbonate-void gangue, since the dissolution/hydrolysis kinetics of primary-silicates (both felsic- and mafic-silicates) are strongly pH-dependent.

MULTI-ELEMENT ANALYSES

The total content of a wide range of major- and minor-elements in selected samples can be determined through the use of various digestion and analytical techniques. The detection-limits employed in these analyses are appropriate for environmental investigations.

Element enrichments were identified using the *Geochemical Abundance Index (GAI)*.⁸ The GAI quantifies an assay result for a particular element in terms of the average crustal- abundance of that element.⁹

The GAI (based on a log-2 scale) is expressed in 7 integer increments (0 to 6). A GAI of 0 indicates that the content of the element is less than, or similar to, the average crustal-abundance; a GAI of 3 corresponds to a 12-fold enrichment above the average crustal-abundance; and so forth, up to a GAI of 6 which corresponds to a 96-fold, or greater, enrichment above average-crustal-abundances.

Notes:

1. The sample slurries are stirred at the beginning of the testwork, and once again immediately prior to measuring pH and EC.
2. The pH-(1:2) values approximate the "Abrasion-pH" values employed for identifying minerals in the field (Stevens and Carron 1948).
3. The Na_2CO_3 -reagent extracts SO_4 -S which occurs as soluble sulphates, and calcium sulphates (e.g. gypsum and anhydrite). It also extracts SO_4 sorbed to the surfaces of sesquioxides, clays and silicates. However, SO_4 present as barytes (BaSO_4) is not extracted, and SO_4 associated with jarositic-type and alunitic-type compounds are incompletely extracted.
4. Two drops of 30 % (w/w) H_2O_2 were added to the test mixtures as the pH=7 end-point was approached, so that any Fe(II) forms released by the acid-attack of ferroan-carbonates and -silicates are oxidised to Fe(III) forms (which then hydrolyse to " $\text{Fe}(\text{OH})_3$ "). This step ensures that the resulting ANC values are not unduly biased "on-the-high-side", due to the release of Fe(II) during the acidification/digestion step. Such potential bias in ANC values may be marked for mine-waste samples in which "Fe-rich" ferroan carbonates (e.g. siderite) dominate acid consumption. The addition of the H_2O_2 reagent is not part of the methodology described by Sobek *et al.* (1978).
5. SORs of this magnitude (at circum-neutral-pH) would typically only be recorded for the oxidation of "trace-sulphides" (e.g. Sulphide-S contents less than 0.5 %).
6. NAPP calculations are normally performed for samples with Sulphide-S contents ≥ 0.1 %. Conservatively these can also be calculated for Sulphide-S contents $\geq 0.05\%$.
7. Where mine-waste samples contain sufficient Cu, then Cu(II) forms will be released to solution during the NAG Test, especially at low pH.
8. The GAI was developed by Förstner *et al* (1993), and is defined as:
$$\text{GAI} = \log_2 [\text{Cn}/(1.5 \times \text{Bn})]$$

where:
Cn = measured content of n-th element in the sample.
Bn = "background" content of the n-th element in the sample.
9. The average-crustal-abundances of the elements for the GAI calculations are based on the values listed in Bowen (1979).

Appendix C

XRD Assessment

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WR081			Major		Trace	Minor		Major	Minor																						
WR082			Major			Major		Major	Minor	Trace																					
WR086		Trace	Major			Trace		Minor		Trace			Minor																		
WR089			Major			Trace		Major	Trace								Trace														
WR090			Major			Minor		Major		Minor			Major																		
WR094			Major			Minor	Trace	Major	Major	Minor																					
Area F East Pit 1																															
WR097			Major			Major			Trace																						
WR098			Major			Minor				Trace	Trace									Trace											
WR105			Major	Major	Minor	Trace	Trace		Major																						
WR107			Major	Major	Minor	Minor			Major												Minor										
WR109			Major	Trace		Major																									
WR111			Major			Major		Trace												Trace	Minor										
Area F East Pit 2																															
WR118			Major						Minor													Minor	Minor								
WR124			Major	Trace		Major	Minor																								
WR132			Major						Minor													Minor	Minor								
Area F East Pit 3																															
WR147			Major		Trace				Minor																						
WR153	Trace		Major					Major	Major	Minor				Trace																	
WR156	Trace		Major						Minor													Minor	Minor	Trace	Trace						
WR157	Minor		Major					Minor	Minor	Minor				Minor		Trace															
WR160			Major			Trace			Minor													Minor	Minor								
WR171			Major				Trace		Minor													Minor	Minor								
WR175			Major			Trace				Minor																		Minor	Minor		

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WR179			Major					Trace		Minor																			Minor	Trace	
WR181			Major					Trace		Minor																			Minor	Trace	Trace
Area F West																															
WR184			Major			Major					Major																				
WR185			Major		Minor	Trace	Trace		Major				Trace																		
WR188			Major	Trace		Minor			Trace	Trace																					
WR190			Major			Minor			Minor																						
WR196			Major		Minor	Trace			Major		Minor																				
WR201			Major	Minor		Major	Minor	Major							Minor																
WR204			Major			Major		Minor		Minor				Major																	
Albite, ordered (NaAlSi3O8); Microcline (K(Si0.75Al0.25)4O8); Quartz (SiO2); Clinochlore-ferroan (Mg,Fe)6(Si,Al)4O10(OH)8); Muscovite-2M1 (KAl2(Si3Al)O10(OH,F)2); Hematite (Fe2O3); Pyrite (FeS2); Siderite (FeCO3); Kaolinite (Al2Si2O5(OH)4); Muscovite-3T ((K,Na)(Al,Mg,Fe)2(Si3.1Al0.9)O10(OH)2); Goethite (FeOOH); Jarosite (KFe3(SO4)2(OH)6); Chamosite-1MIIb ((Fe,Al,Mg)6(Si,Al)4O10(OH)8); Chamosite-1OIb ((Fe,Al,Mg,Mn)6(Si,Al)4O10(OH)8); Hydroniumjarosite ((H3O)Fe3(SO4)2(OH)6); Pyroxene ((Mg0.962Fe0.038)(Ca0.999Mg0.04)(Si2O6)); Iron (Fe); Dickite (Al2Si2O5(OH)4); Cronstedtite (Fe3FeSiO4(OH)5); Afghanite (Na4.8Ca3.5K0.7Si6.1Al5.9O25(SO4)1.27Cl1.55(CO3)0.1-0.5(H2O)); Clinochlore-1MIIb-4 (Mg5Al(Si,Al)4O10(OH)8); Olivine (Fe0.2Mg1.8SiO4); Muscovite (KAl3Si3O10(OH)2); Microcline, intermediate (KAlSi3O8); Muscovite-1M (KAl2Si3AlO10(OH)2); Wollastonite-2M (CaSiO3); Albite, ordered (NaAlSi3O8); Kaolinite-1Ad (Al2Si2O5(OH)4); Rutile, syn (TiO2); Sodalite, syn (KNa3Al3Cl(SiO4)3)																															

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Client: ALS
Job number: 11_860
Sample: 11_860_01
Client ID: EP1108259-001
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

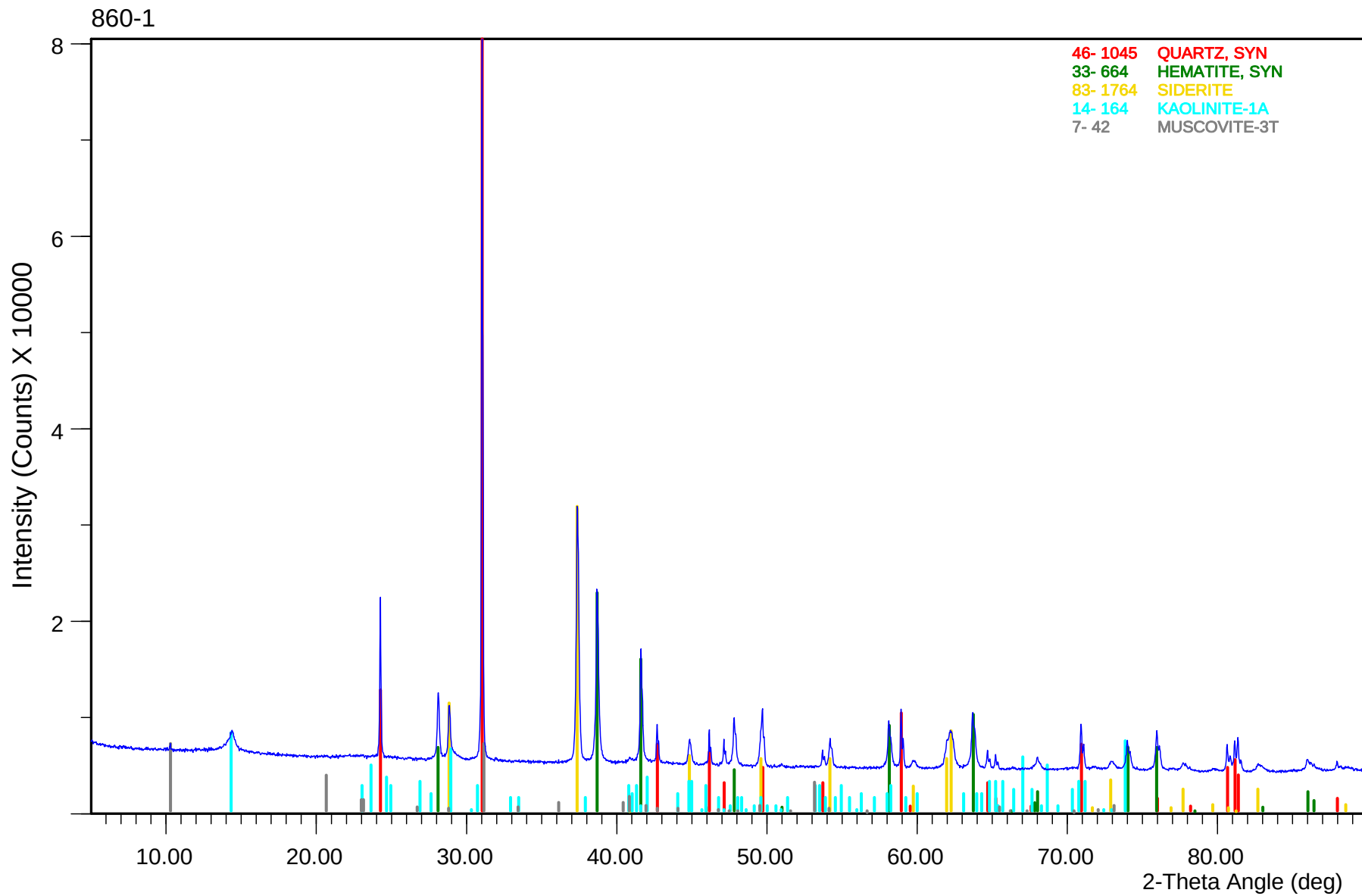
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Major	good
Siderite (FeCO ₃)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_02
Client ID: EP1108259-002
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

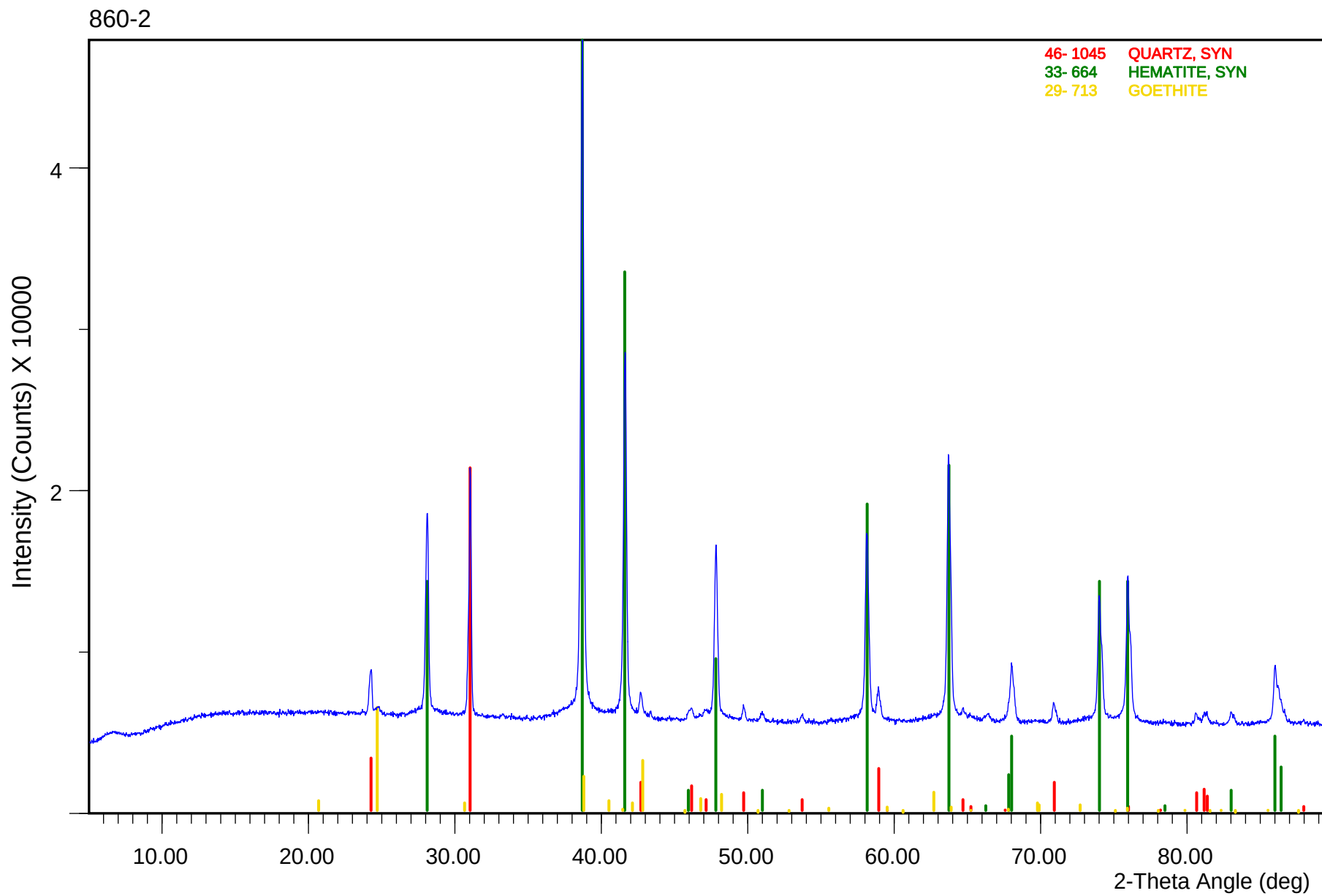
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Minor	good
Hematite (Fe ₂ O ₃)	Major	good
Goethite (FeOOH)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_03
Client ID: EP1108259-003
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

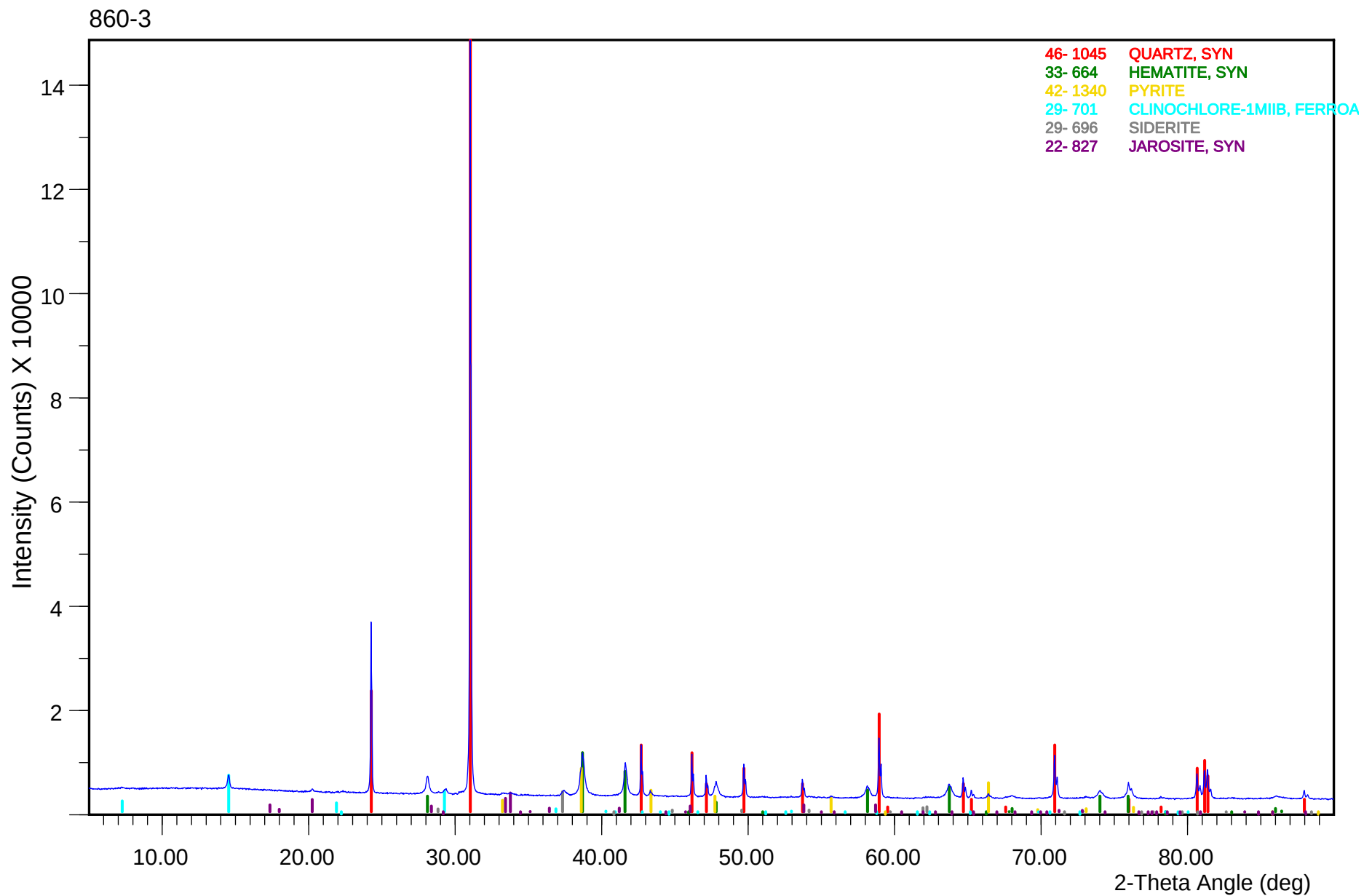
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Minor	good
Pyrite (FeS ₂)	Trace	medium
Clinocllore, ferroan ((Mg,Fe) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Trace	medium
Siderite (FeCO ₃)	Trace	low
Jarosite (KFe ₃ (SO ₄) ₂ (OH) ₆)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_04
Client ID: EP1108259-004
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

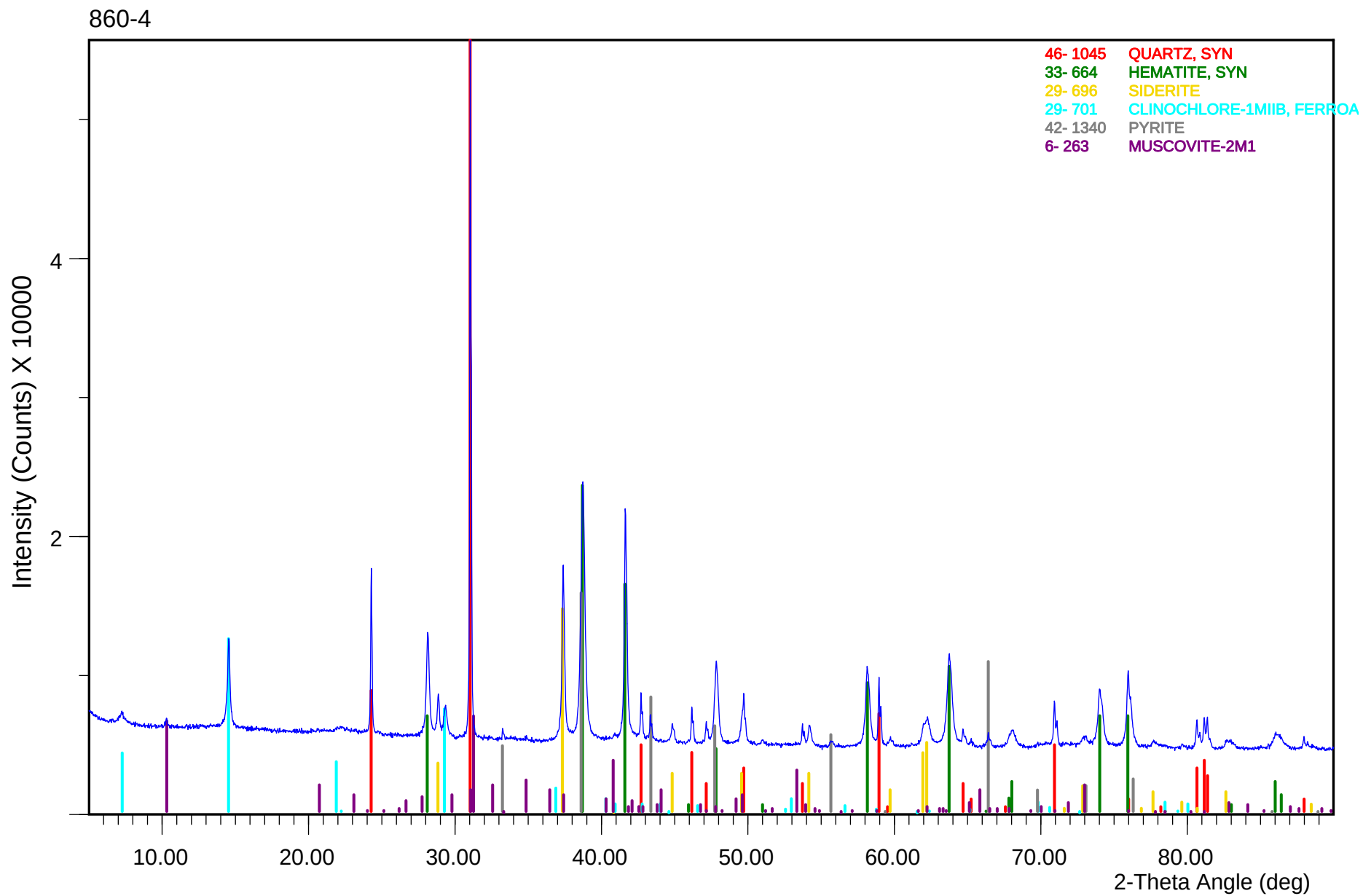
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Major	good
Siderite (FeCO ₃)	Major	good
Clinocllore, ferroan ((Mg,Fe) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Minor	medium
Pyrite (FeS ₂)	Minor	medium
Muscovite-2M1 (KAl ₂ (Si ₃ Al)O ₁₀ (OH,F) ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_05
Client ID: EP1108259-005
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

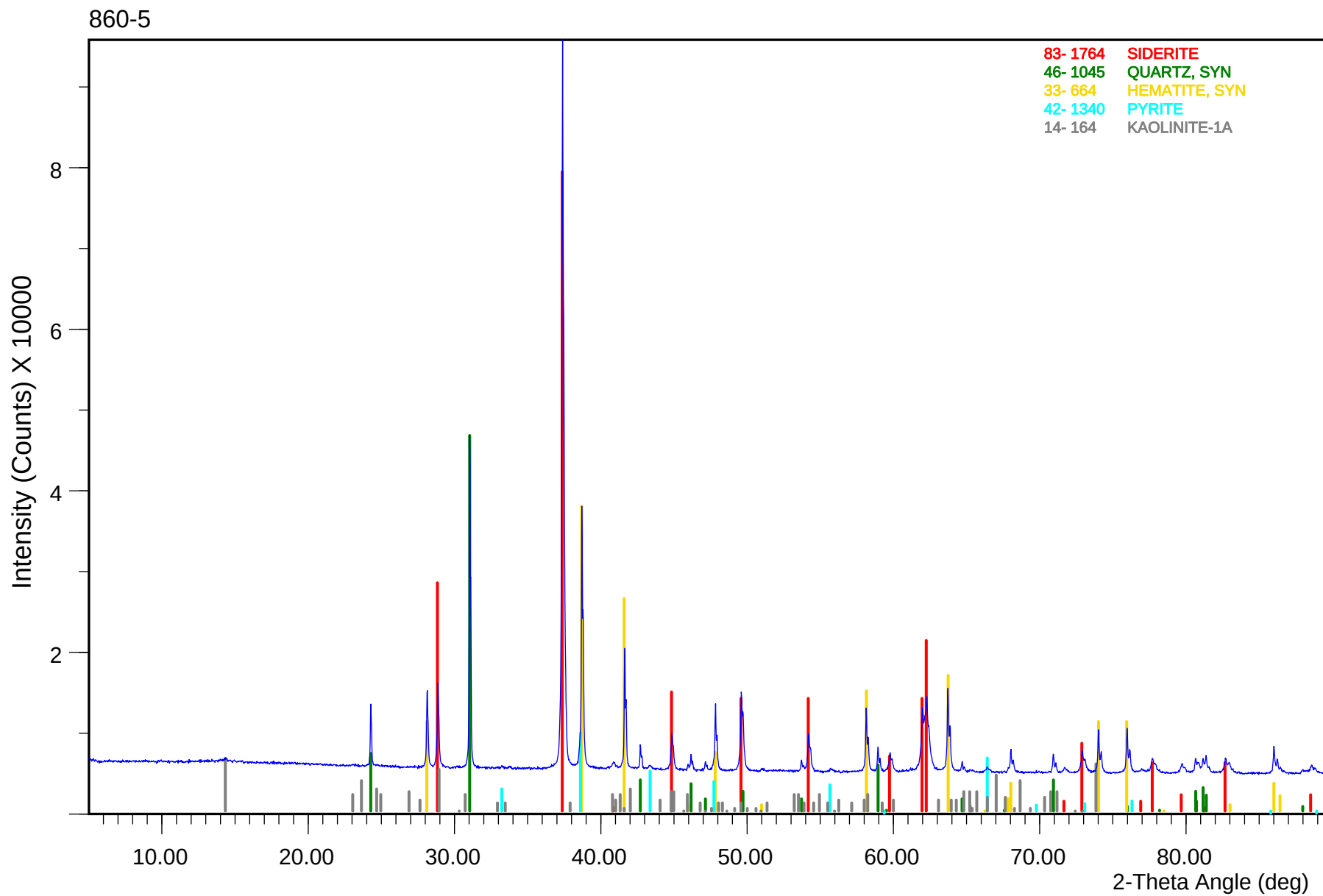
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Siderite (FeCO_3)	Major	good
Quartz (SiO_2)	Major	good
Hematite (Fe_2O_3)	Major	good
Pyrite (FeS_2)	Trace	low
Kaolinite ($\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_07
Client ID: EP1108259-007
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

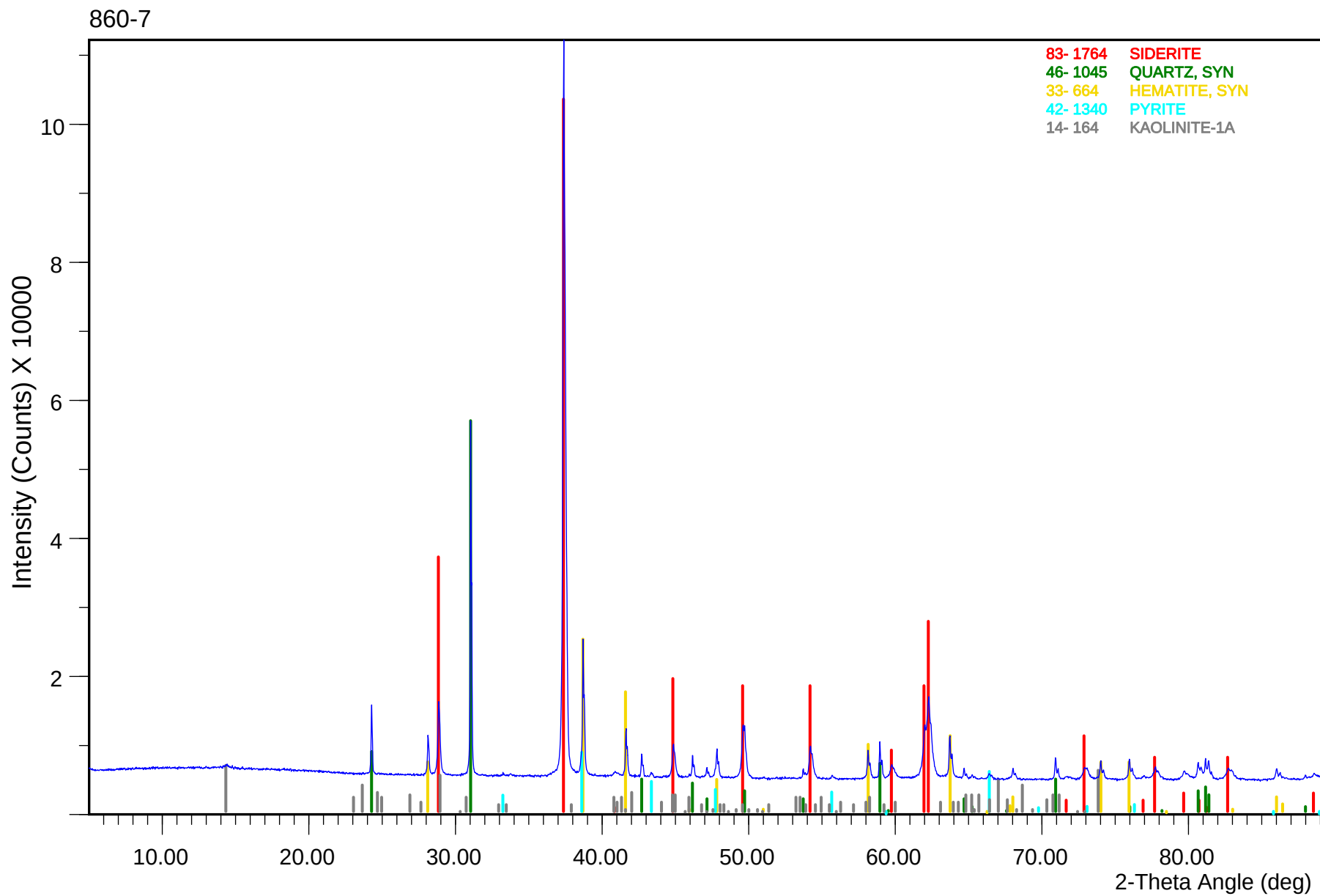
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Siderite (FeCO_3)	Major	good
Quartz (SiO_2)	Major	good
Hematite (Fe_2O_3)	Major	good
Pyrite (FeS_2)	Minor	good
Kaolinite ($\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_08
Client ID: EP1108259-008
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

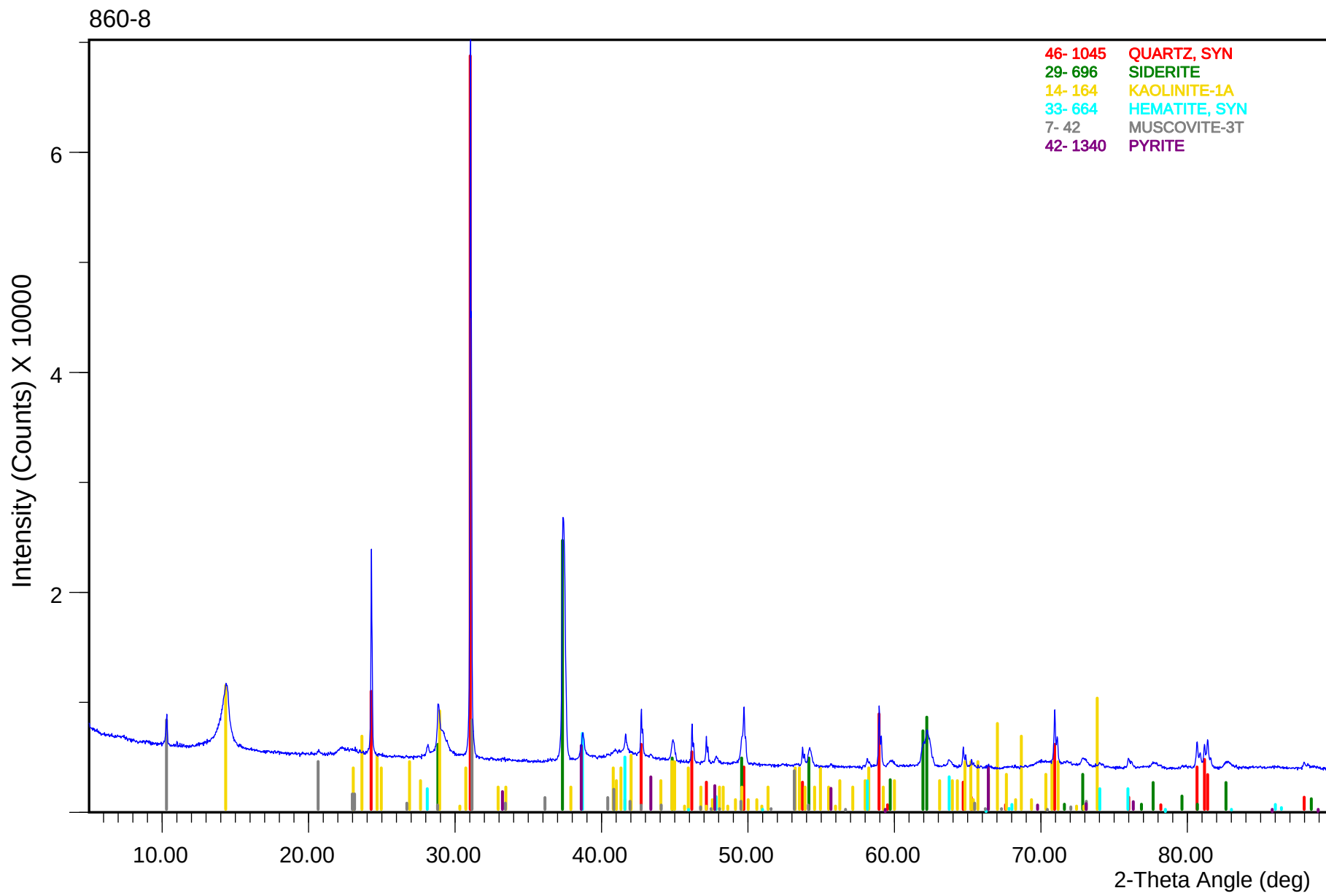
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Siderite (FeCO ₃)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Major	good
Hematite (Fe ₂ O ₃)	Minor	good
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Minor	medium
Pyrite (FeS ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_09
Client ID: EP1108259-009
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

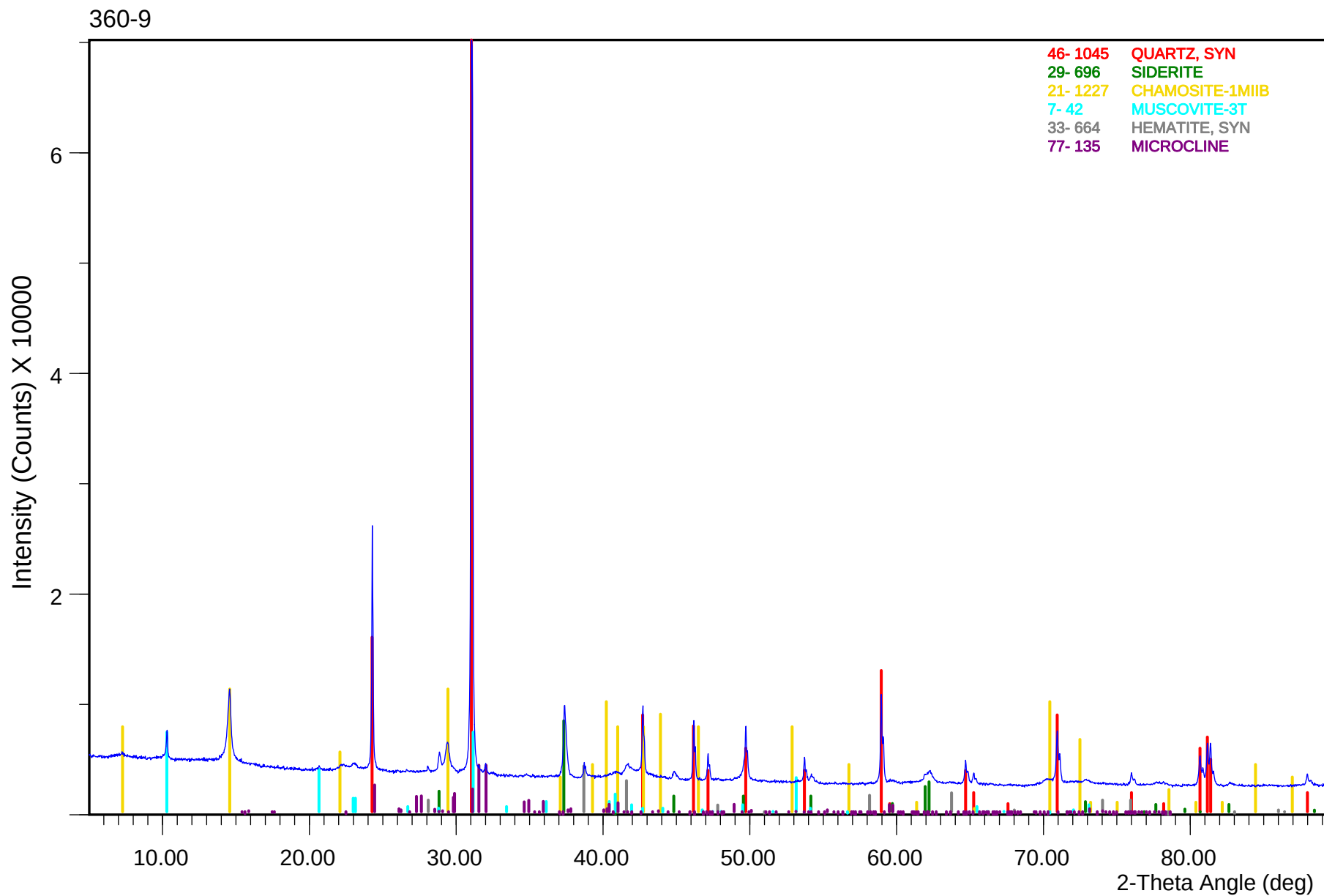
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Siderite (FeCO ₃)	Minor	good
Chamosite-1MIIb ((Fe,Al,Mg) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Minor	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Trace	low
Hematite (Fe ₂ O ₃)	Trace	medium
Microcline (K(Si _{0.75} Al _{0.25}) ₄ O ₈)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_10
Client ID: EP1108259-010
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

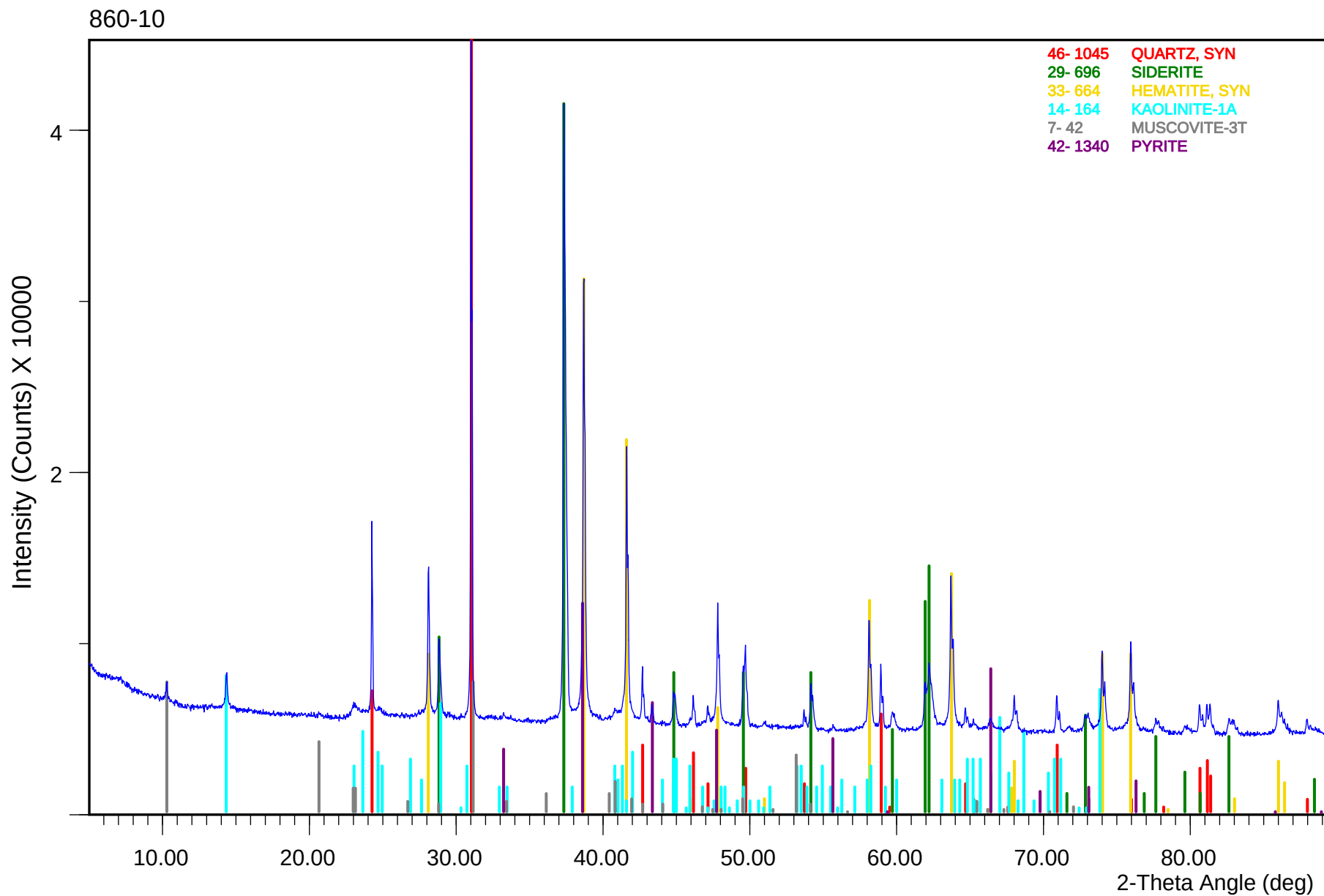
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Siderite (FeCO ₃)	Major	good
Hematite (Fe ₂ O ₃)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Trace	low
Pyrite (FeS ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_11
Client ID: EP1108259-011
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

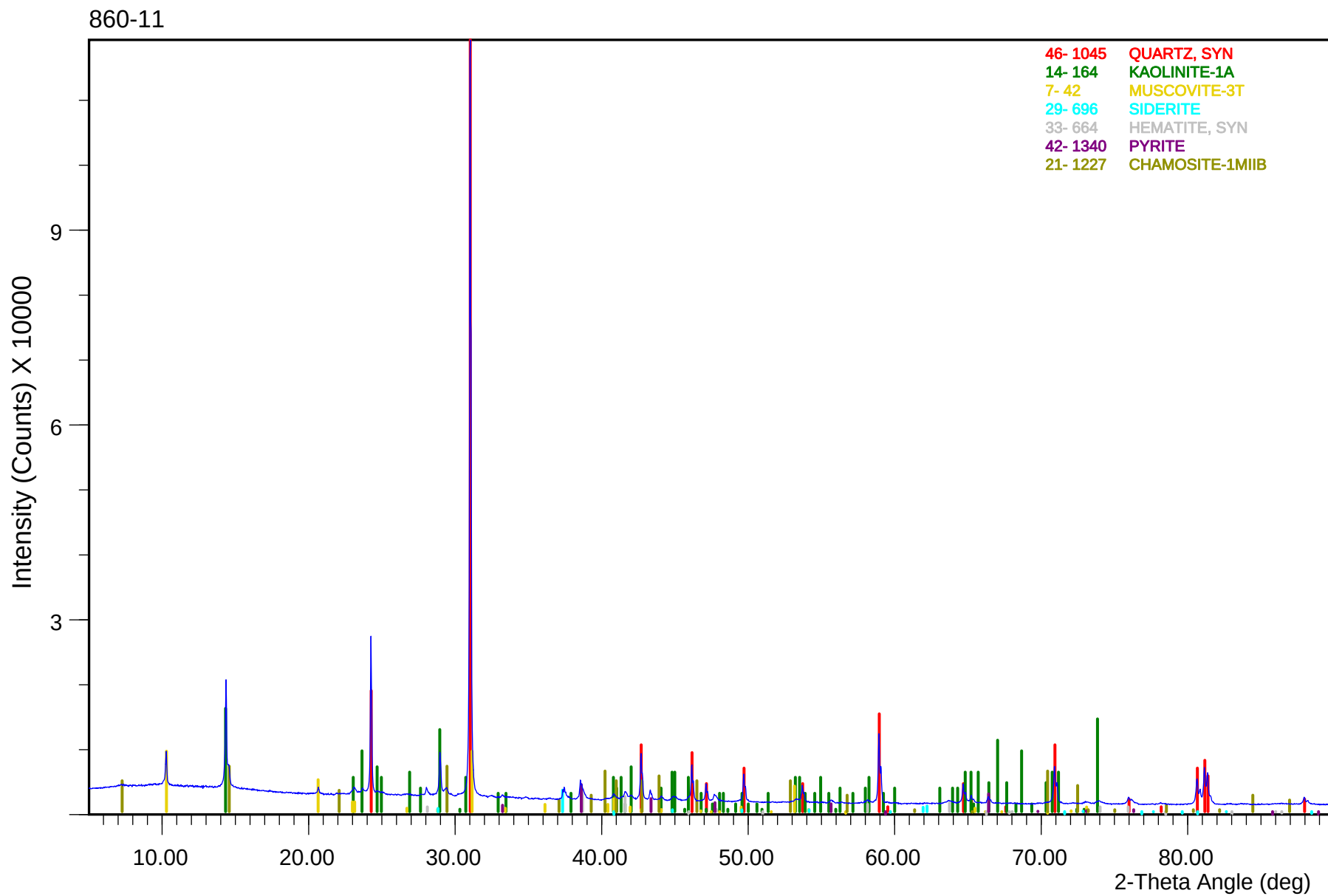
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Major	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Minor	medium
Siderite (FeCO ₃)	Minor	medium
Hematite (Fe ₂ O ₃)	Trace	good
Pyrite (FeS ₂)	Trace	good
Chamosite-1MIIb ((Fe,Al,Mg) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_12
Client ID: EP1108259-012
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

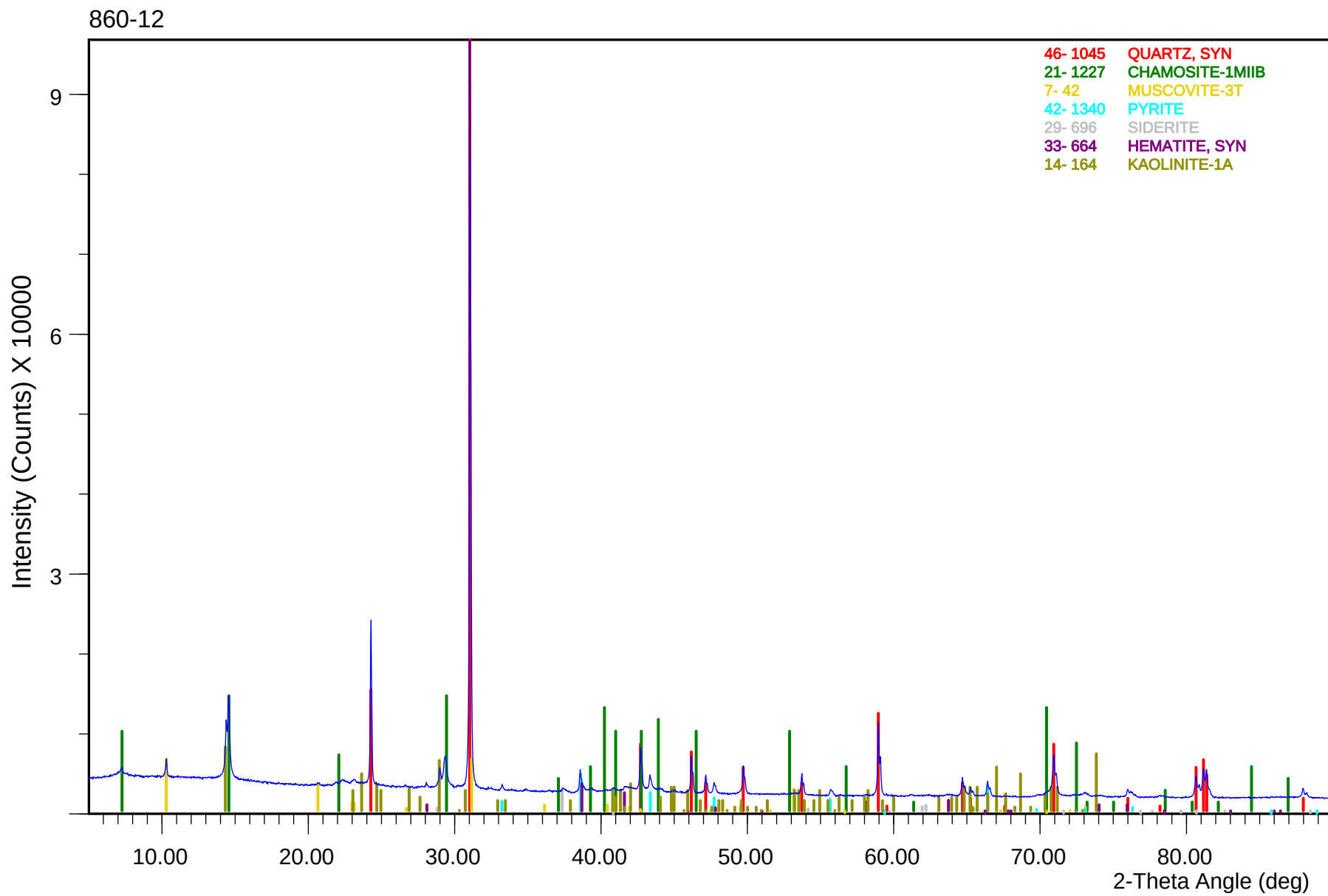
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Chamosite-1MIIb ((Fe,Al,Mg) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Major	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Minor	medium
Pyrite (FeS ₂)	Trace	good
Siderite (FeCO ₃)	Trace	low
Hematite (Fe ₂ O ₃)	Trace	medium
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_13
Client ID: EP1108259-013
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

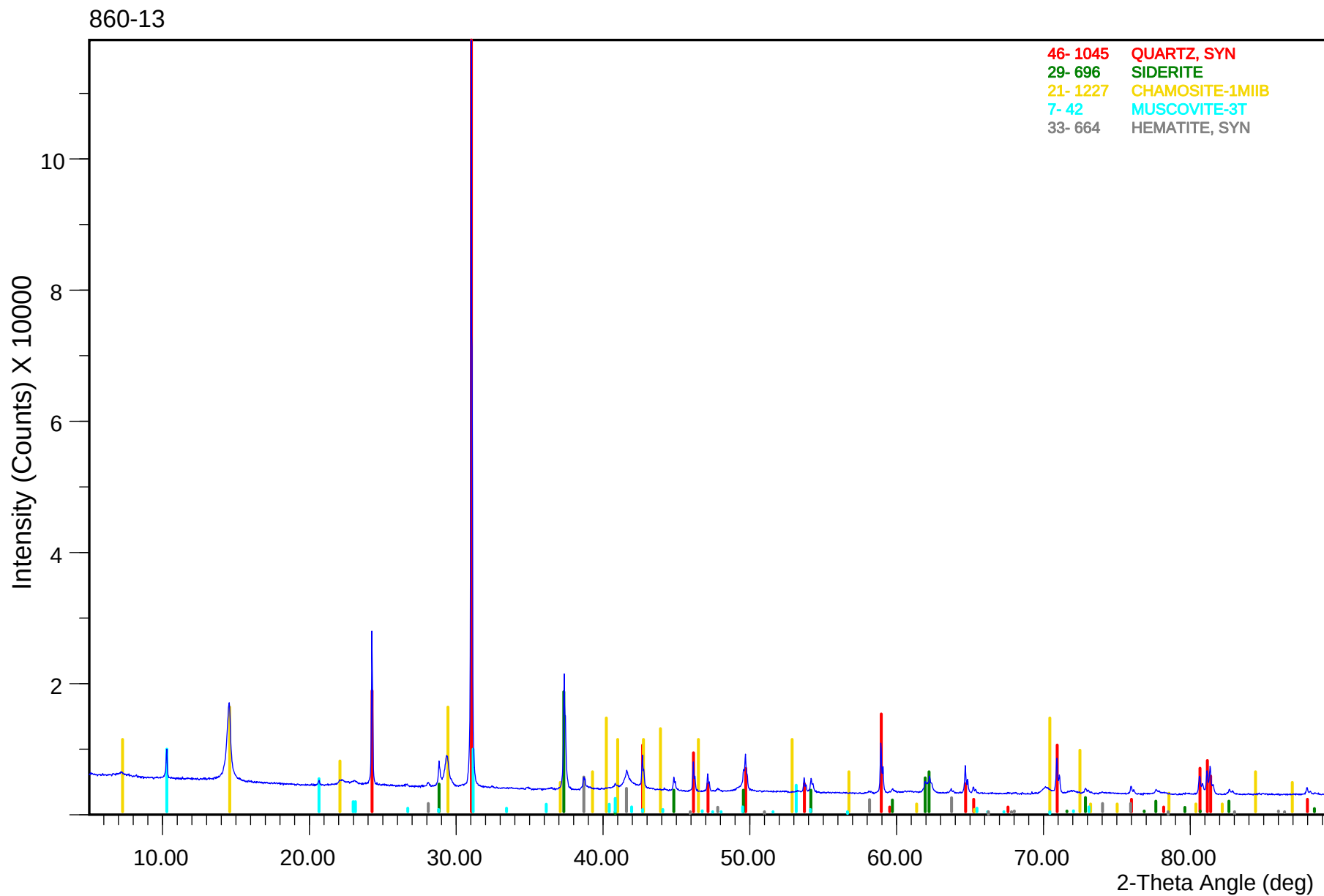
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Siderite (FeCO ₃)	Major	good
Chamosite-1MIIb ((Fe,Al,Mg) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Major	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Minor	medium
Hematite (Fe ₂ O ₃)	Minor	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_14
Client ID: EP1108259-014
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

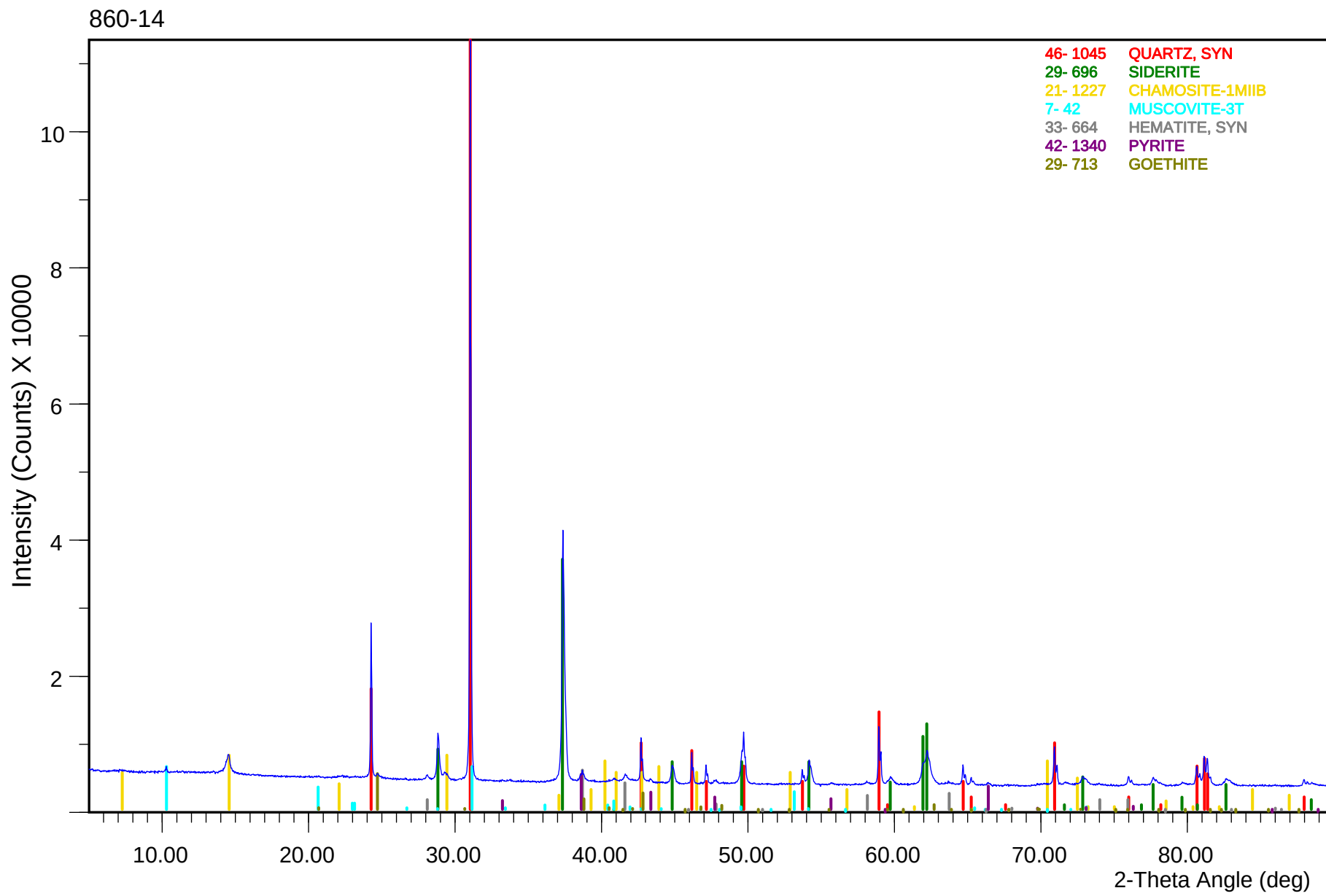
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Siderite (FeCO ₃)	Major	good
Chamosite-1MIIb ((Fe,Al,Mg) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Minor	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Trace	medium
Hematite (Fe ₂ O ₃)	Trace	good
Pyrite (FeS ₂)	Trace	good
Goethite (FeOOH)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_15
Client ID: EP1108259-015
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

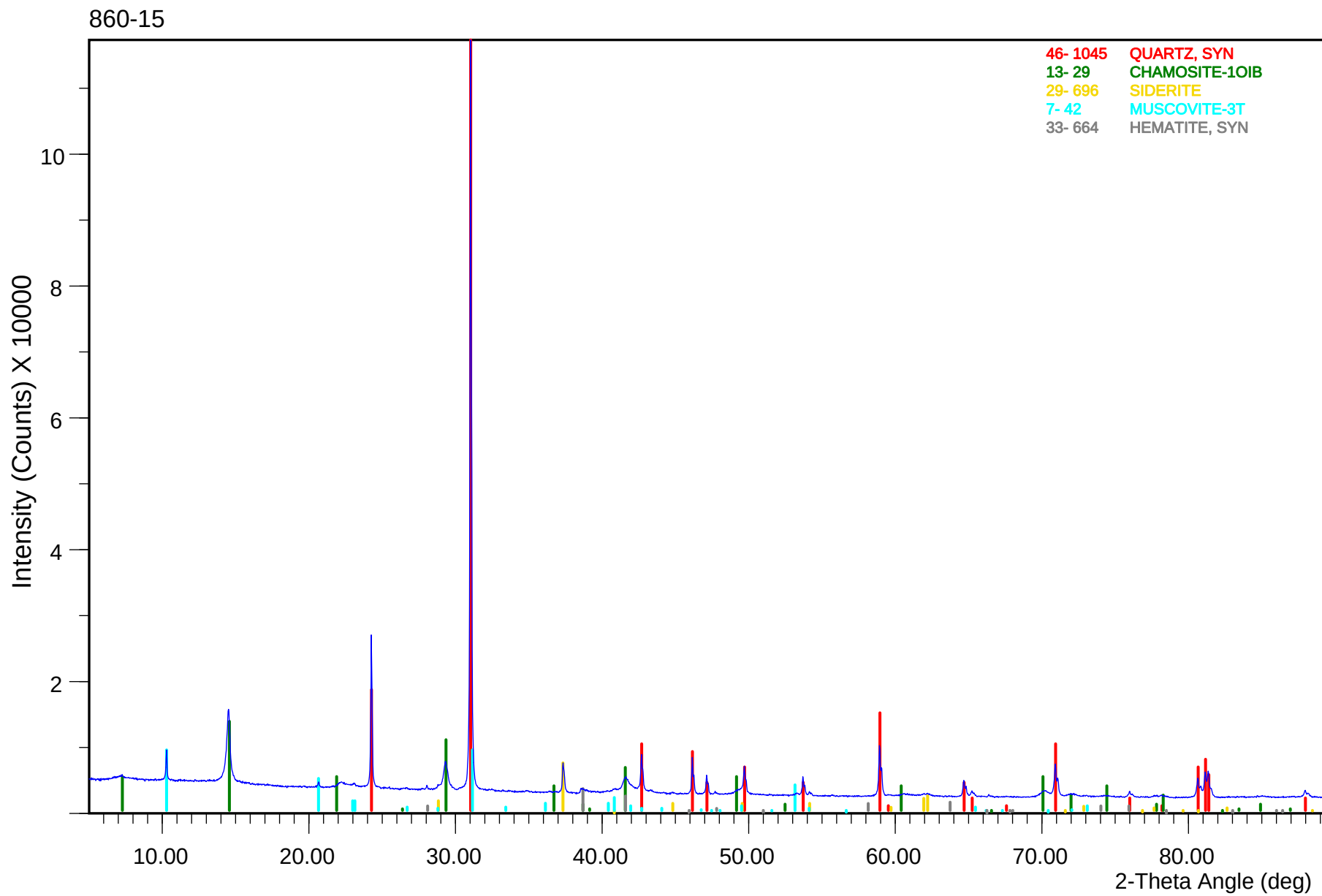
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Chamosite-1MIIb ((Fe,Al,Mg) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Major	medium
Siderite (FeCO ₃)	Minor	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Minor	medium
Hematite (Fe ₂ O ₃)	Trace	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_16
Client ID: EP1108259-016
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

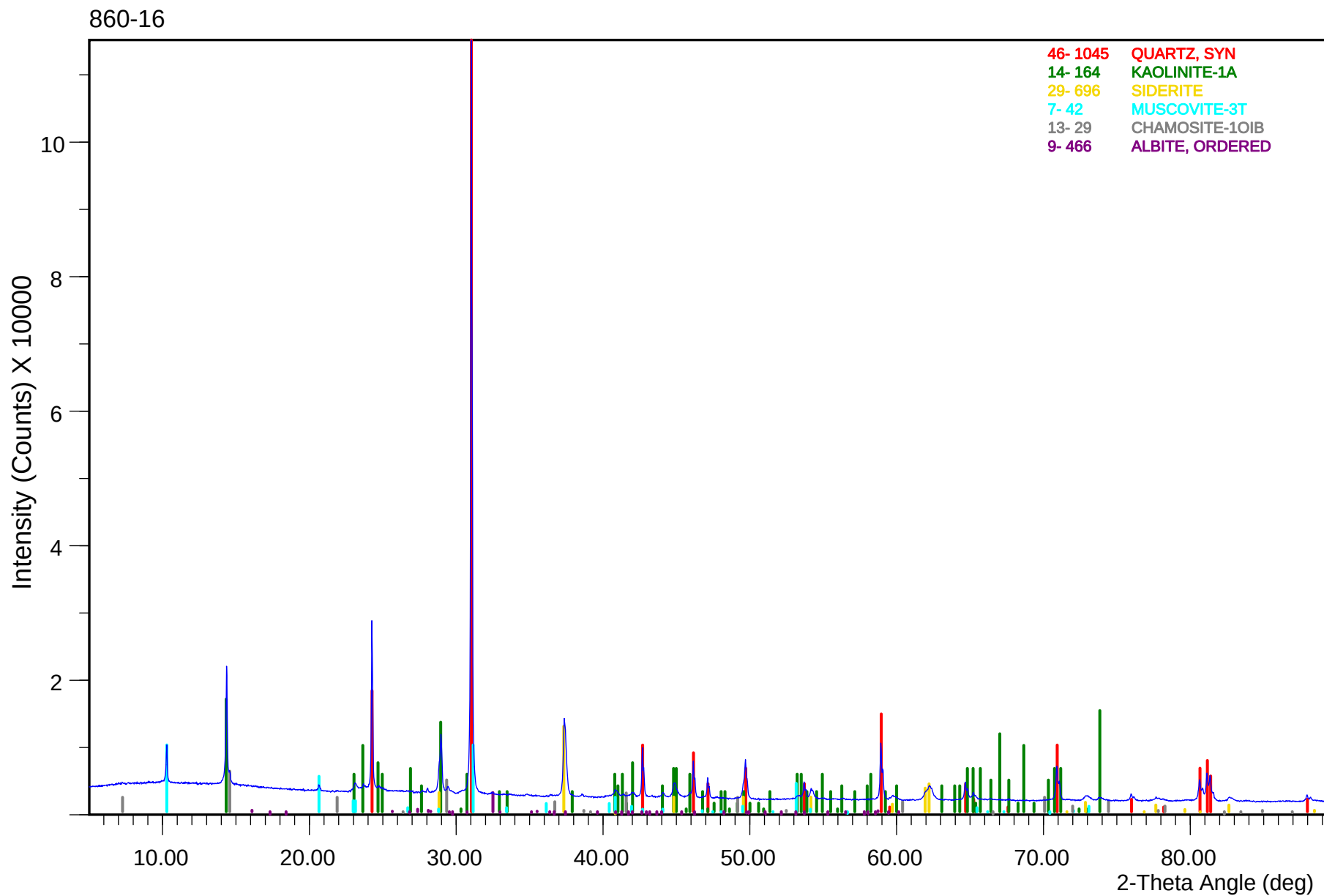
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Major	good
Siderite (FeCO ₃)	Major	good
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Minor	medium
Chamosite-10lb (Fe,Al,Mg,Mn) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Trace	low
Albite, ordered (NaAlSi ₃ O ₈)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_17
Client ID: EP1108259-017
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

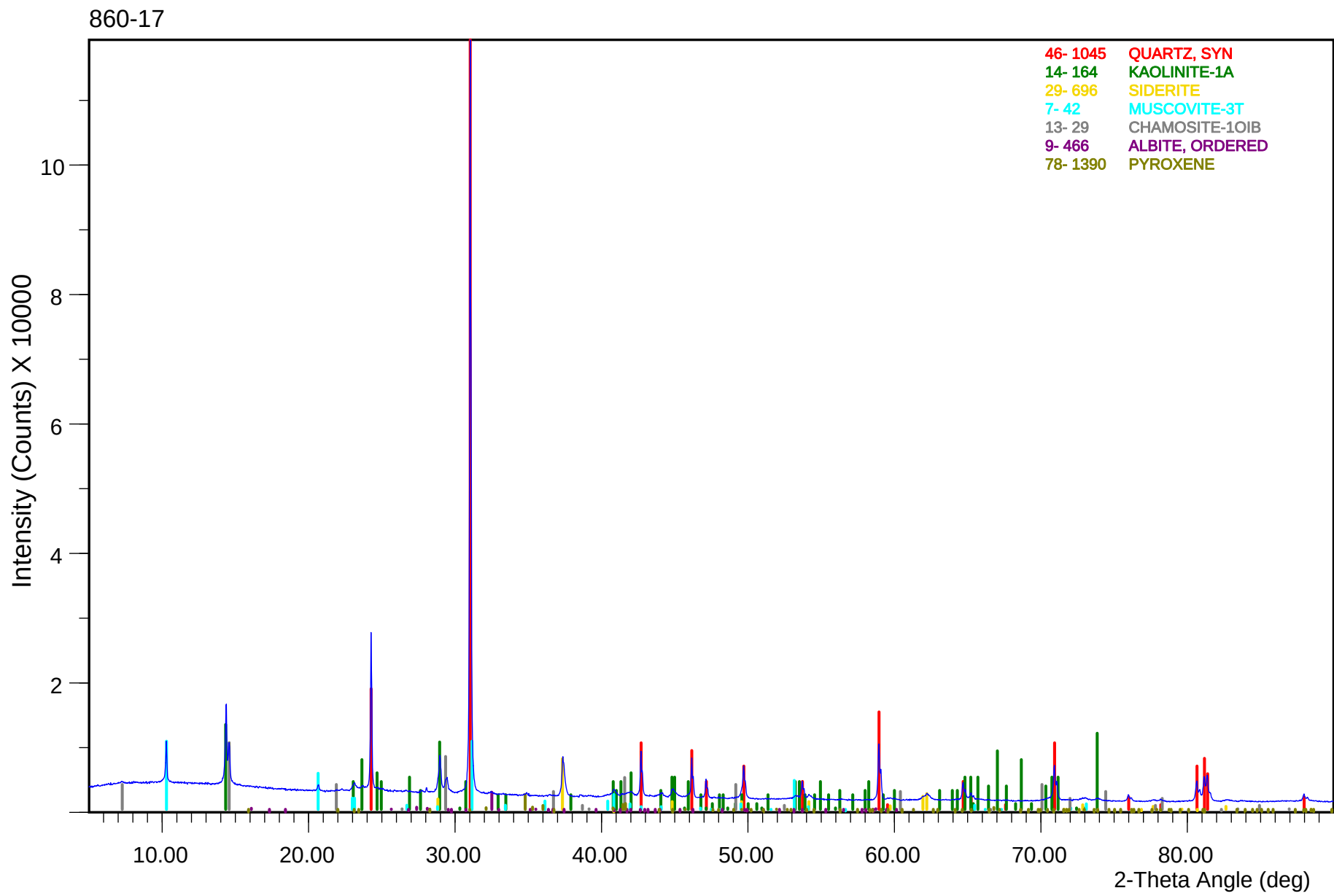
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	good
Siderite (FeCO ₃)	Minor	good
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Minor	medium
Chamosite-10lb (Fe,Al,Mg,Mn) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Minor	medium
Albite, ordered (NaAlSi ₃ O ₈)	Minor	medium
Pyroxene ((Mg _{0.962} Fe _{0.038})(Ca _{0.999} Mg _{0.04})(Si ₂ O ₆))	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_18
Client ID: EP1108259-018
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

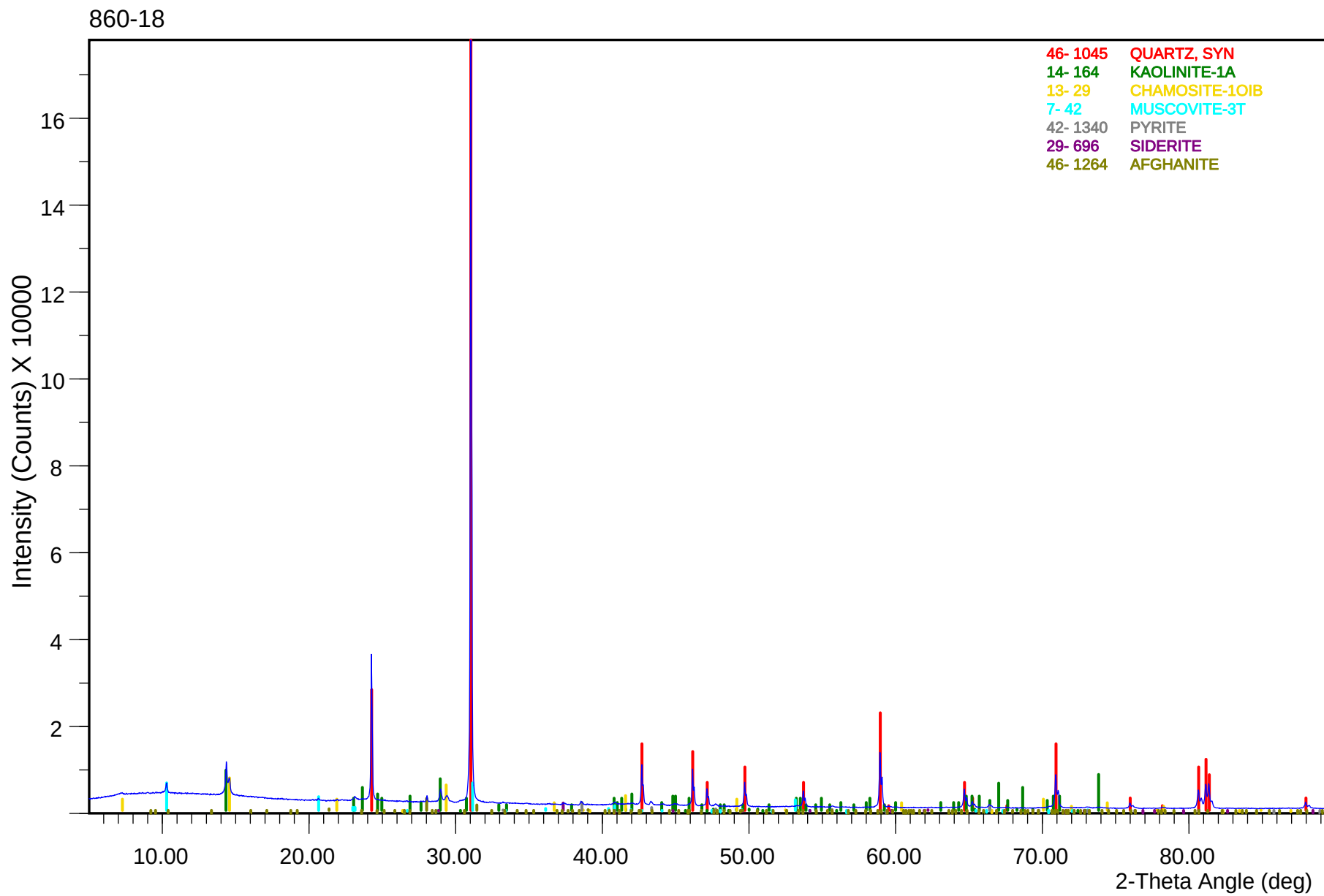
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	good
Chamosite-10lb (Fe,Al,Mg,Mn) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Trace	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Trace	medium
Pyrite (FeS ₂)	Trace	good
Siderite (FeCO ₃)	Trace	medium
Afghanite (Na _{4.8} Ca _{3.5} K _{0.7} Si _{6.1} Al _{5.9} O ₂₅ (SO ₄) _{1.27} Cl _{1.55} (CO ₃) _{0.1} ·0.5(H ₂ O))	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_19
Client ID: EP1108259-019
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

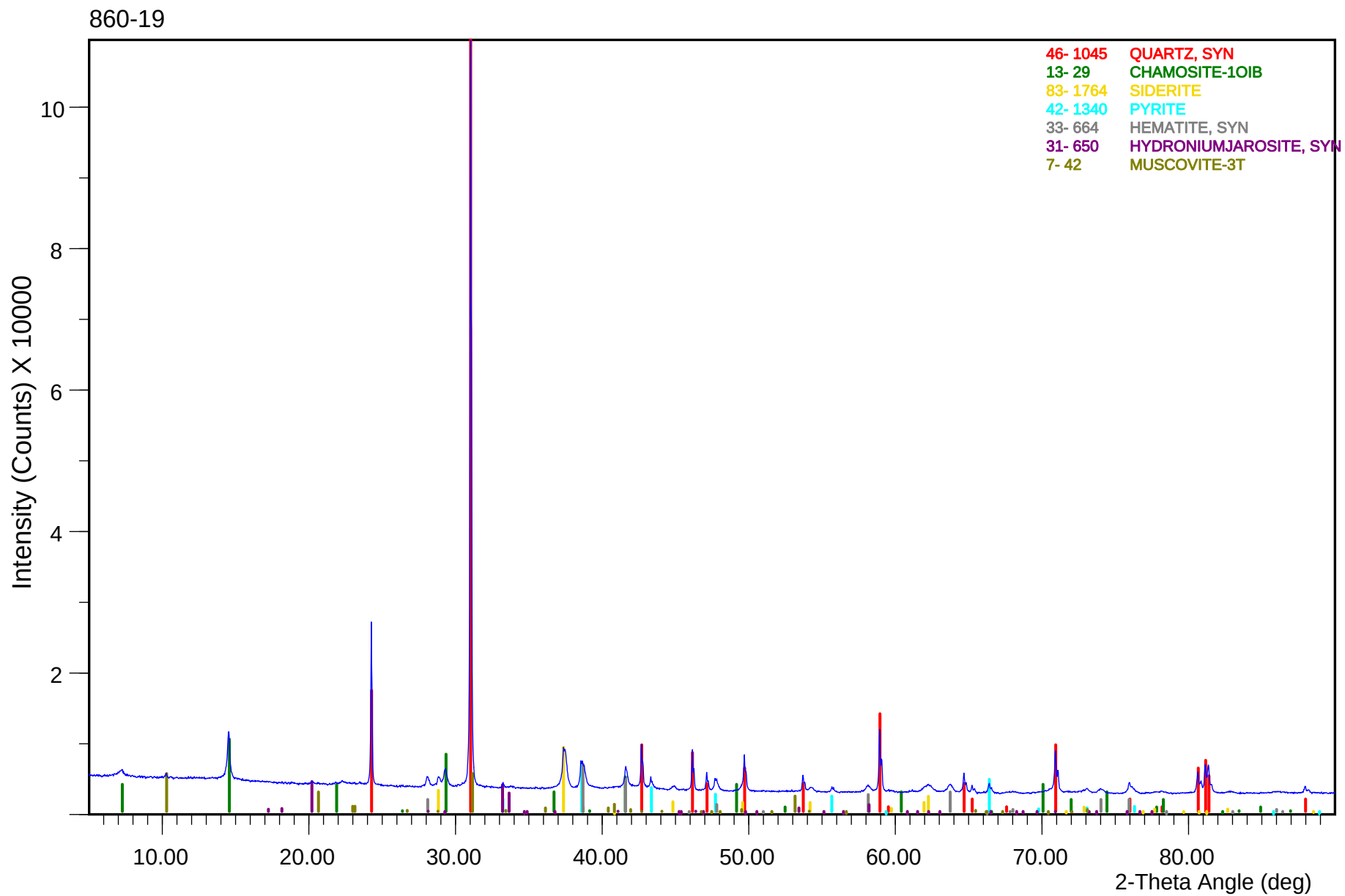
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Chamosite-10lb (Fe,Al,Mg,Mn) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Minor	medium
Siderite (FeCO ₃)	Minor	good
Pyrite (FeS ₂)	Minor	good
Hematite (Fe ₂ O ₃)	Minor	good
Hydroniumjarosite ((H ₃ O)Fe ₃ (SO ₄) ₂ (OH) ₆)	Trace	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_20
Client ID: EP1108259-020
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

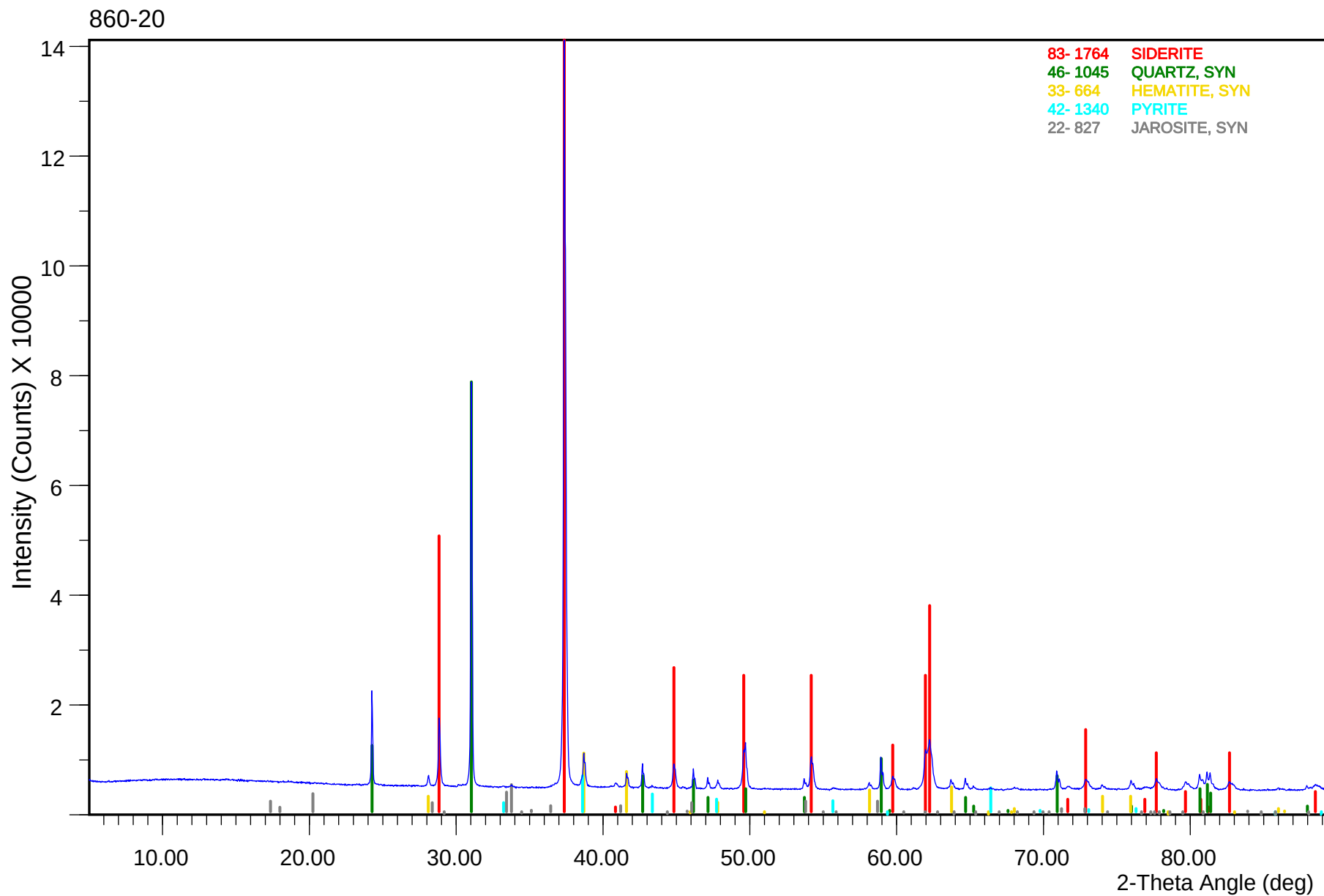
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Siderite (FeCO_3)	Major	good
Quartz (SiO_2)	Major	good
Hematite (Fe_2O_3)	Minor	good
Pyrite (FeS_2)	Trace	medium
Jarosite ($\text{KFe}_3(\text{SO}_4)_2(\text{OH})_6$)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_21
Client ID: EP1108259-021
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

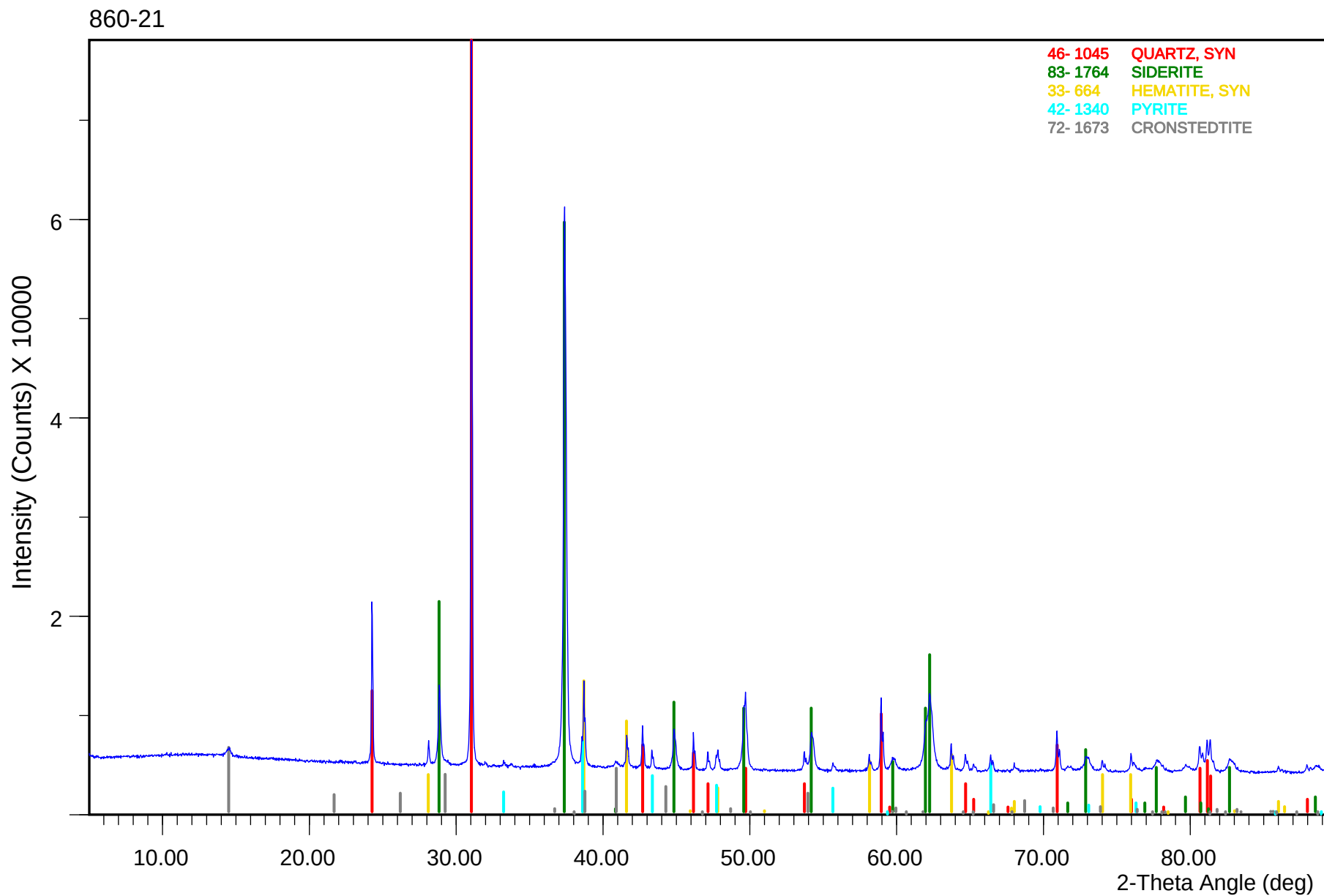
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Siderite (FeCO ₃)	Major	good
Hematite (Fe ₂ O ₃)	Minor	good
Pyrite (FeS ₂)	Trace	medium
Cronstedtite (Fe ₃ FeSiO ₄ (OH) ₅)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_22
Client ID: EP1108259-022
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

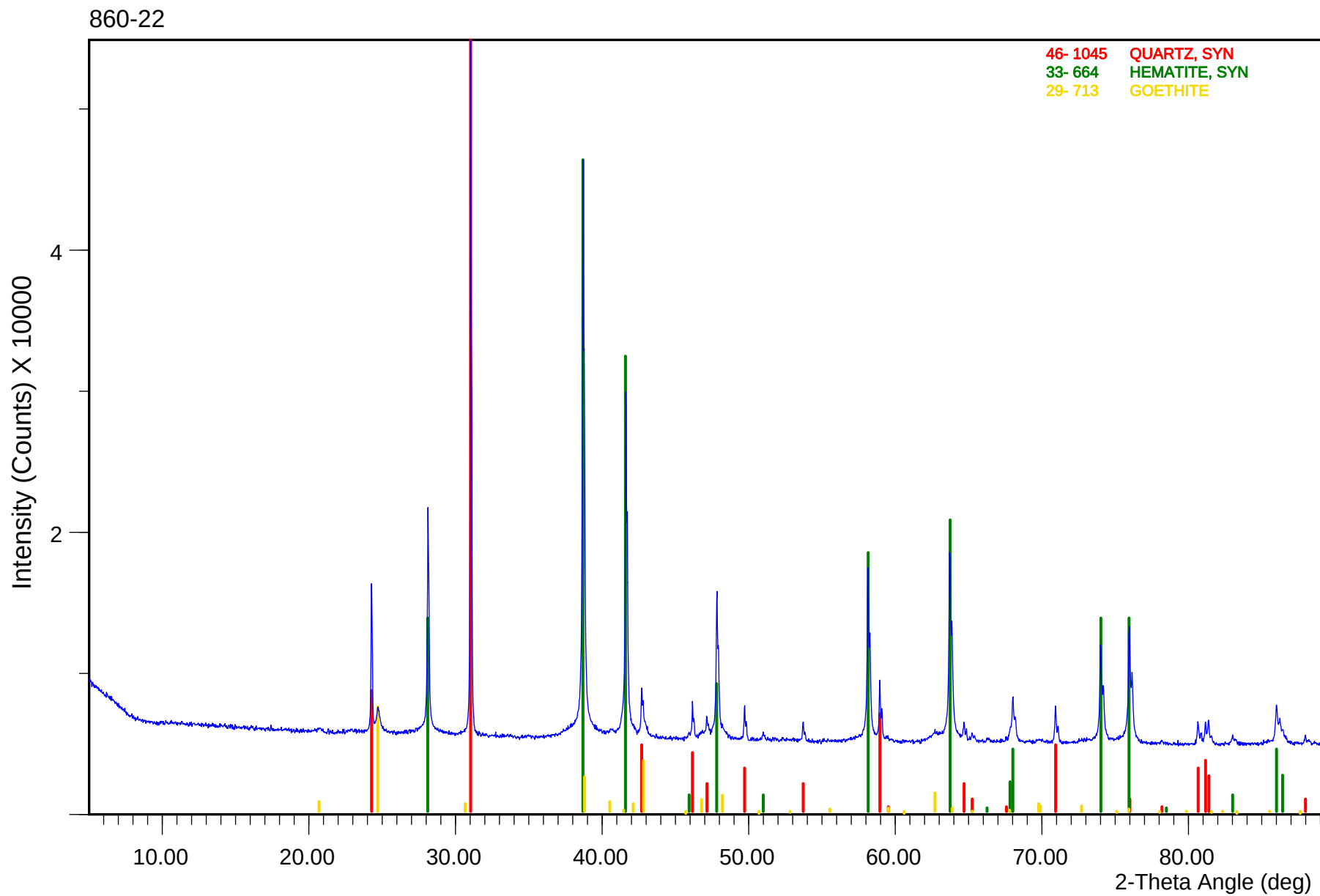
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Major	good
Goethite (FeOOH)	Minor	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_23
Client ID: EP1108259-023
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

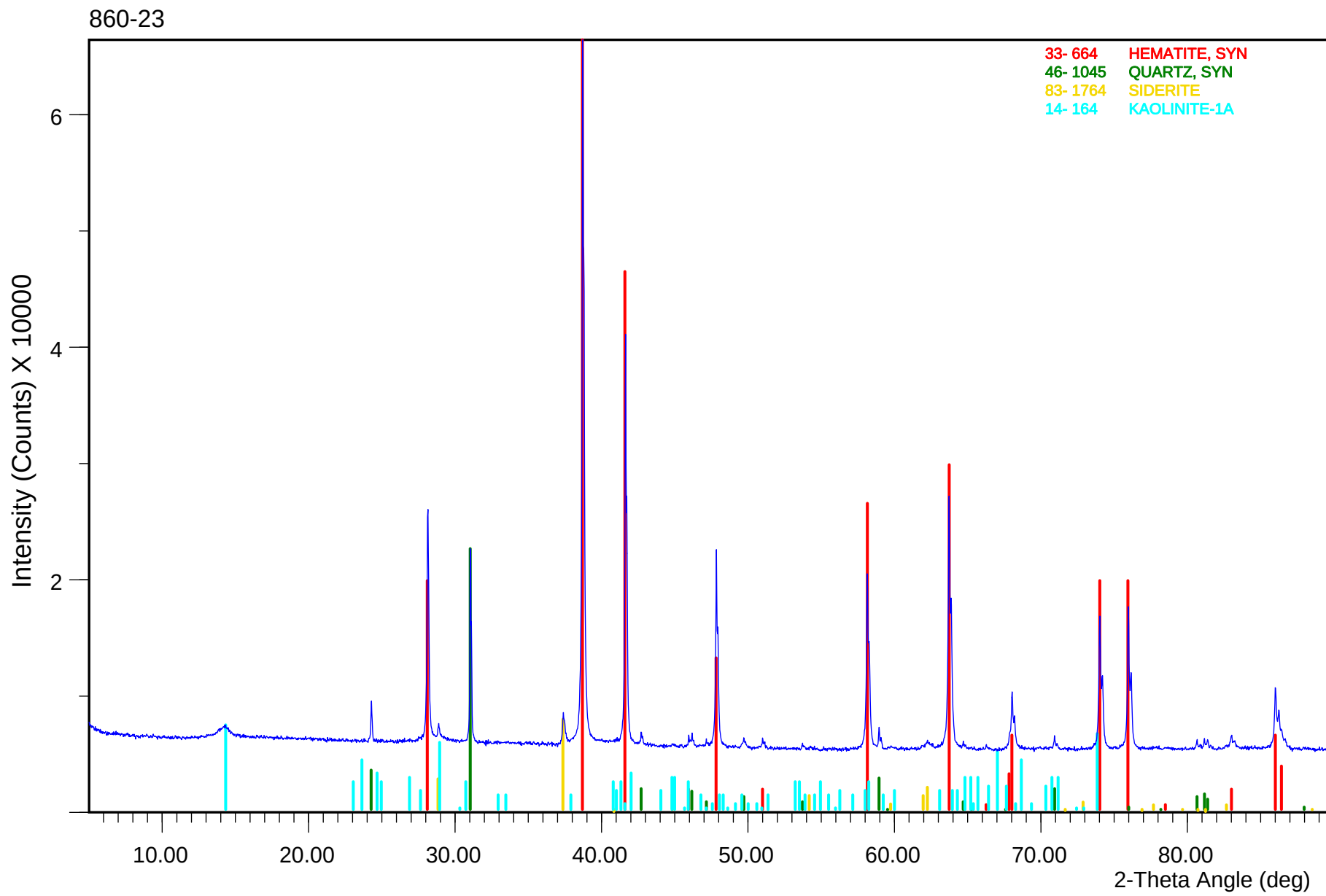
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Hematite (Fe_2O_3)	Major	good
Quartz (SiO_2)	Major	good
Siderite (FeCO_3)	Minor	medium
Kaolinite ($\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_24
Client ID: EP1108259-024
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

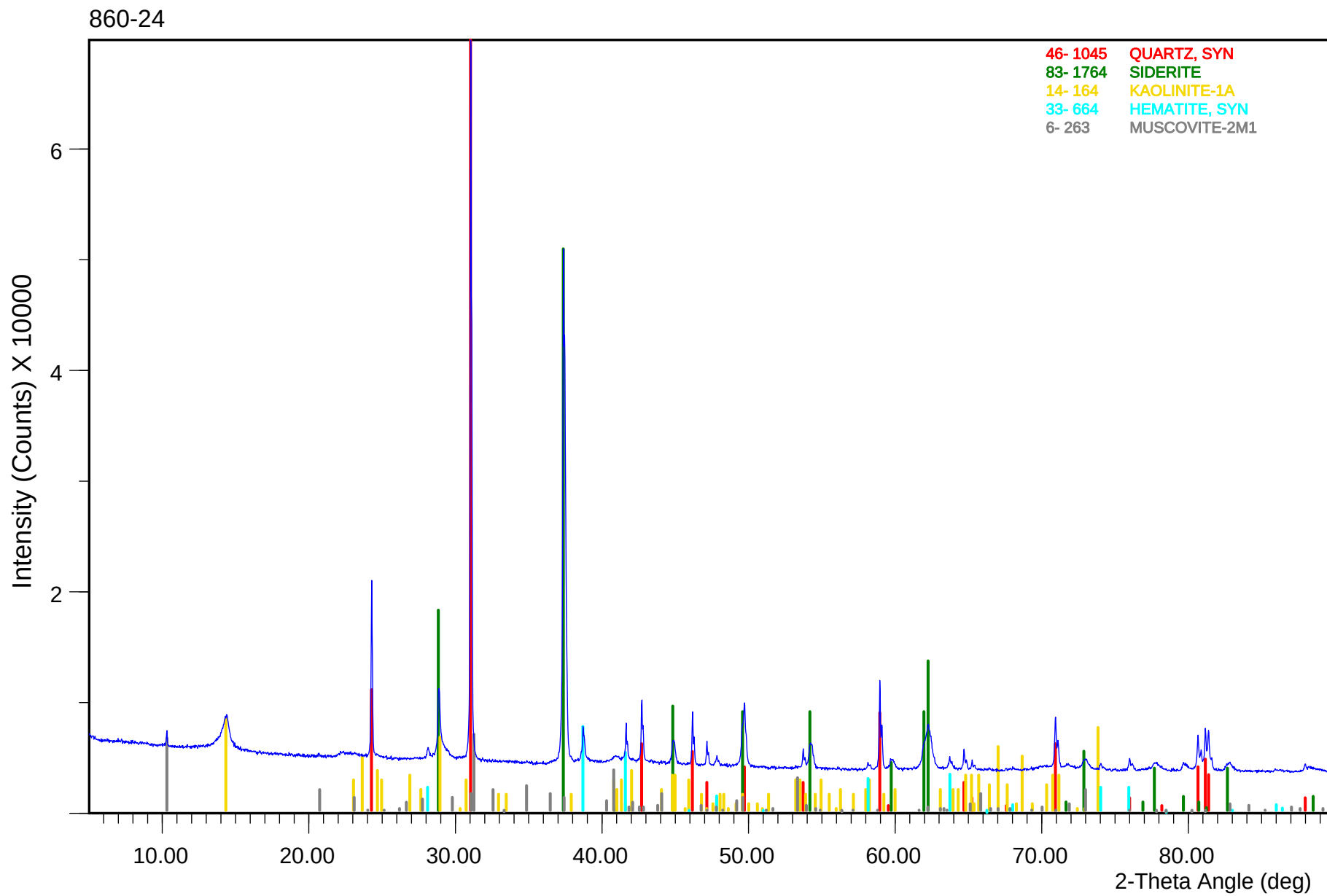
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Siderite (FeCO ₃)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	medium
Hematite (Fe ₂ O ₃)	Minor	good
Muscovite-2M1 (KAl ₂ (Si ₃ Al)O ₁₀ (OH,F) ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_25
Client ID: EP1108259-025
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

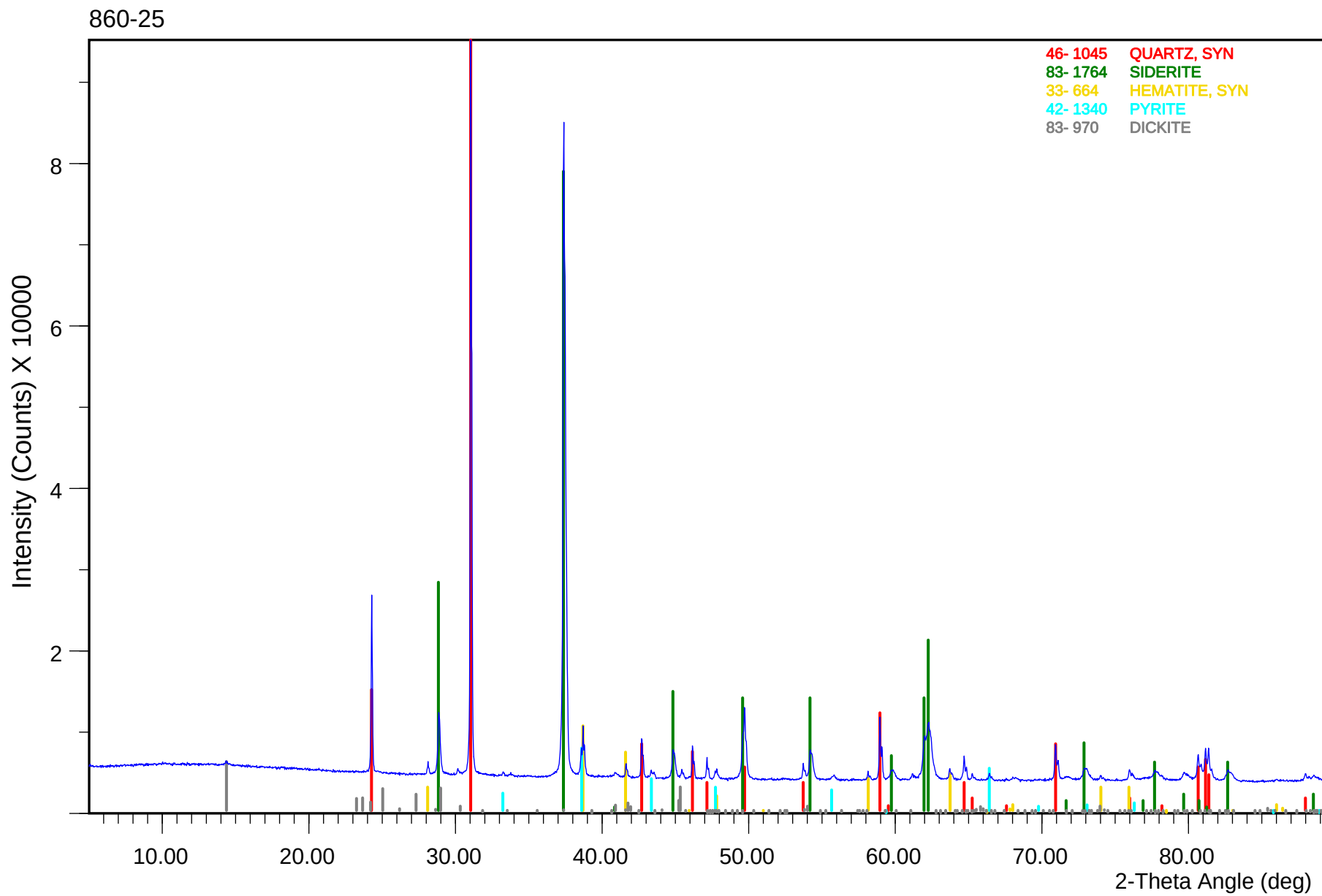
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Siderite (FeCO ₃)	Major	good
Hematite (Fe ₂ O ₃)	Minor	good
Pyrite (FeS ₂)	Trace	good
Dickite (Al ₂ Si ₂ O ₅ (OH) ₄)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_26
Client ID: EP1108259-026
Date: 16/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

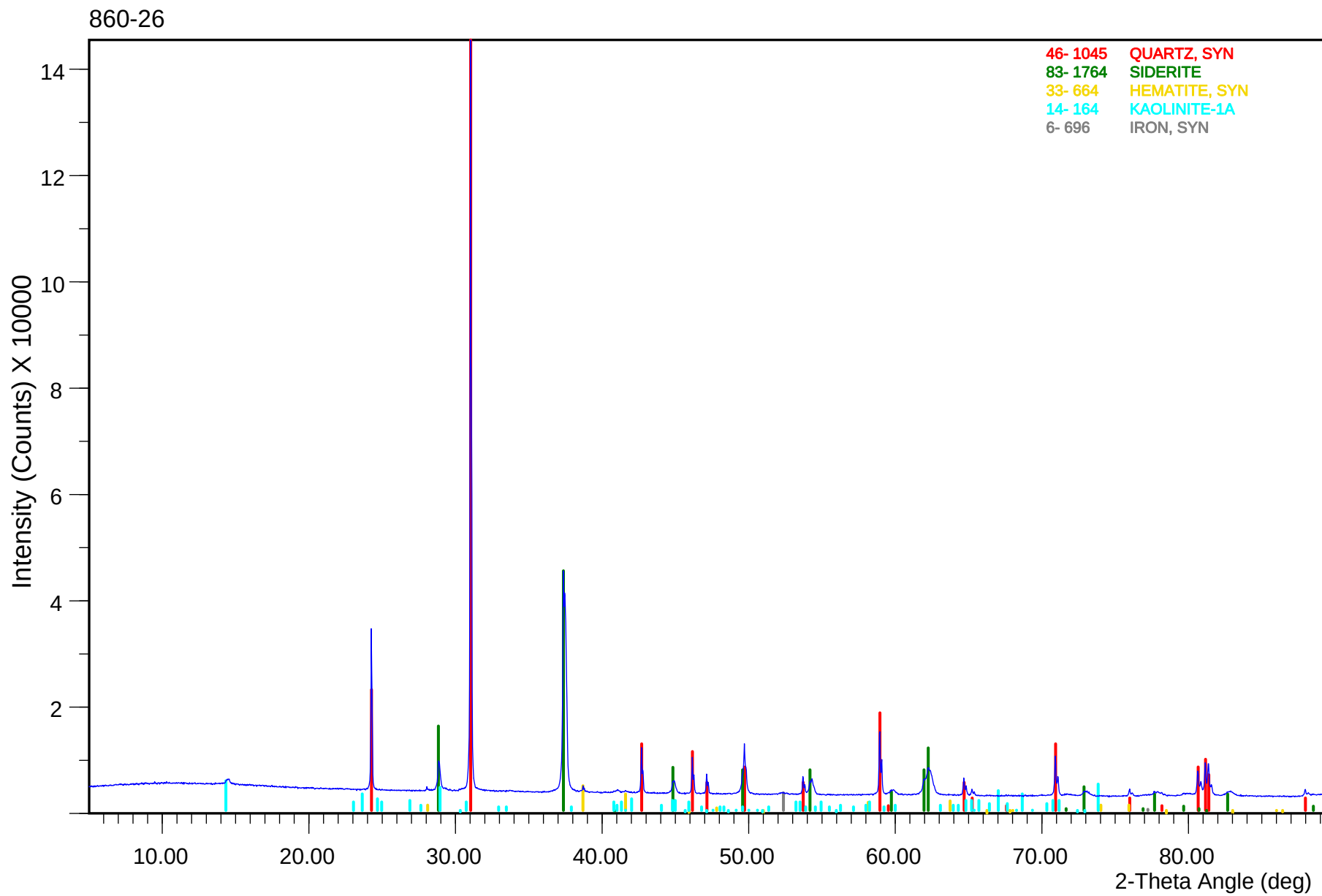
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Siderite (FeCO ₃)	Major	good
Hematite (Fe ₂ O ₃)	Trace	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Trace	medium
Iron (Fe)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS
Job number: 11_860
Sample: 11_860_30
Client ID: EP1108259 044 60594
Date: 15/12/11
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine particulates in a plastic bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

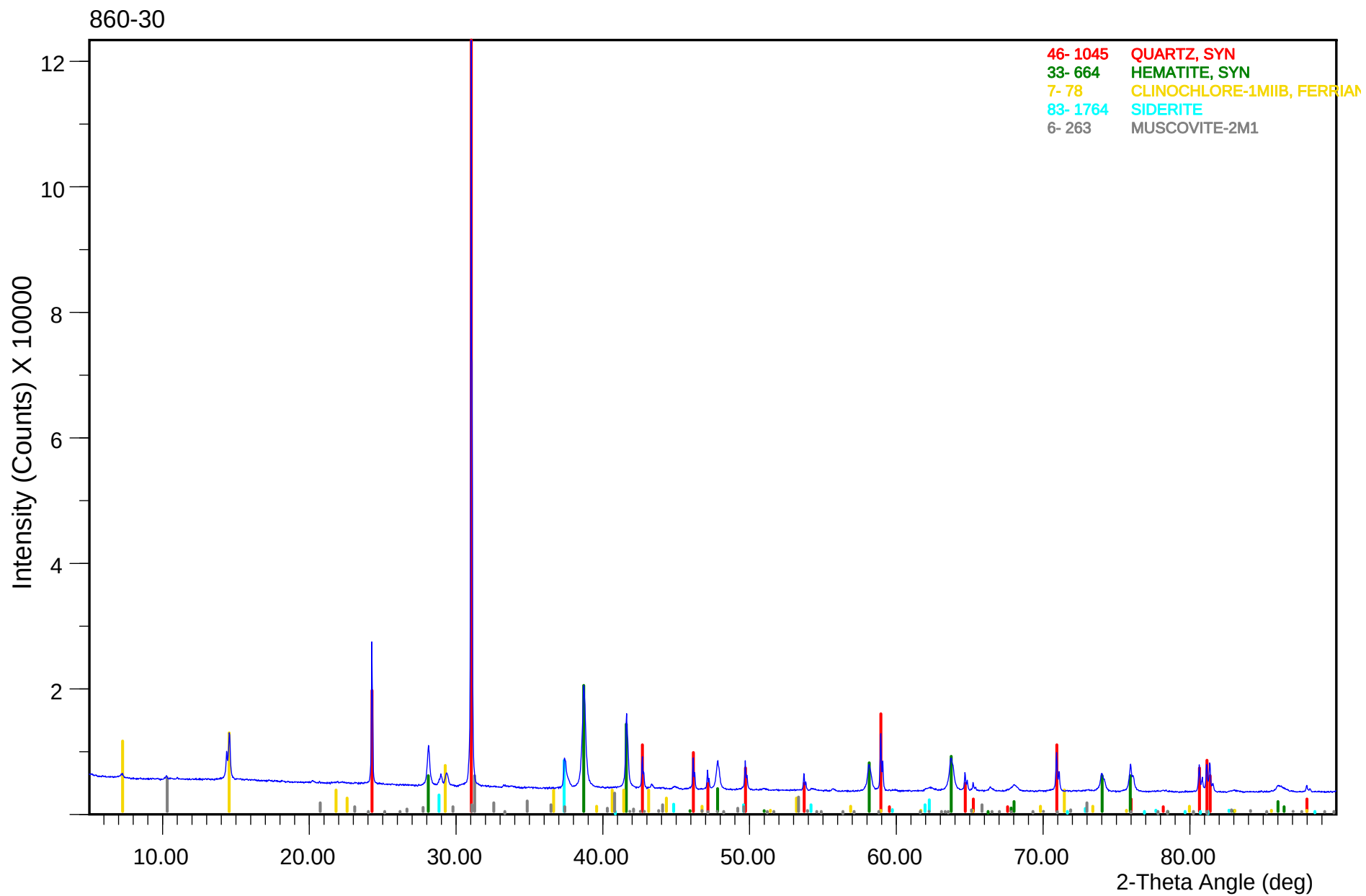
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Major	good
Clinochlore-1MIIb, ferroan ((Mg,Fe) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Minor	medium
Siderite (FeCO ₃)	Minor	medium
Muscovite-2M1 (KAl ₂ (Si ₃ Al)O ₁₀ (OH,F) ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_03
Client ID: EP1108946-001
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

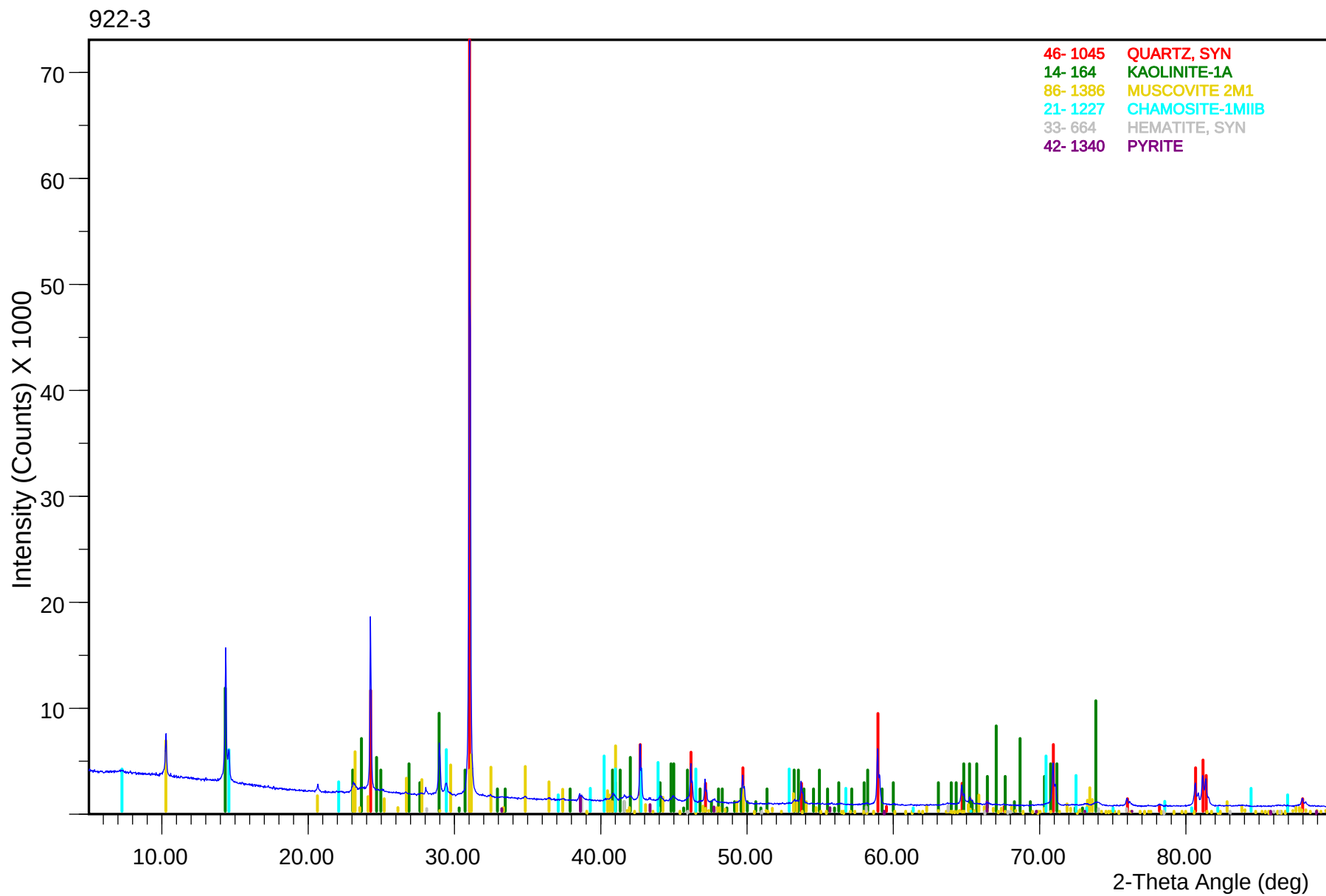
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Major	medium
Muscovite-2M1 (KAl ₂ (Si ₃ Al)O ₁₀ (OH,F) ₂)	Minor	medium
Chamosite-1MIIb ((Fe,Al,Mg) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Trace	medium
Hematite (Fe ₂ O ₃)	Trace	medium
Pyrite (FeS ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_10
Client ID: EP1108946-002
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

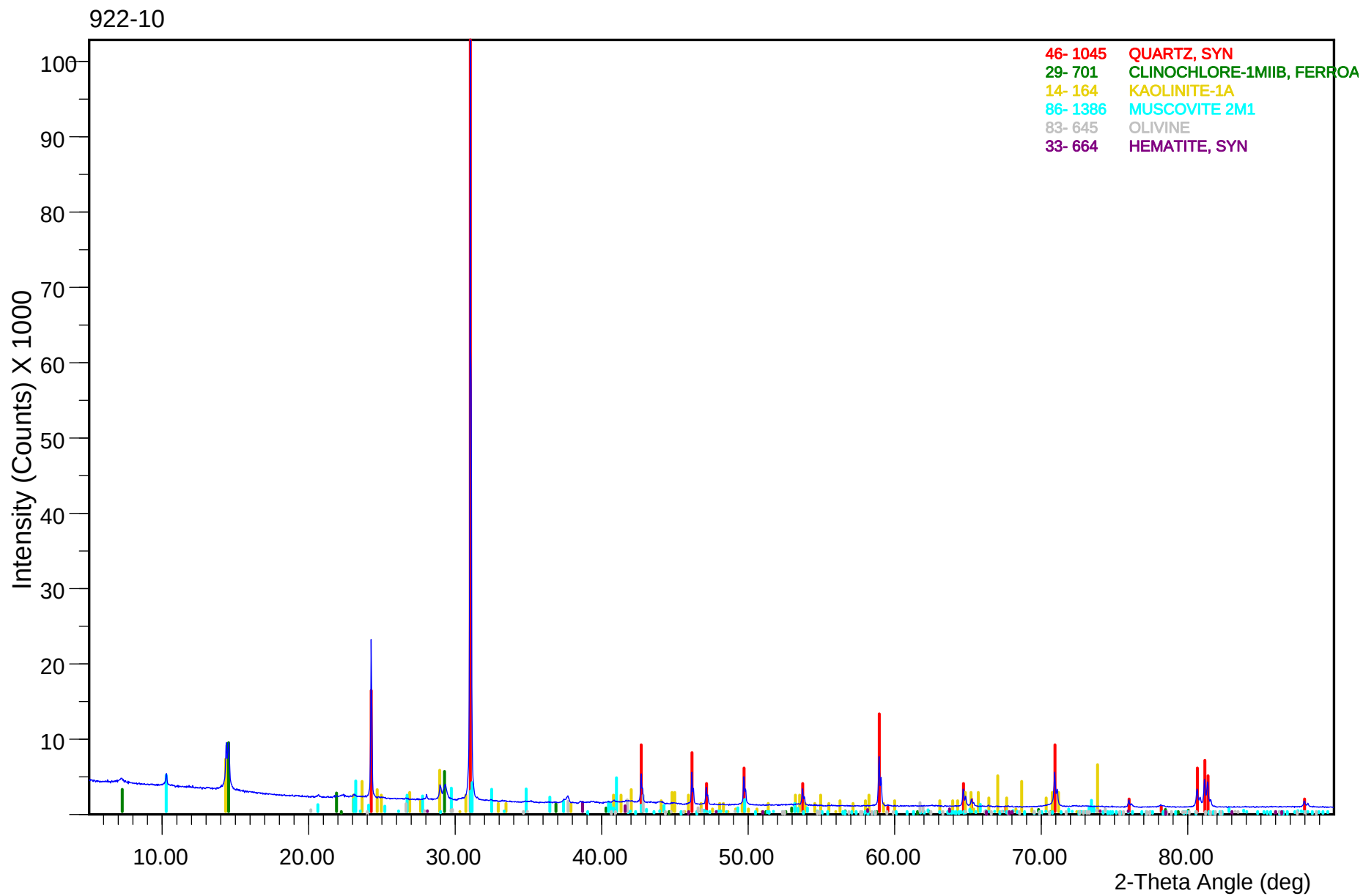
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Clinochlore, ferroan ((Mg,Fe) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Major	good
Muscovite-2M1 (KAl ₂ (Si ₃ Al)O ₁₀ (OH,F) ₂)	Minor	medium
Olivine ((Mg _{0.879} Fe _{0.121})(Mg _{0.881} Fe _{0.119})(SiO ₄))	Minor	medium
Hematite (Fe ₂ O ₃)	Minor	good

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_16
Client ID: EP1108946-005
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

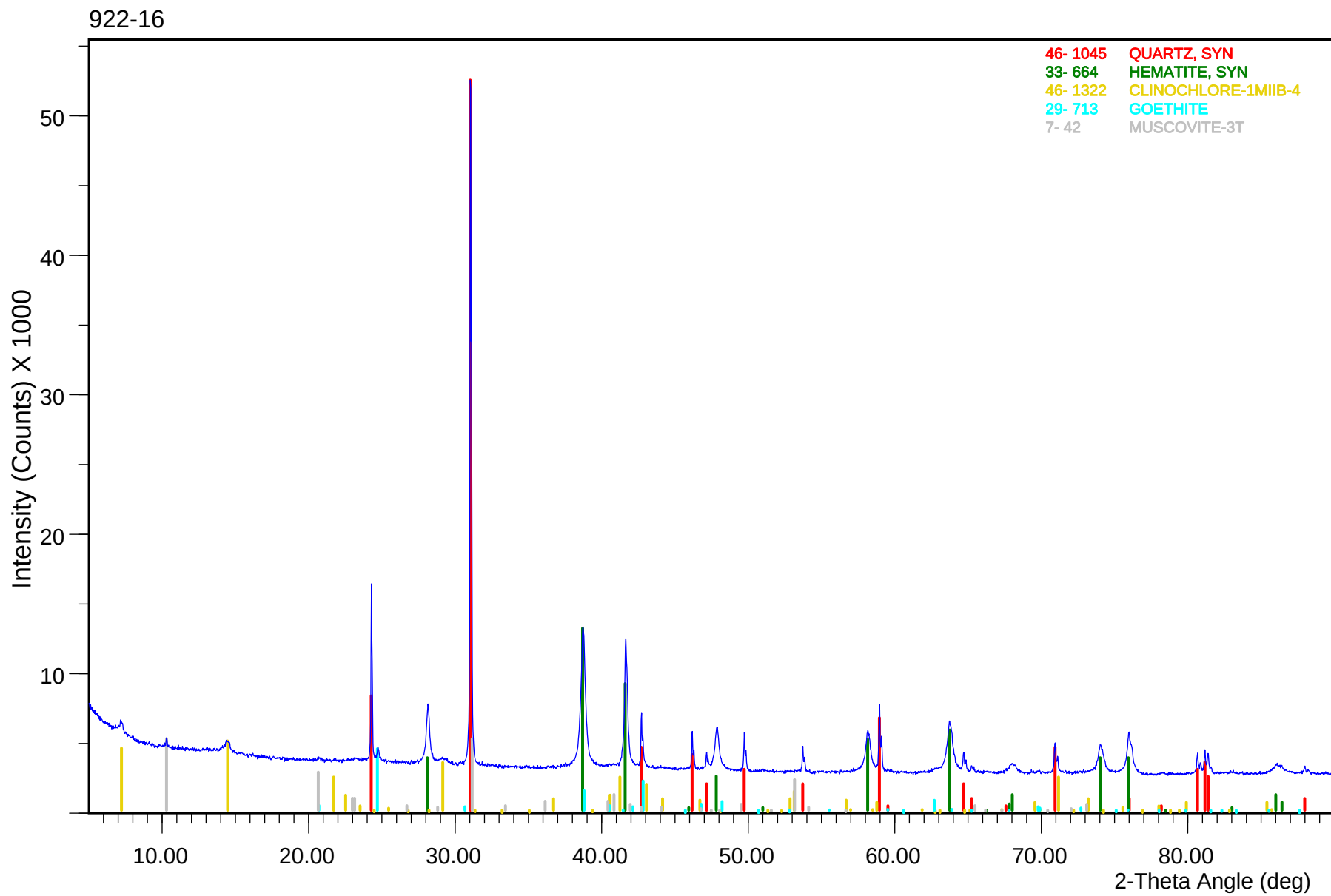
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Minor	good
Clinochlore-1MIIb-4 (Mg ₅ Al(Si,Al) ₄ O ₁₀ (OH) ₈)	Trace	medium
Goethite (FeOOH)	Trace	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_15
Client ID: EP1108946-006
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

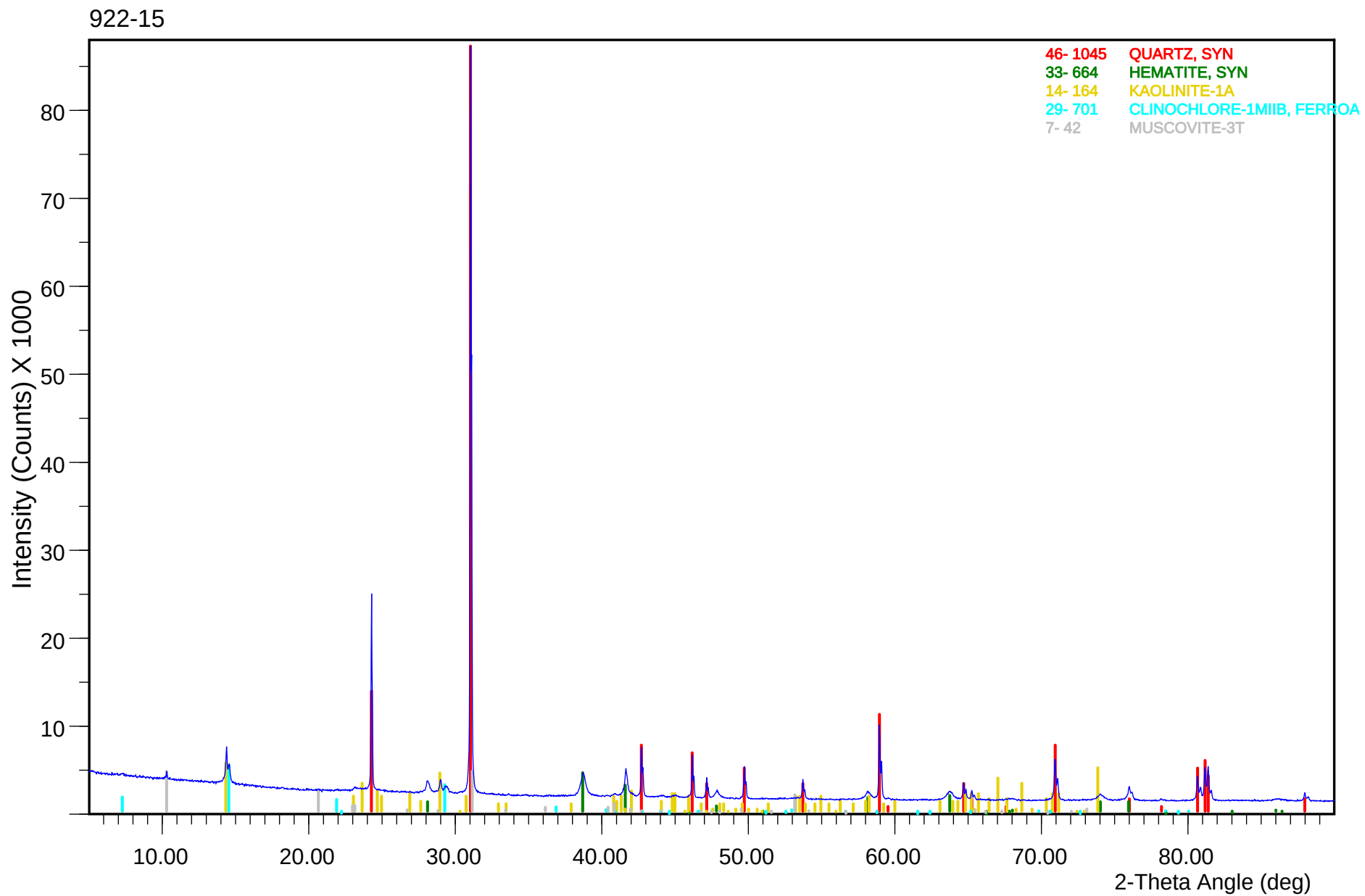
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Minor	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Trace	medium
Clinochlore, ferroan ((Mg,Fe) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Trace	low
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_17
Client ID: EP1108946-007
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

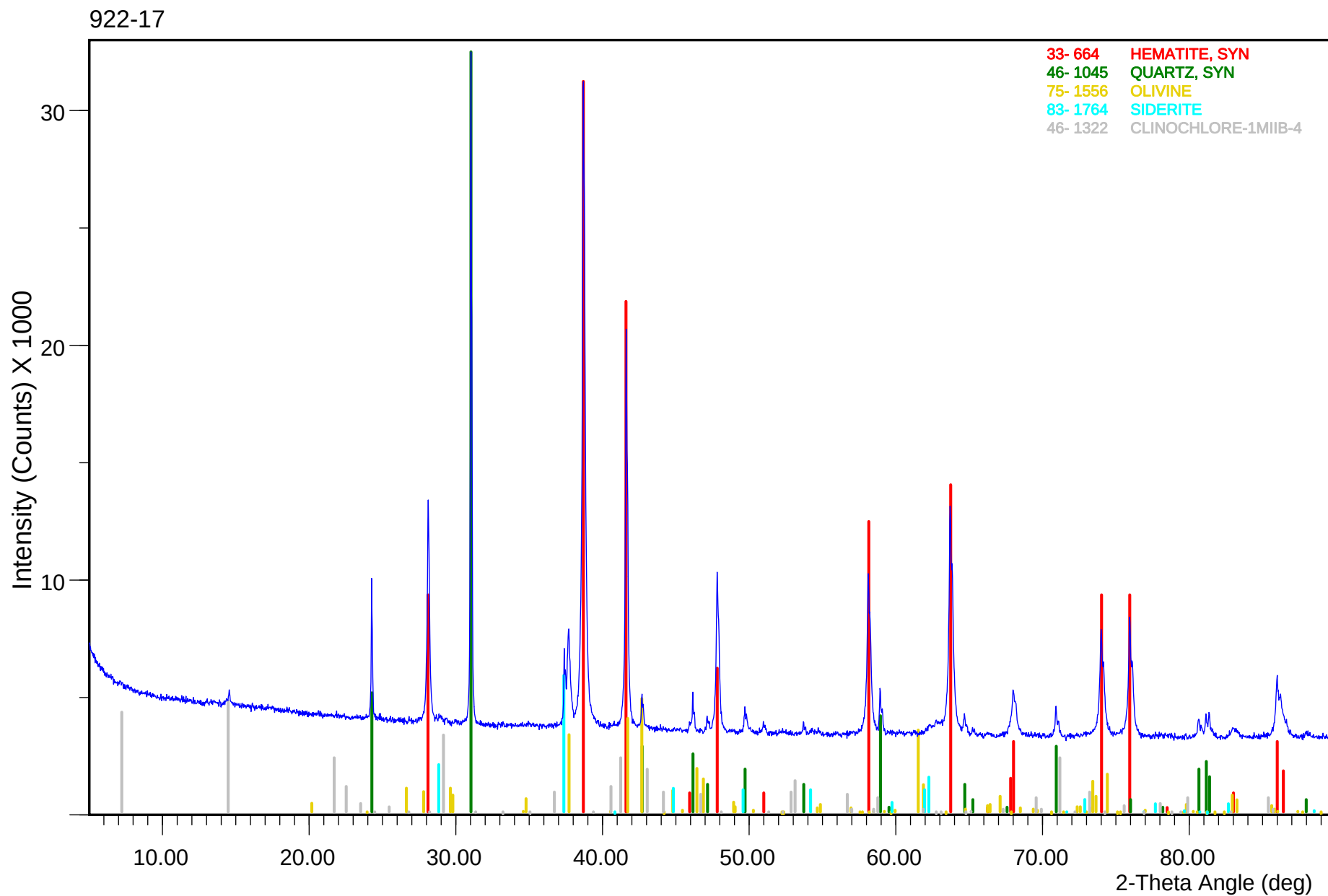
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Hematite (Fe_2O_3)	Major	good
Quartz (SiO_2)	Major	good
Olivine ($\text{Fe}_{0.2}\text{Mg}_{1.8}\text{SiO}_4$)	Minor	medium
Siderite (FeCO_3)	Trace	low
Clinochlore-1M11b-4 ($\text{Mg}_5\text{Al}(\text{Si},\text{Al})_4\text{O}_{10}(\text{OH})_8$)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_02
Client ID: EP1108946-012
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

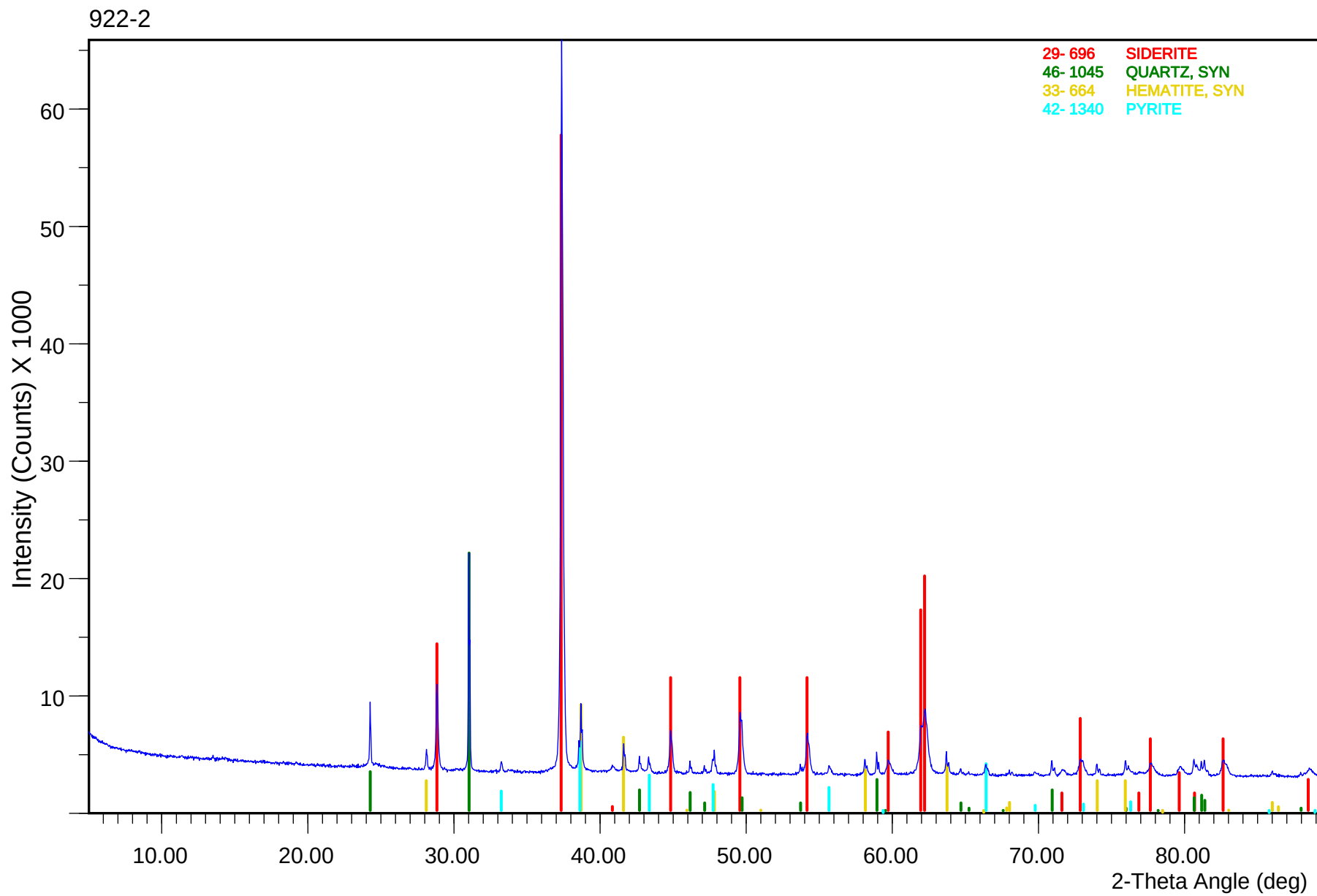
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Siderite (FeCO ₃)	Major	good
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Minor	medium
Pyrite (FeS ₂)	Minor	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_09
Client ID: EP1108946-022
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

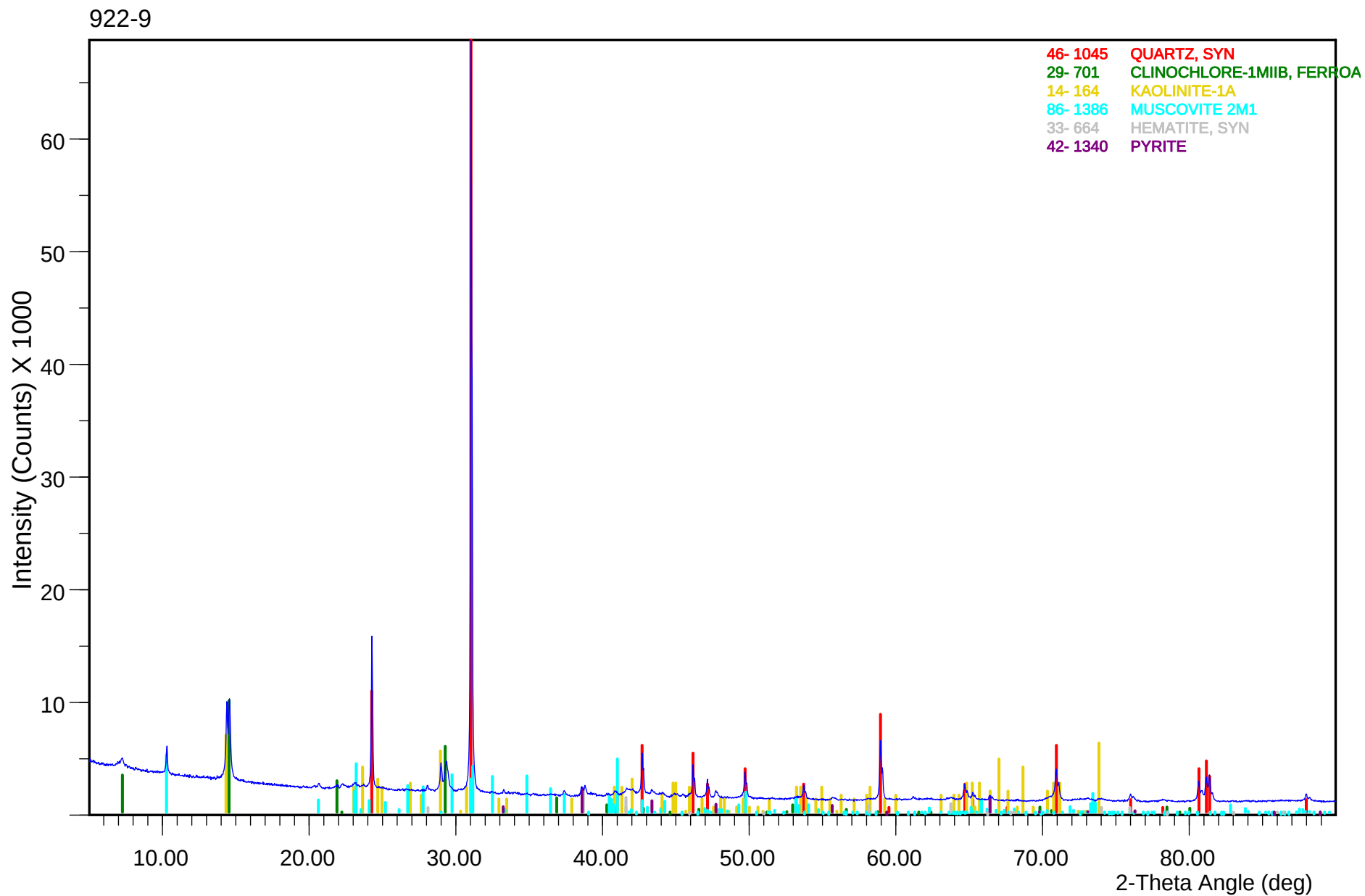
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Clinochlore, ferroan ((Mg,Fe) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Major	good
Muscovite-2M1 (KAl ₂ (Si ₃ Al)O ₁₀ (OH,F) ₂)	Minor	medium
Hematite (Fe ₂ O ₃)	Trace	medium
Pyrite (FeS ₂)	Trace	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_09
Client ID: EP1108946-023
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

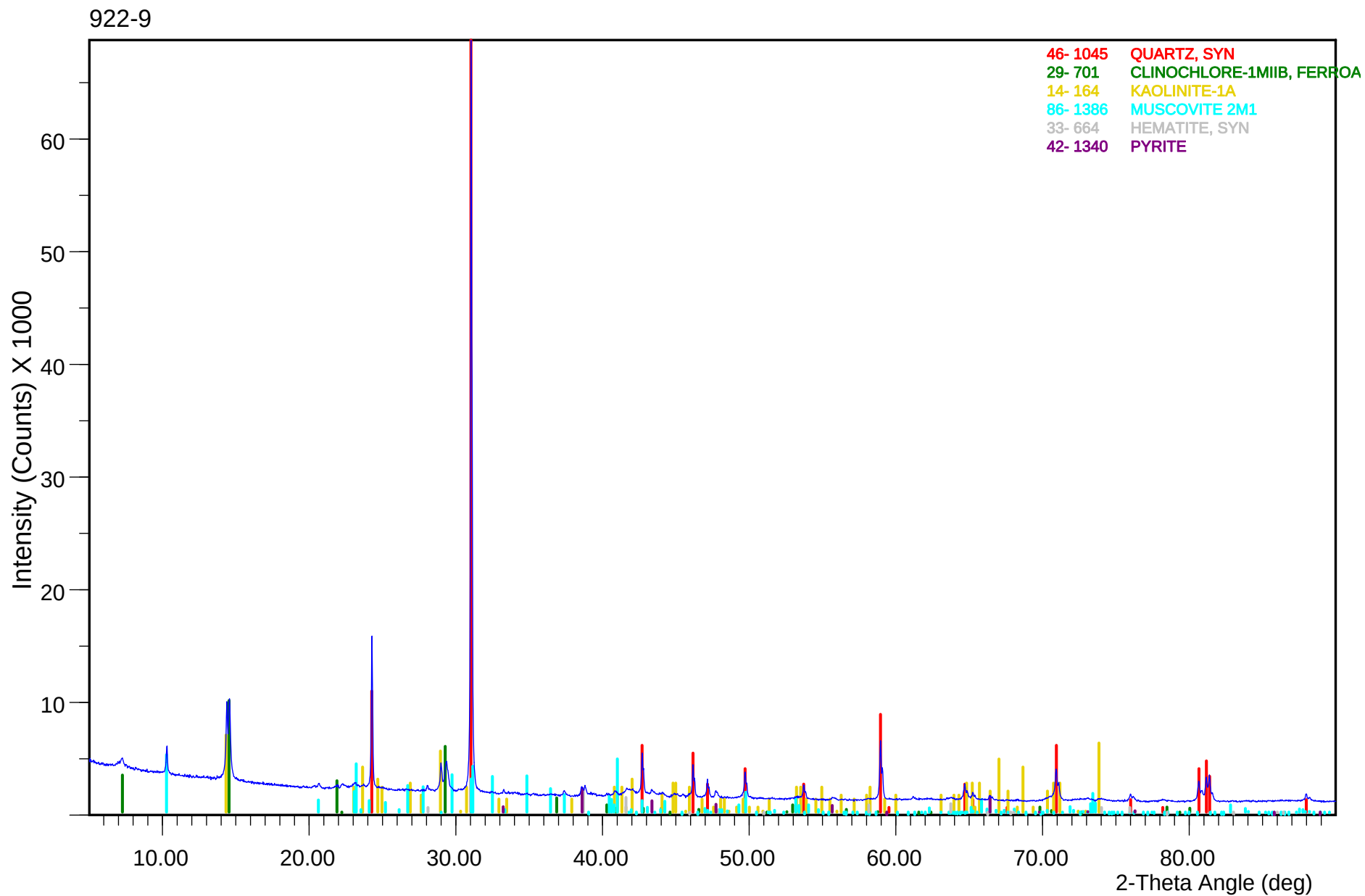
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Clinochlore, ferroan ((Mg,Fe) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Major	good
Muscovite-2M1 (KAl ₂ (Si ₃ Al)O ₁₀ (OH,F) ₂)	Minor	medium
Hematite (Fe ₂ O ₃)	Trace	medium
Pyrite (FeS ₂)	Trace	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_06
Client ID: EP1108946-032
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

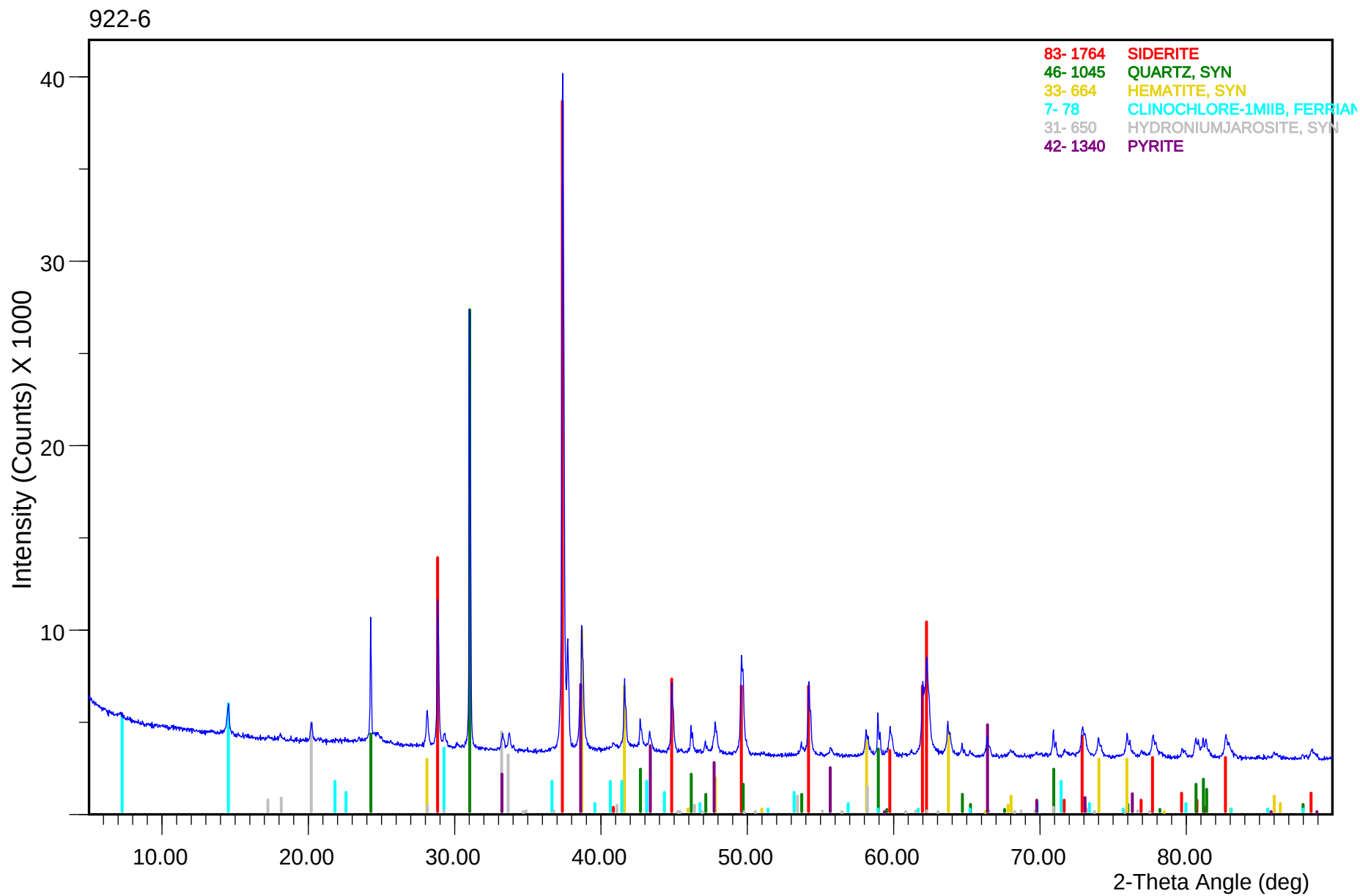
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Siderite (FeCO ₃)	Major	good
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Major	good
Clinocllore, ferroan ((Mg,Fe) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Minor	medium
Hydroniumjarosite, syn ((H ₃ O)Fe ₃ (SO ₄) ₂ (OH) ₆)	Minor	medium
Pyrite (FeS ₂)	Minor	good

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_07
Client ID: EP1108946-035
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

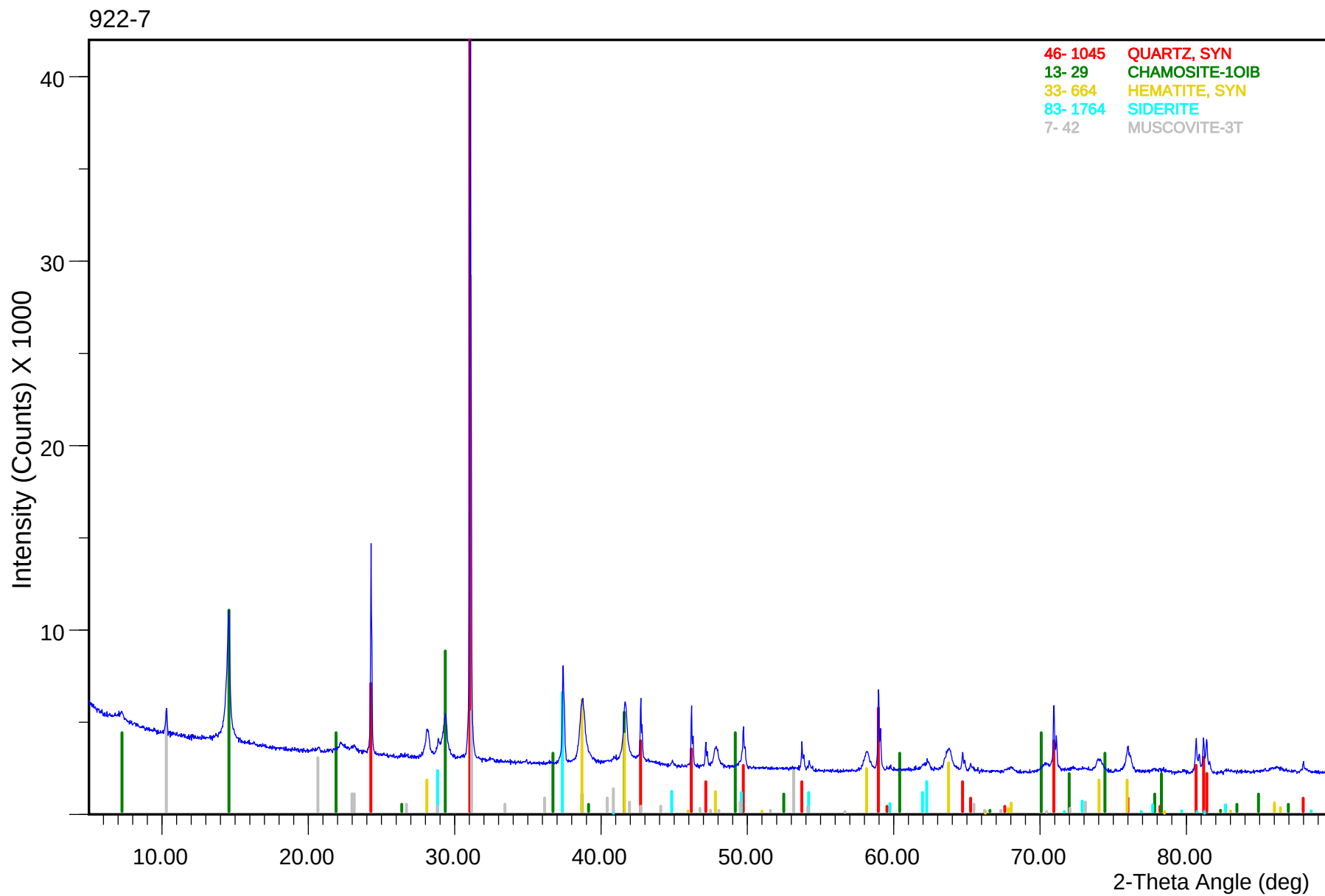
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Chamosite-10lb ((Fe,Al,Mg,Mn) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Major	good
Hematite (Fe ₂ O ₃)	Major	good
Siderite (FeCO ₃)	Minor	medium
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Minor	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_04
Client ID: EP1108946-037
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

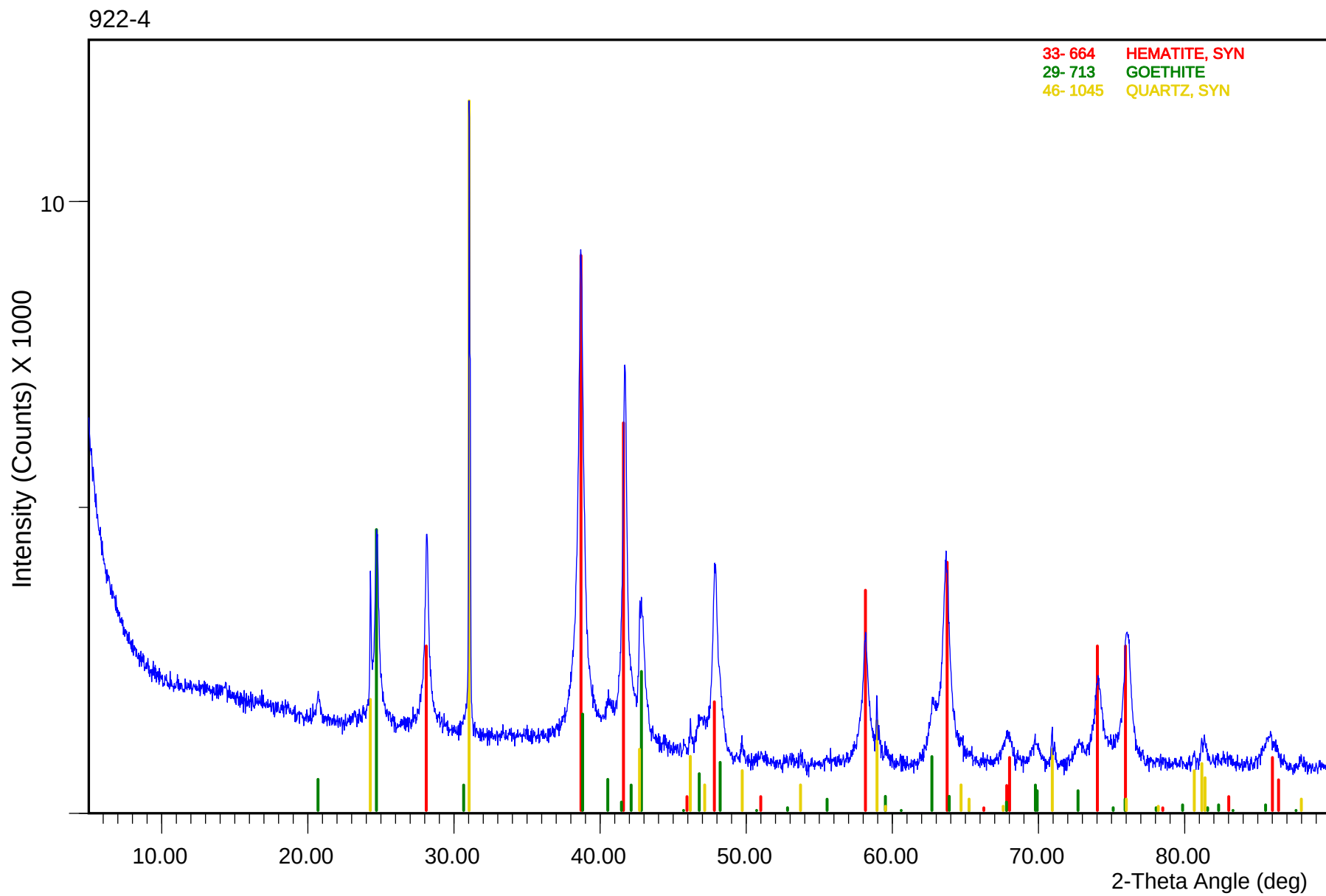
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Hematite (Fe ₂ O ₃)	Major	Good
Goethite (FeOOH)	Major	Good
Quartz (SiO ₂)	Major	Good

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_05
Client ID: EP1108946-038
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

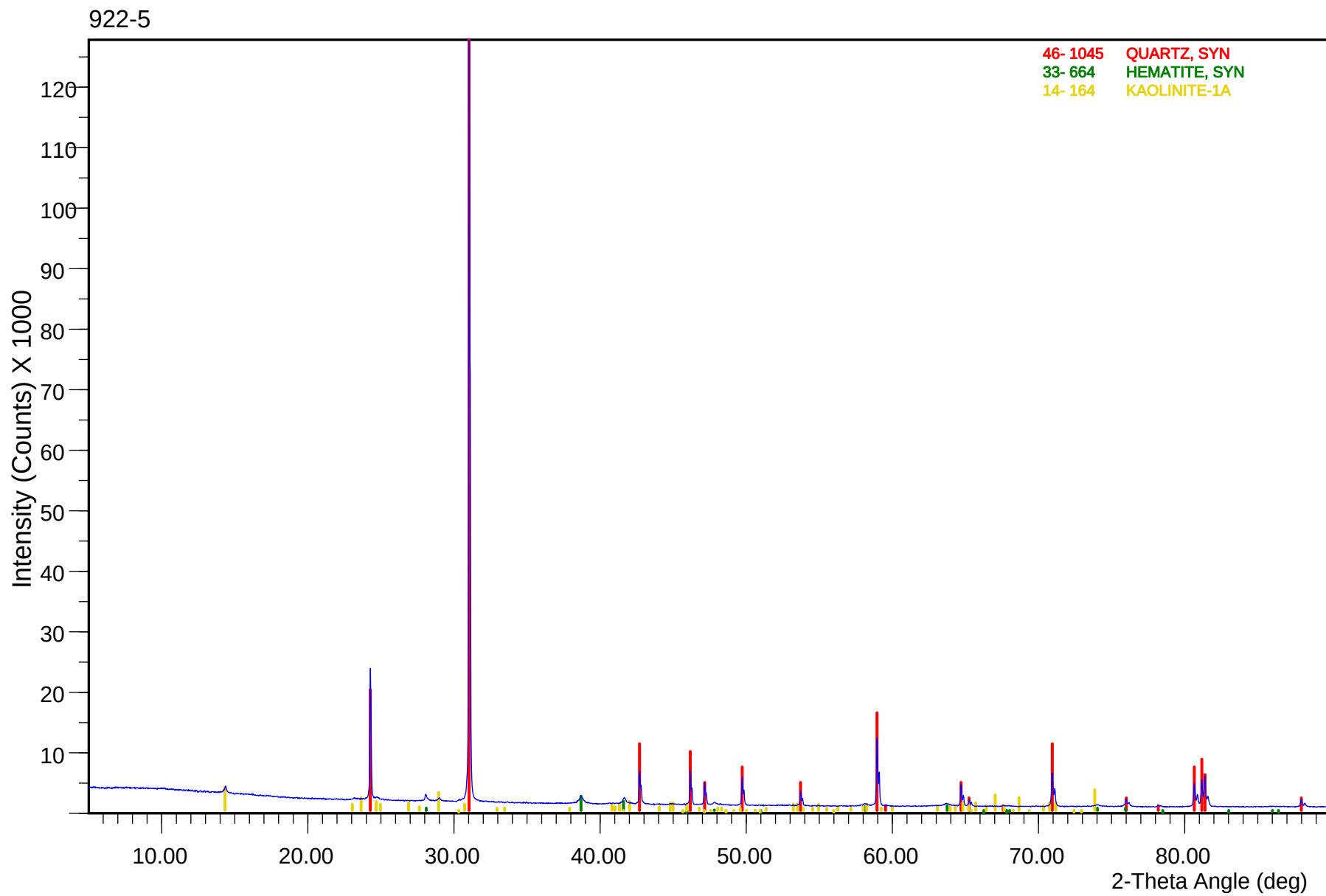
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Minor	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_08
Client ID: EP1108946-039
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 μm . Grinding to this size helps eliminate preferred orientation.

Analysis

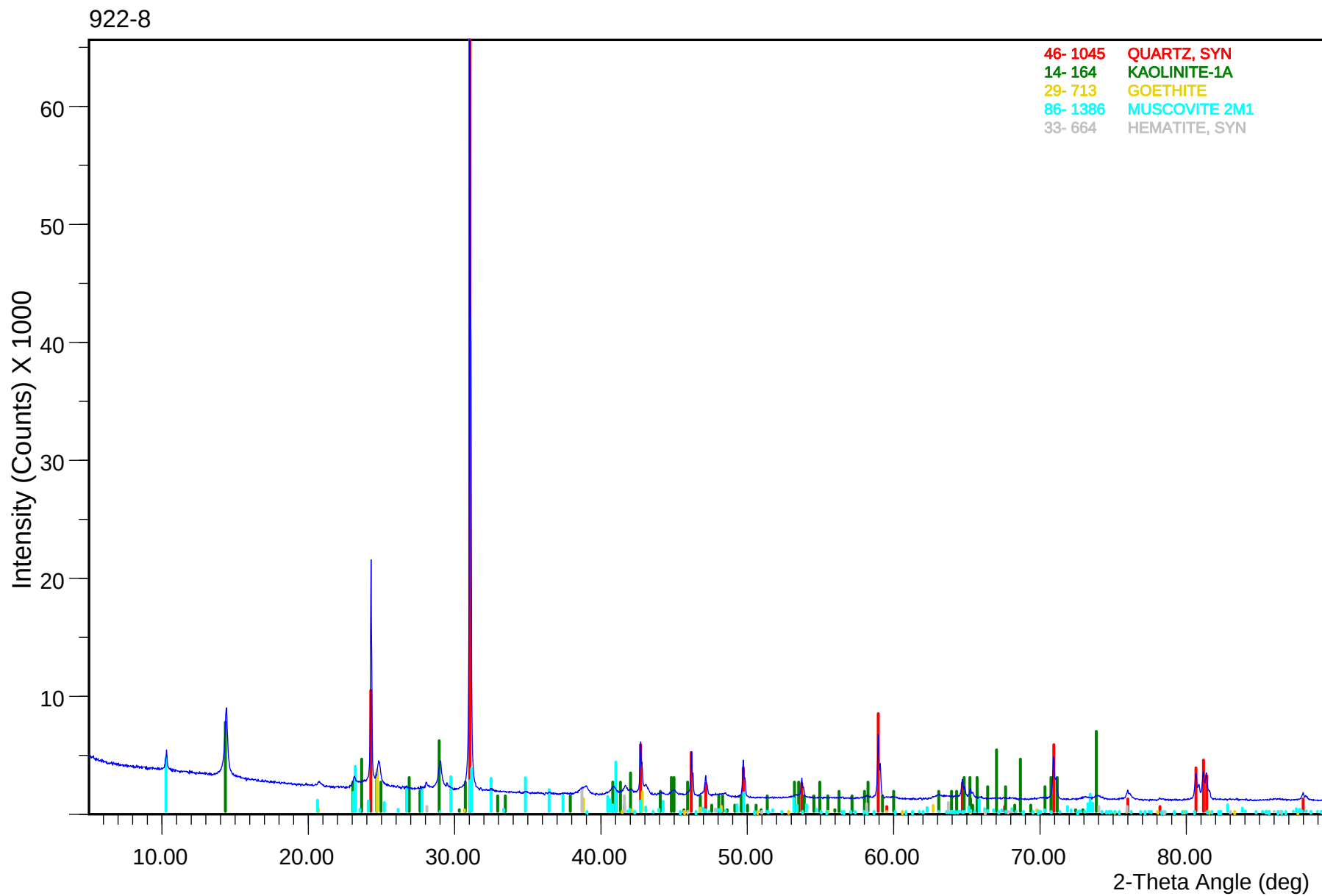
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO_2)	Major	good
Kaolinite ($\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$)	Major	good
Goethite (FeOOH)	Minor	medium
Muscovite-2M1 ($\text{KAl}_2(\text{Si}_3\text{Al})\text{O}_{10}(\text{OH},\text{F})_2$)	Minor	medium
Hematite (Fe_2O_3)	Trace	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_11
Client ID: EP1108946-040
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

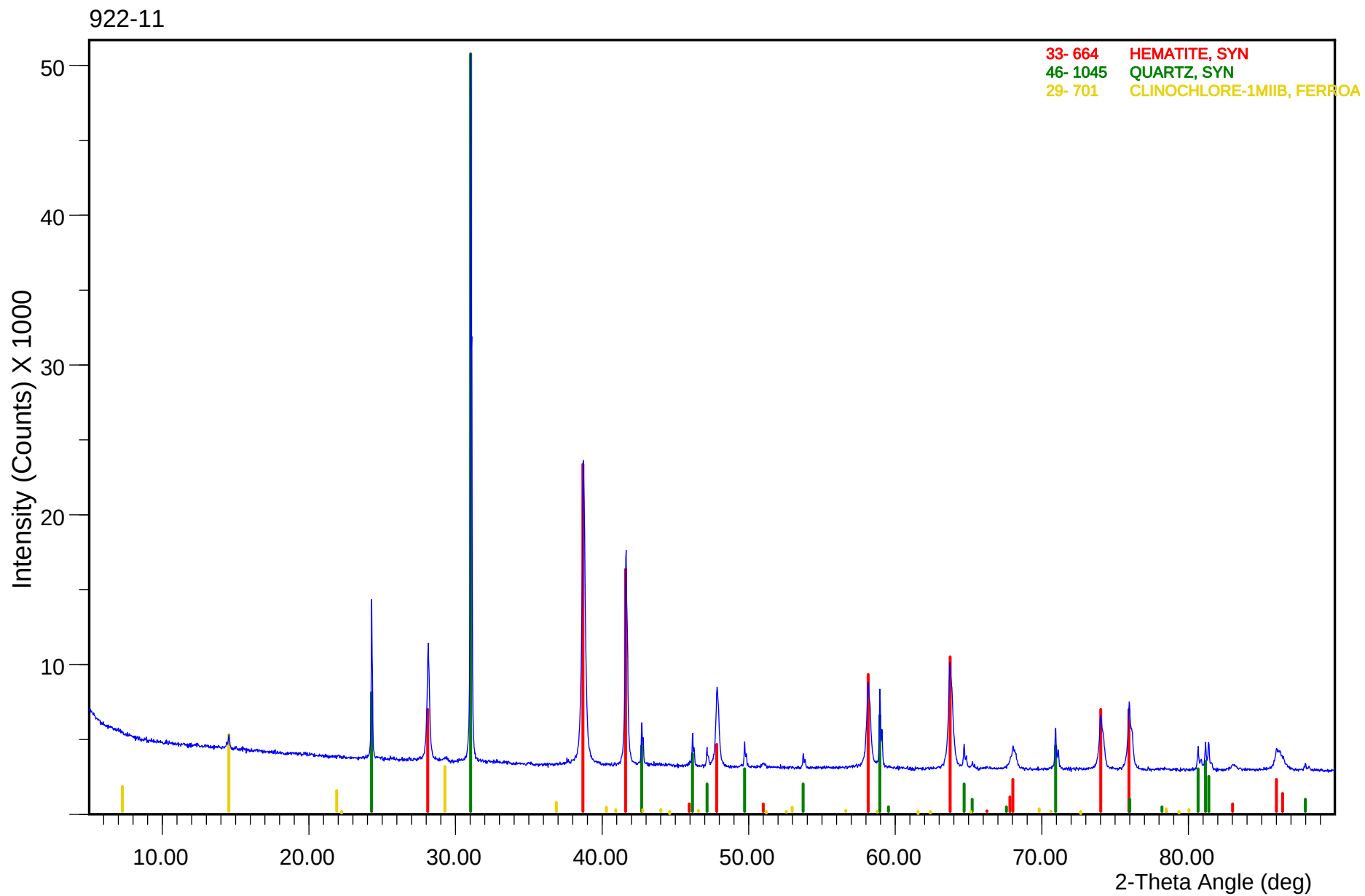
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Hematite (Fe ₂ O ₃)	Major	good
Quartz (SiO ₂)	Major	good
Clinochlore, ferroan ((Mg,Fe) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_14
Client ID: EP1108946-041
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

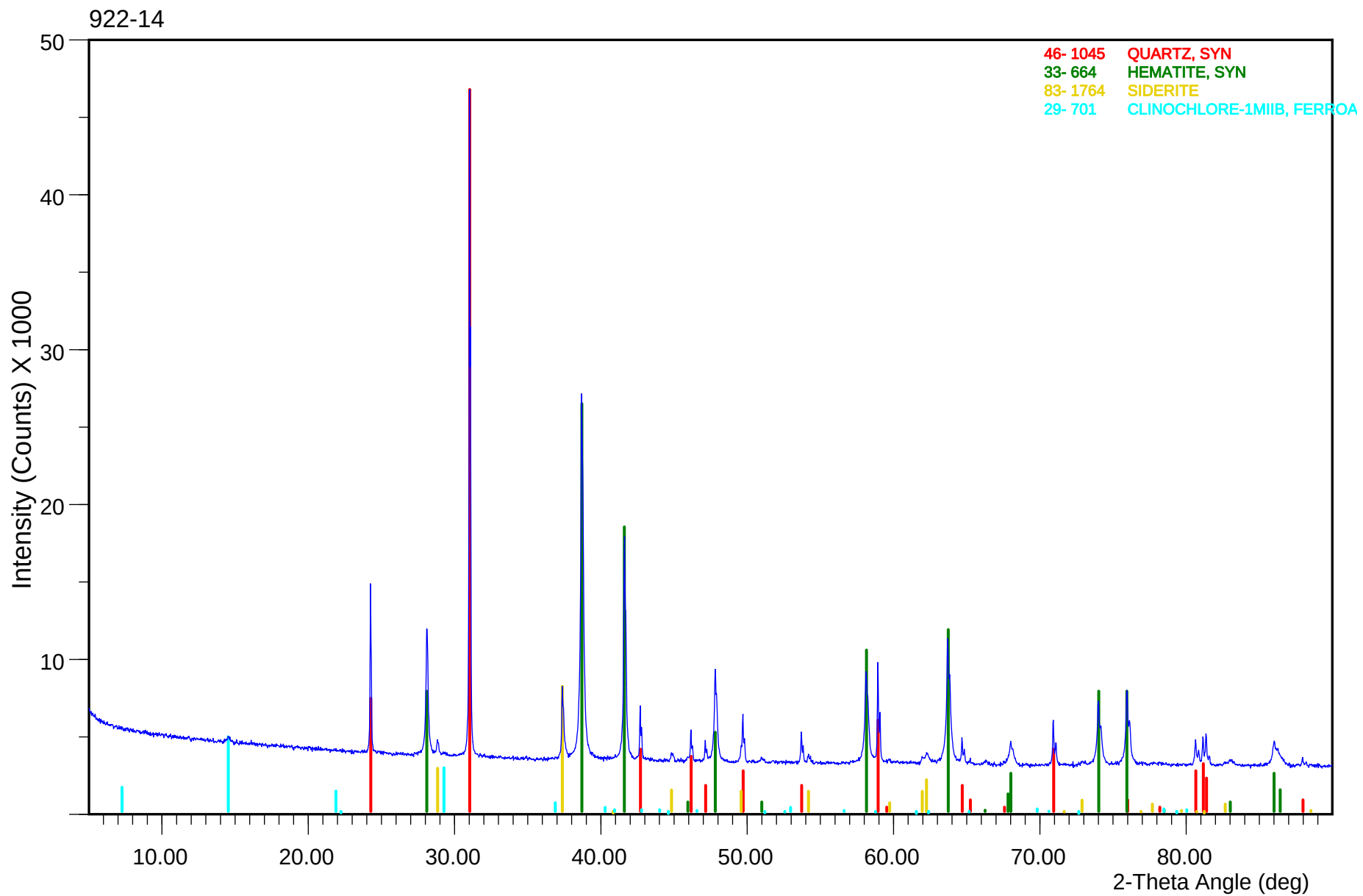
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Major	good
Siderite (FeCO ₃)	Minor	good
Clinochlore, ferroan ((Mg,Fe) ₆ (Si,Al) ₄ O ₁₀ (OH) ₈)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 11_922
Sample: 11_922_01
Client ID: EP1108946-055
Date: 18/1/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine, powdery particulate in a paper sample bag. A representative sub-sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

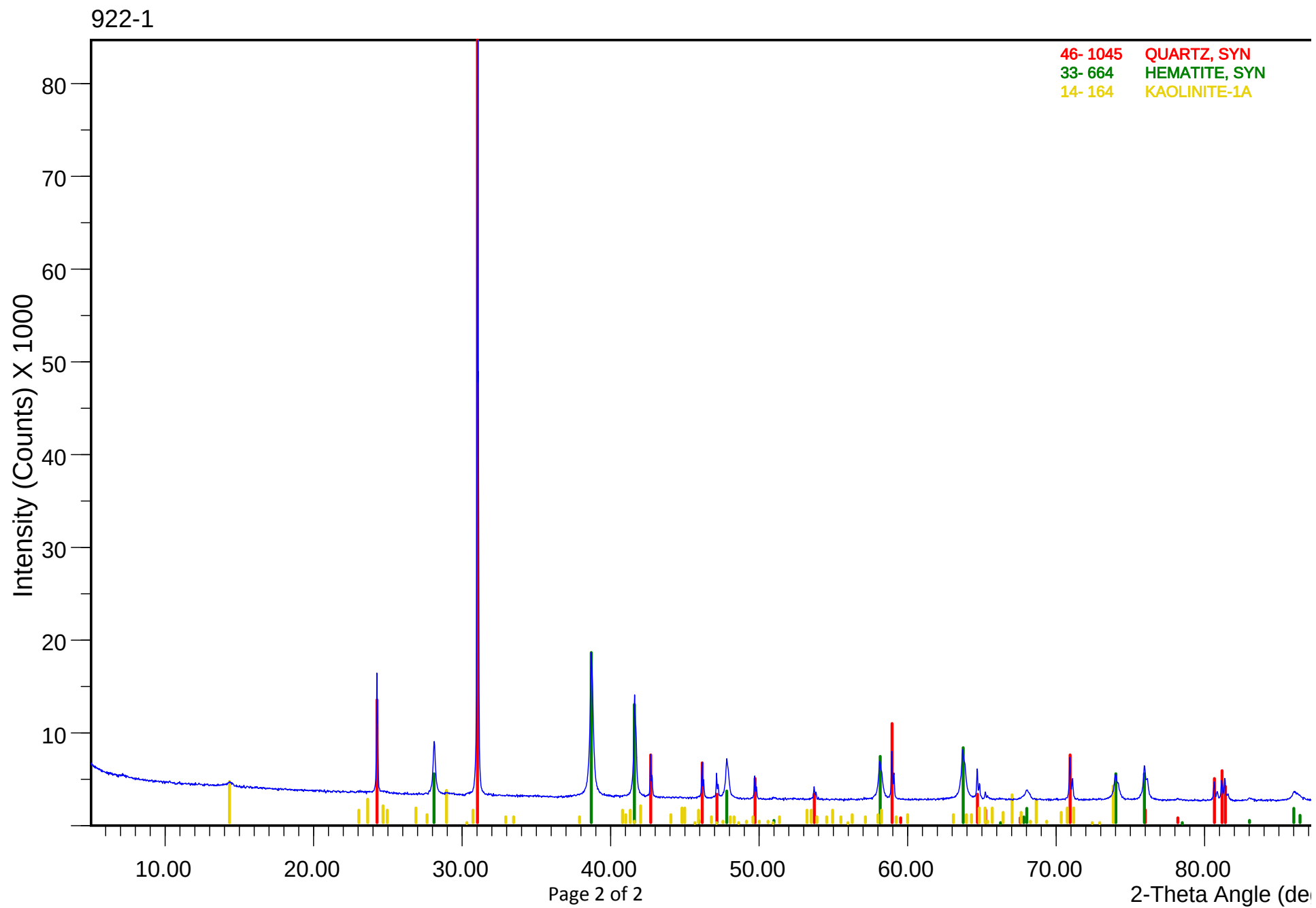
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was cobalt radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Hematite (Fe ₂ O ₃)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 12_159
Sample: 12_159_01
Client ID: EP1201090-001
Date: 27/03/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine powder in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

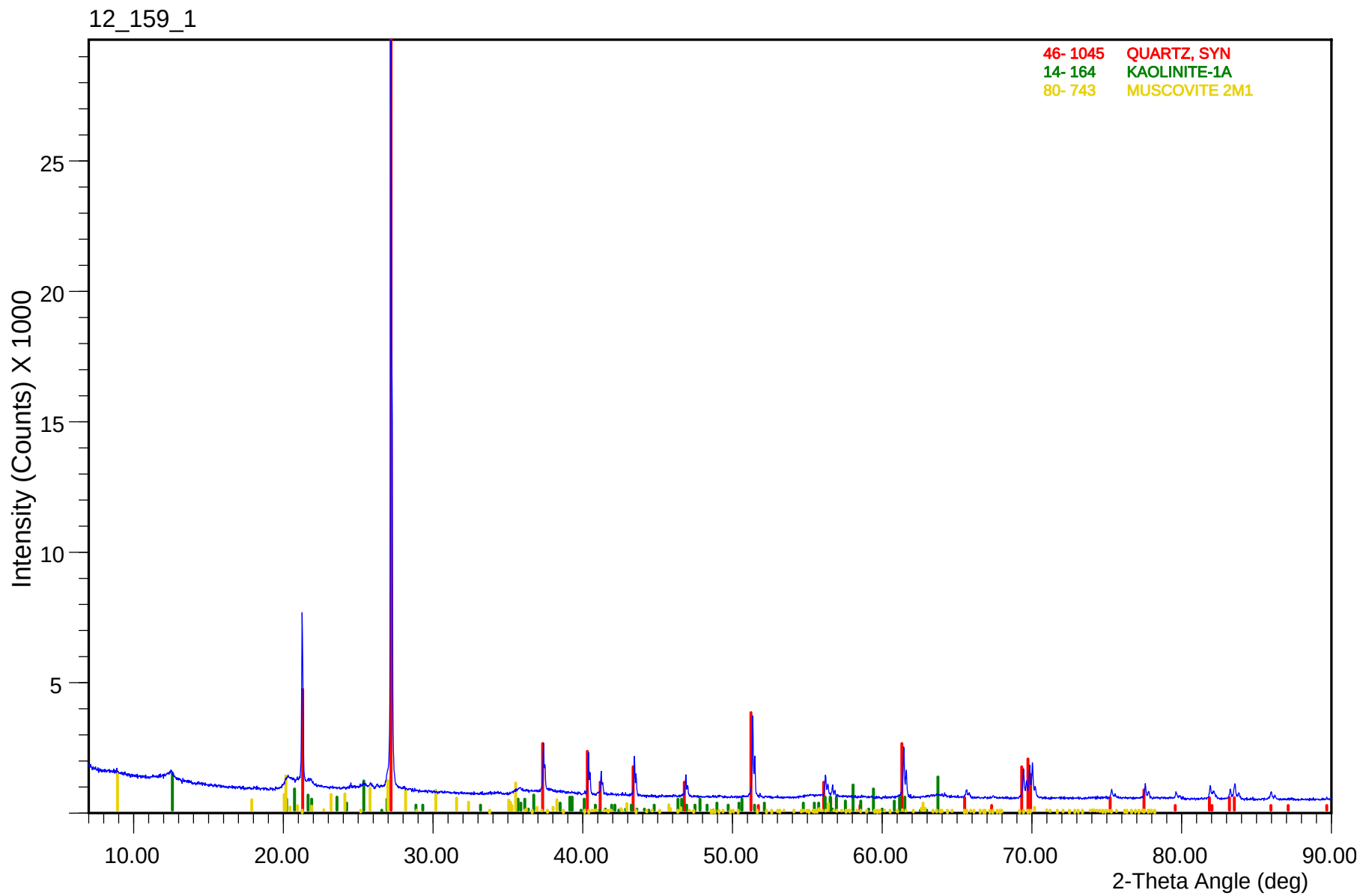
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was copper radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	medium
Muscovite-2M1 (KAl ₂ (Si ₃ Al)O ₁₀ (OH,F) ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 12_159
Sample: 12_159_08
Client ID: EP1201090-008
Date: 27/03/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine powder in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

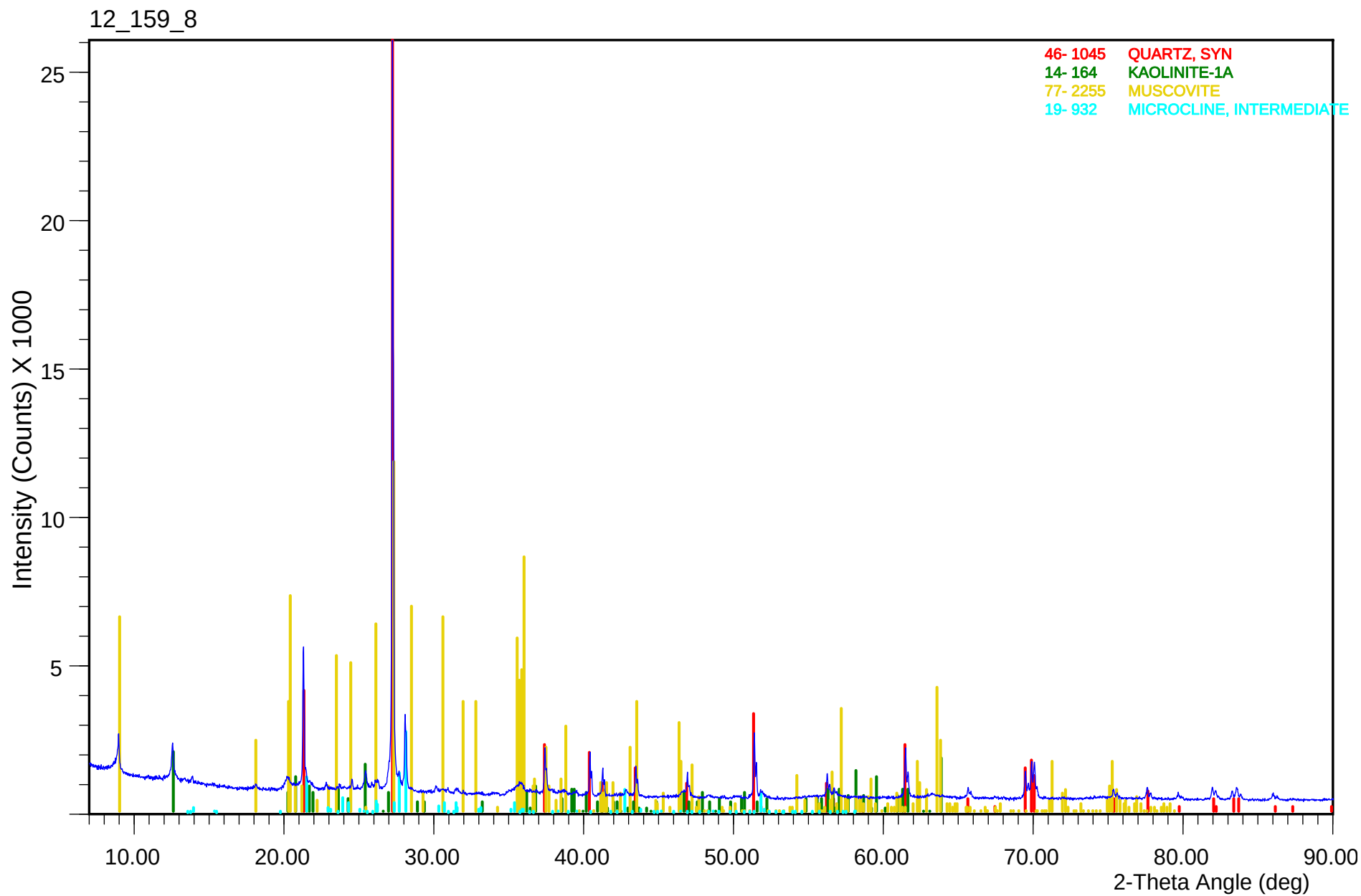
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was copper radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	medium
Muscovite (KAl ₃ Si ₃ O ₁₀ (OH) ₂)	Minor	medium
Microcline, intermediate (KAlSi ₃ O ₈)	Minor	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 12_159
Sample: 12_159_15
Client ID: EP1201090-015
Date: 27/03/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine powder in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

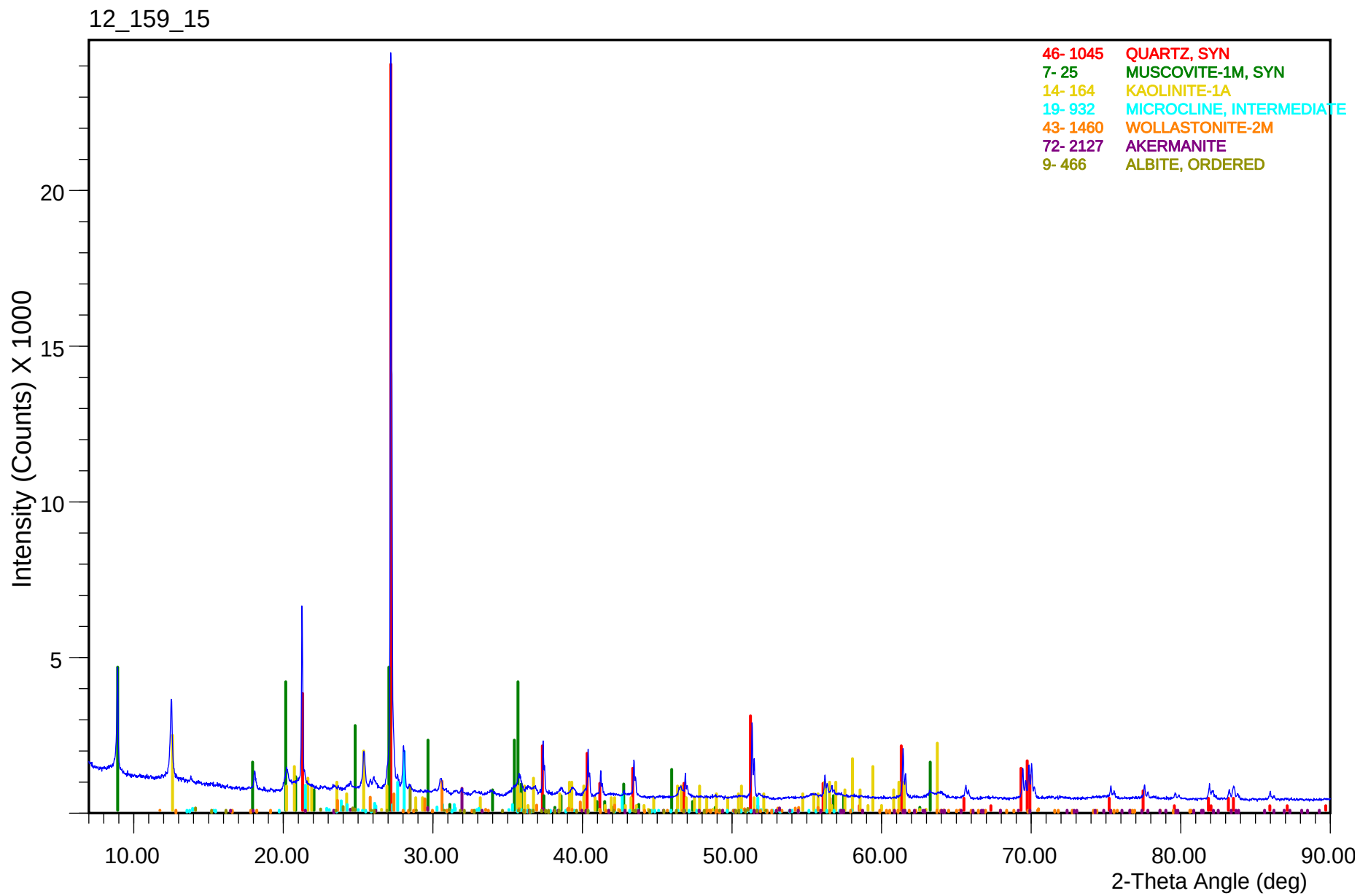
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was copper radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Muscovite-1M (KAl ₂ Si ₃ AlO ₁₀ (OH) ₂)	Minor	medium
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	medium
Microcline, intermediate (KAlSi ₃ O ₈)	Minor	medium
Wollastonite-2M (CaSiO ₃)	Trace	low
Akermanite ((Ca _{1.53} Na _{0.51})(Mg _{0.39} Al _{0.41} Fe _{0.16})(Si ₂ O ₇))	Trace	low
Albite, ordered (NaAlSi ₃ O ₈)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 12_159
Sample: 12_159_21
Client ID: EP1201090-021
Date: 27/03/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine powder in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

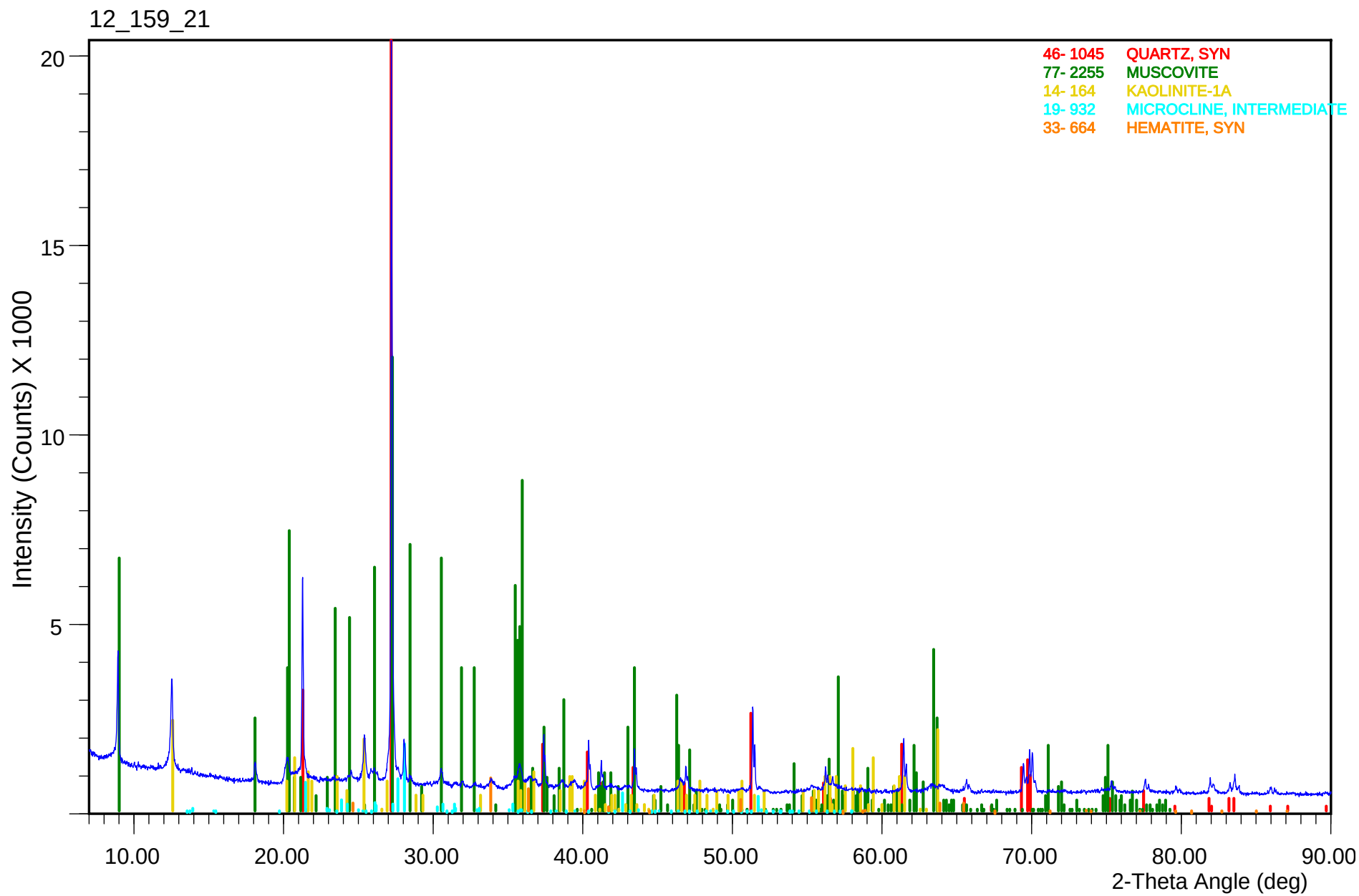
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was copper radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Muscovite (KAl ₃ Si ₃ O ₁₀ (OH) ₂)	Minor	medium
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	medium
Microcline, intermediate (KAlSi ₃ O ₈)	Minor	medium
Hematite (Fe ₂ O ₃)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 12_159
Sample: 12_159_28
Client ID: EP1201090-028
Date: 27/03/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine powder in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

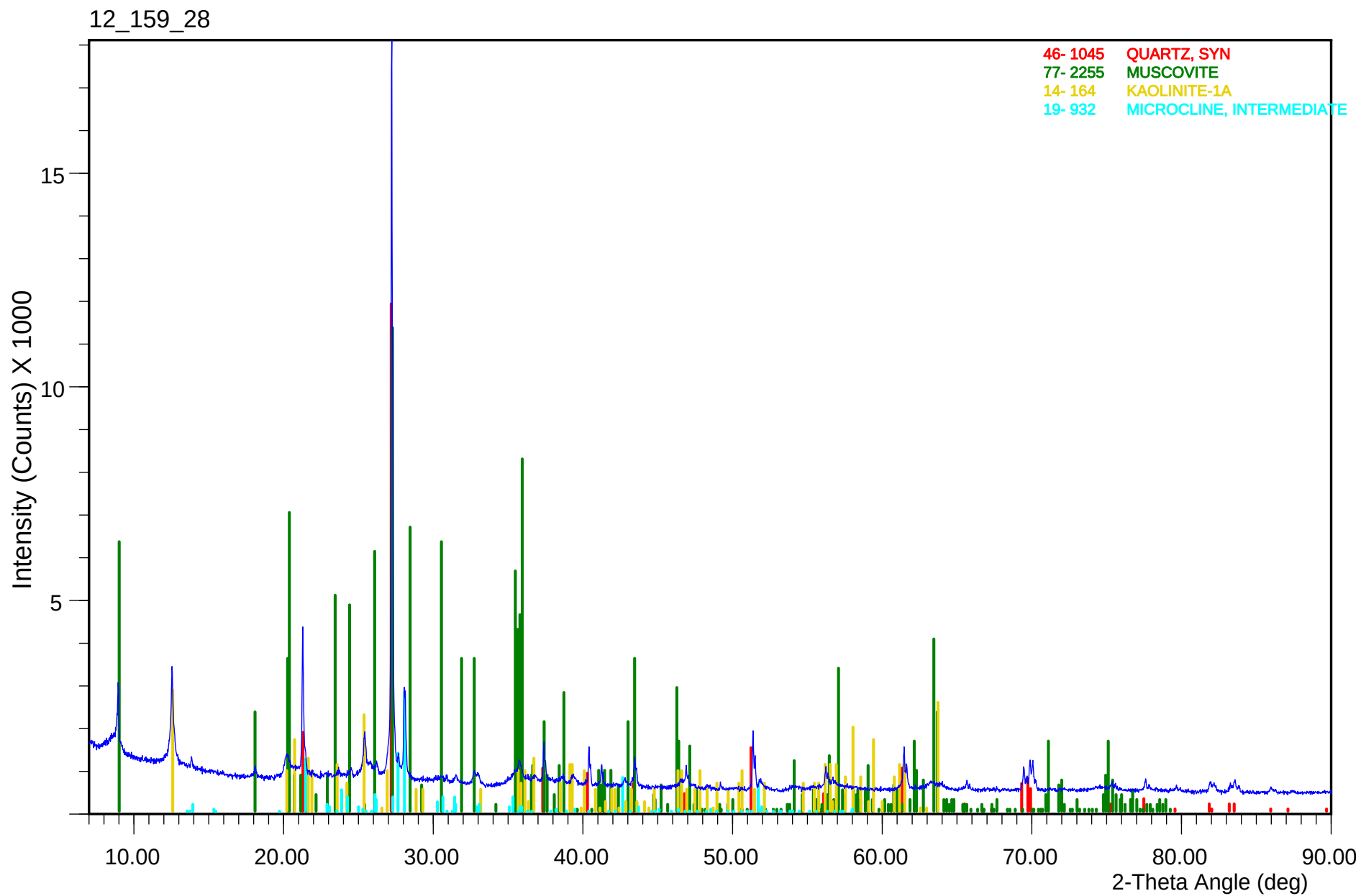
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was copper radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Muscovite (KAl ₃ Si ₃ O ₁₀ (OH) ₂)	Minor	medium
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	medium
Microcline, intermediate (KAlSi ₃ O ₈)	Minor	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 12_159
Sample: 12_159_35
Client ID: EP1201090-035
Date: 27/03/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine powder in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

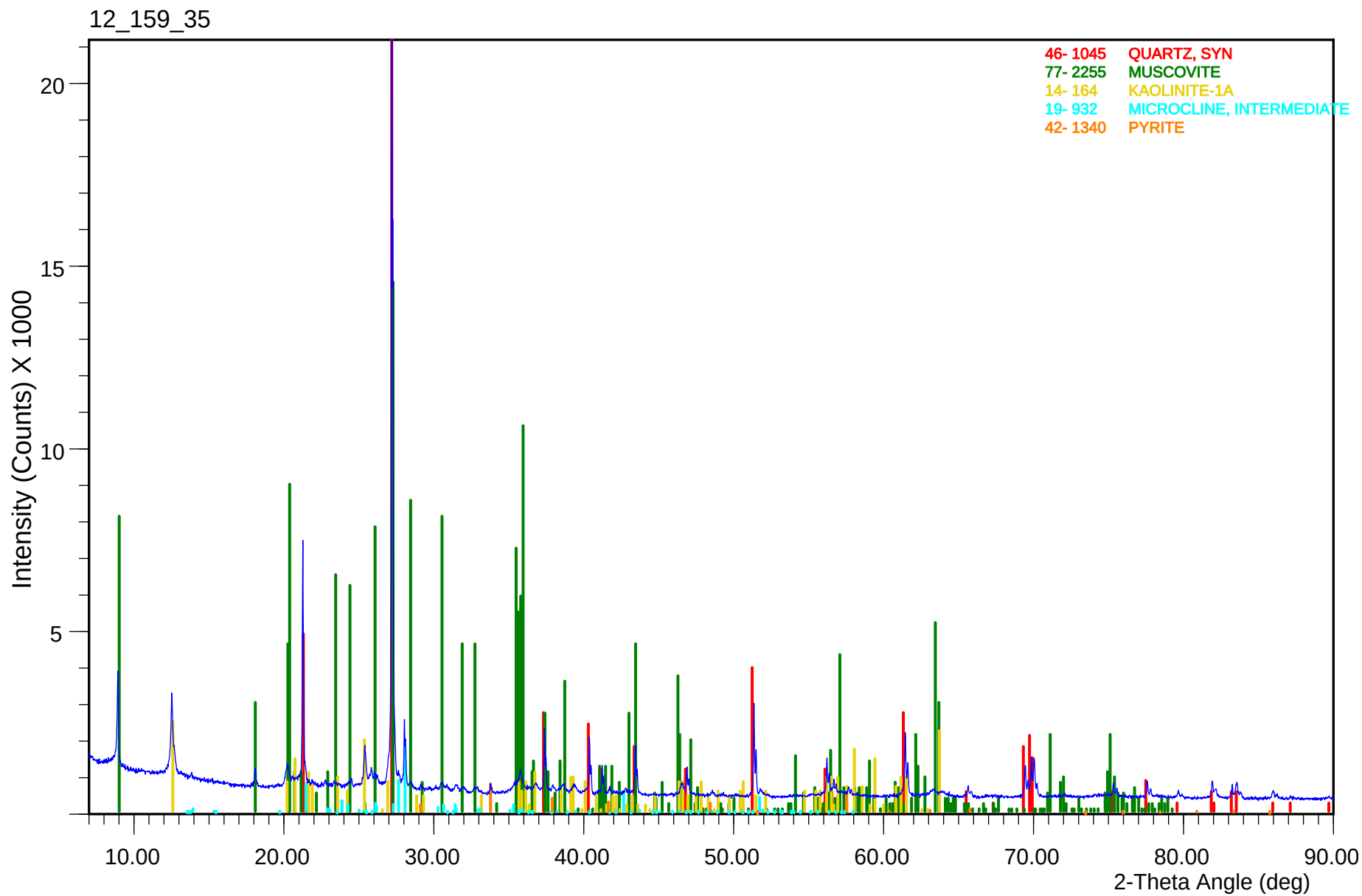
Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was Xplot. An up to date ICDD card set was used. The x-ray source was copper radiation.

Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Muscovite (KAl ₃ Si ₃ O ₁₀ (OH) ₂)	Minor	medium
Kaolinite (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	medium
Microcline, intermediate (KAlSi ₃ O ₈)	Minor	medium
Pyrite (FeS ₂)	Trace	low

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.



Client: ALS Environmental
Job number: 12_159
Sample: 12_159_41
Client ID: EP1201090-041
Date: 19/03/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine powder in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was EVA. An up to date ICDD card set was used. The x-ray source was copper radiation.

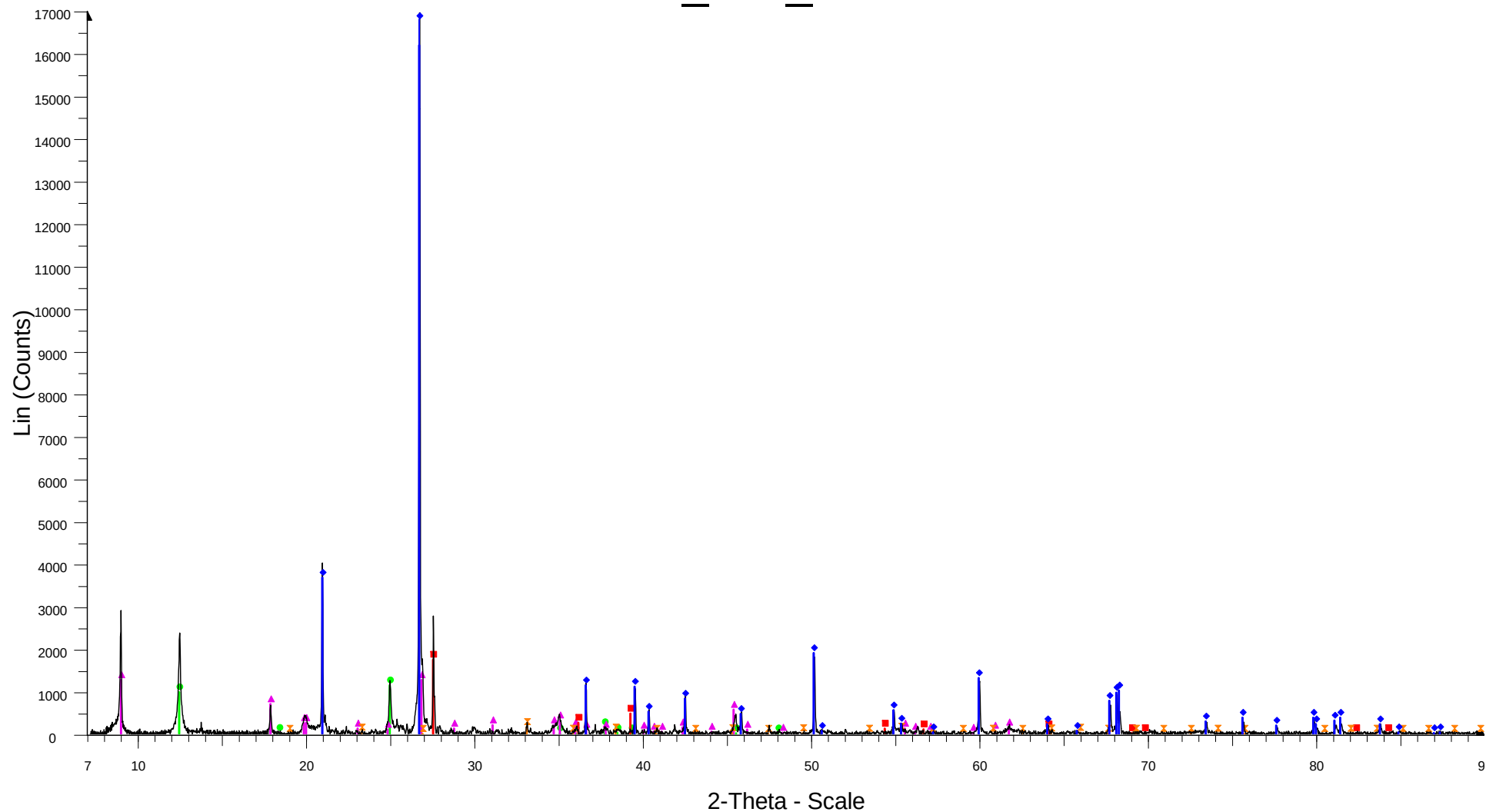
Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Kaolinite-1Ad (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	good
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Minor	good
Rutile, syn (TiO ₂)	Minor	low
Iron Oxide (Fe ₂ O ₃)	Trace	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.

12_159_41



12_159_41 - File: 12_159_41.raw - Type: 2Th/Th locked - Start: 7.000 ° - End: 90.009 ° - Step: 0.019 ° - Step time: 88.5 s - Temp.: 25 °C (Room) - Time Started: 22 s - 2-Theta: 7.000 ° - Theta: 3.500 ° - Chi: 0.00 ° - Phi: Operations: Strip kAlpha2 0.500 | Background 1.000,1.000 | Import

- 01-075-8322 (*) - Quartz - SiO₂ - Y: 69.42 % - d x by: 1. - WL: 1.5406 - Hexagonal - a 4.91700 - b 4.91700 - c 5.41000 - alpha 90.000 - beta 90.000 - gamma 120.000 - Primitive - P3221 (154) - 3 - 113.273 - I/Ic PDF 3. -
- 00-058-2006 (N) - Kaolinite-1Ad - Al₂Si₂O₅(OH)₄ - Y: 4.58 % - d x by: 1. - WL: 1.5406 - Triclinic - a 5.15190 - b 8.95160 - c 7.40350 - alpha 91.635 - beta 104.448 - gamma 90.243 - Base-centered - C1 (1) - 2 - 330.477 -
- 00-007-0042 (I) - Muscovite-3T - (K,Na)(Al,Mg,Fe)₂(Si_{3.1}Al_{0.9})O₁₀(OH)₂ - Y: 5.09 % - d x by: 1. - WL: 1.5406 - Hexagonal - a 5.20300 - b 5.20300 - c 29.98800 - alpha 90.000 - beta 90.000 - gamma 120.000 - Primitive -
- 00-034-0180 (D) - Rutile, syn - TiO₂ - Y: 7.02 % - d x by: 1. - WL: 1.5406 - Tetragonal - a 4.59300 - b 4.59300 - c 2.95900 - alpha 90.000 - beta 90.000 - gamma 90.000 - Primitive - P42/mnm (136) - 2 - 62.4220 - I/Ic PD
- 01-074-6271 (I) - Iron Oxide - Fe₂O₃ - Y: 0.65 % - d x by: 1. - WL: 1.5406 - Cubic - a 9.39300 - b 9.39300 - c 9.39300 - alpha 90.000 - beta 90.000 - gamma 90.000 - Body-centered - Ia-3 (206) - 16 - 828.730 - I/Ic PDF 5

Client: ALS Environmental
Job number: 12_159
Sample: 12_159_49
Client ID: EP1201090-049
Date: 19/03/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine powder in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was EVA. An up to date ICDD card set was used. The x-ray source was copper radiation.

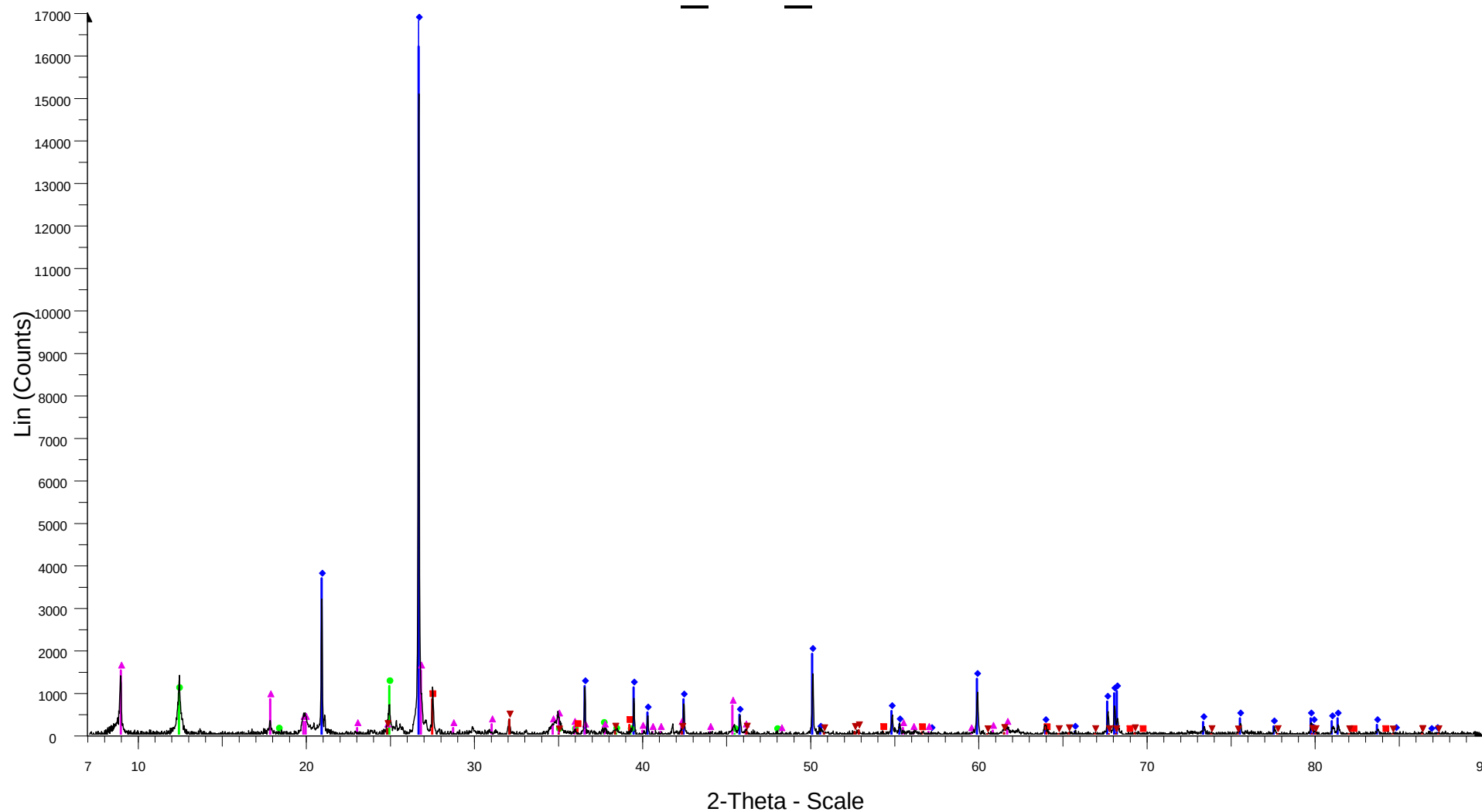
Summary

The phases are listed in order of interpreted concentration:

Mineral phase	Concentration	ICDD match probability
Quartz (SiO ₂)	Major	good
Kaolinite-1Ad (Al ₂ Si ₂ O ₅ (OH) ₄)	Minor	good
Muscovite-3T ((K,Na)(Al,Mg,Fe) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	Minor	good
Rutile, syn (TiO ₂)	Trace	medium
Siderite (Fe(CO ₃))	Trace	medium

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.

12_159_49



12_159_49 - File: 12_159_49.raw - Type: 2Th/Th locked - Start: 7.000 ° - End: 90.009 ° - Step: 0.019 ° - Step time: 88.5 s - Temp.: 25 °C (Room) - Time Started: 20 s - 2-Theta: 7.000 ° - Theta: 3.500 ° - Chi: 0.00 ° - Phi: 0.00 °
 Operations: Strip kAlpha2 0.500 | Background 1.000,1.000 | Import

01-075-8322 (*) - Quartz - SiO₂ - Y: 69.42 % - d x by: 1. - WL: 1.5406 - Hexagonal - a 4.91700 - b 4.91700 - c 5.41000 - alpha 90.000 - beta 90.000 - gamma 120.000 - Primitive - P3221 (154) - 3 - 113.273 - I/Ic PDF 3. -
 00-058-2006 (N) - Kaolinite-1Ad - Al₂Si₂O₅(OH)₄ - Y: 4.58 % - d x by: 1. - WL: 1.5406 - Triclinic - a 5.15190 - b 8.95160 - c 7.40350 - alpha 91.635 - beta 104.448 - gamma 90.243 - Base-centered - C1 (1) - 2 - 330.477 -
 00-007-0042 (I) - Muscovite-3T - (K,Na)(Al,Mg,Fe)₂(Si_{3.1}Al_{0.9})O₁₀(OH)₂ - Y: 6.07 % - d x by: 1. - WL: 1.5406 - Hexagonal - a 5.20300 - b 5.20300 - c 29.98800 - alpha 90.000 - beta 90.000 - gamma 120.000 - Primitive -
 00-034-0180 (D) - Rutile, syn - TiO₂ - Y: 3.35 % - d x by: 1. - WL: 1.5406 - Tetragonal - a 4.59300 - b 4.59300 - c 2.95900 - alpha 90.000 - beta 90.000 - gamma 90.000 - Primitive - P42/mnm (136) - 2 - 62.4220 - I/Ic PD
 01-083-1764 (*) - Siderite - Fe(CO₃) - Y: 1.43 % - d x by: 1. - WL: 1.5406 - Rhombo.H.axes - a 4.69160 - b 4.69160 - c 15.37960 - alpha 90.000 - beta 90.000 - gamma 120.000 - Primitive - R-3c (167) - 6 - 293.169 - I/Ic

Client: ALS Environmental
Job number: 12_159
Sample: 12_159_53
Client ID: EP1201090-053
Date: 19/03/12
Analysis: Qualitative mineralogical analysis by x-ray diffraction (XRD)

Sample Preparation

The sample was supplied to Microanalysis Australia as fine powder in a paper bag. A representative sub – sample was removed and lightly ground such that 90% was passing 20 µm. Grinding to this size helps eliminate preferred orientation.

Analysis

Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non crystalline) material will add to the background. The search match software used was EVA. An up to date ICDD card set was used. The x-ray source was copper radiation.

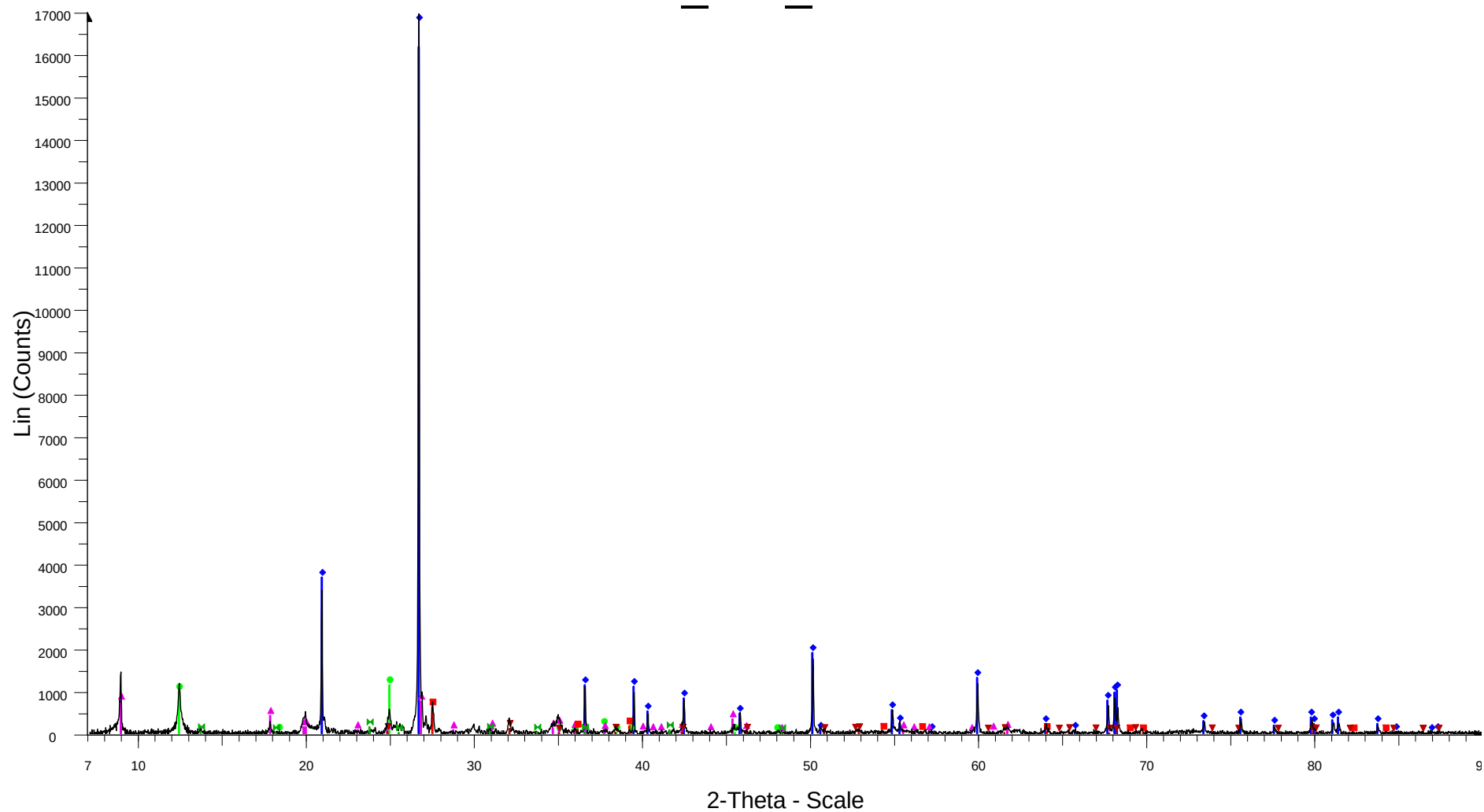
Summary

The phases are listed in order of interpreted concentration:

Concentration	ICDD Match Probability	Phase
Major	100	Quartz (SiO ₂)
Minor	99	1Ad (Al ₂ Si ₂ O ₅ (OH) ₄)
Kaolinite	99	Muscovite-3T
((K,Na)Al ₃ (OH) ₂ (Si _{3.1} Al _{0.9})O ₁₀ (OH) ₂)	99	Albite, syn (TiO ₂)
Trace	99	Fe carbonate (Fe(CO ₃))
Sodalite	99	Syn (KNa ₃ Al ₃ Cl(SiO ₄) ₃)

The ICDD match probability is reported as an indication as to how well the peak positions and relative intensities for the sample matched those in the published literature (www.icdd.org) for that particular compound.

12_159_53



12_159_53 - File: 12_159_53.raw - Type: 2Th/Th locked - Start: 7.000 ° - End: 90.009 ° - Step: 0.019 ° - Step time: 88.5 s - Temp.: 25 °C (Room) - Time Started: 22 s - 2-Theta: 7.000 ° - Theta: 3.500 ° - Chi: 0.00 ° - Phi: Operations: Strip kAlpha2 0.500 | Background 1.000,1.000 | Import

◆ 01-075-8322 (*) - Quartz - SiO₂ - Y: 69.42 % - d x by: 1. - WL: 1.5406 - Hexagonal - a 4.91700 - b 4.91700 - c 5.41000 - alpha 90.000 - beta 90.000 - gamma 120.000 - Primitive - P3221 (154) - 3 - 113.273 - I/Ic PDF 3. -
 ● 00-058-2006 (N) - Kaolinite-1Ad - Al₂Si₂O₅(OH)₄ - Y: 4.58 % - d x by: 1. - WL: 1.5406 - Triclinic - a 5.15190 - b 8.95160 - c 7.40350 - alpha 91.635 - beta 104.448 - gamma 90.243 - Base-centered - C1 (1) - 2 - 330.477 -
 ▲ 00-007-0042 (I) - Muscovite-3T - (K,Na)(Al,Mg,Fe)₂(Si_{3.1}Al_{0.9})O₁₀(OH)₂ - Y: 3.04 % - d x by: 1. - WL: 1.5406 - Hexagonal - a 5.20300 - b 5.20300 - c 29.98800 - alpha 90.000 - beta 90.000 - gamma 120.000 - Primitive -
 ■ 00-034-0180 (D) - Rutile, syn - TiO₂ - Y: 2.47 % - d x by: 1. - WL: 1.5406 - Tetragonal - a 4.59300 - b 4.59300 - c 2.95900 - alpha 90.000 - beta 90.000 - gamma 90.000 - Primitive - P42/mnm (136) - 2 - 62.4220 - I/Ic PD
 ▼ 01-083-1764 (*) - Siderite - Fe(CO₃) - Y: 0.43 % - d x by: 1. - WL: 1.5406 - Rhombo.H.axes - a 4.69160 - b 4.69160 - c 15.37960 - alpha 90.000 - beta 90.000 - gamma 120.000 - Primitive - R-3c (167) - 6 - 293.169 - I/Ic
 ▤ 00-041-0072 (O) - Sodalite. svn - KNa₃Al₃Cl(SiO₄)₃ - Y: 0.58 % - d x by: 1. - WL: 1.5406 -

Appendix D

XRF Assessment and GAI Analysis (Exploration Drillholes)

Average values of element concentration																		
Sample ID	Element																	
	Lithotype	Al	As	Ca	Cl	Co	Cu	Fe	K	Mg	Mn	Na	Ni	P	Pb	S	Si	Ti
Area E East																		
WR001	SST	1.852	0.009	0.079	0.016	0.018		26.810	0.100	0.917	1.180		0.002	0.007		0.134	17.295	0.084
WR002	OO	0.333	0.006	0.200	0.017	0.010		38.710	0.017	0.627	0.295	0.010		0.004		2.300	9.349	0.012
WR003	SST	3.879	0.003	0.021	0.008	0.001	0.003	3.480	0.415	0.410	0.002	0.053	0.002	0.008		1.035	37.255	0.180
WR004	OO	0.386	0.003	0.086	0.014	0.002		21.820	0.017	0.356	0.093	0.018	0.002	0.007	0.005	1.885	25.055	0.024
WR005	OO	0.413		0.186				39.700		0.688		0.037				4.030	8.975	0.012
WR006	OST	0.529	0.004	0.086	0.014	0.003		16.790	0.025	0.374	0.067	0.020	0.002	0.007	0.006	5.000	30.804	0.036
WR007	SST	3.996	0.005	0.007	0.016	0.009		9.020	0.315	0.688	0.028	0.040	0.002	0.008		1.260	32.721	0.204
WR008	OO	2.249	0.001	0.050	0.008	0.006	0.002	29.380	0.125	0.669	0.070	0.037	0.004	0.005	0.001	1.525	16.501	0.114
WR009	CY	0.519	0.005		0.016			49.330	0.025	0.042	0.033	0.013		0.004		0.001	12.294	0.012
WR010	OO	1.979	0.002	0.357	0.008	0.009	0.002	35.130	0.083	1.242	0.233	0.040	0.005	0.009	0.005	4.120	13.743	0.090
WR011	SOO	0.683	0.005	0.064	0.013	0.002		24.230	0.033	0.350	0.035	0.012		0.008		1.140	26.364	0.036
WR012	SST	0.355		0.307				39.200	0.000	0.947		0.037				3.990	7.479	0.012
WR013	SST	2.186	0.009	0.079	0.047	0.016		34.340	0.166	0.983	0.632		0.002	0.008		0.501	12.153	0.096
WR014	SST	0.503	0.005	0.193	0.019	0.007		31.330	0.025	1.291	0.964	0.010		0.005		0.128	13.229	0.018
WR015	OO	0.714	0.009	0.029	0.052	0.007		49.590	0.042	0.392	0.061	0.004	0.002	0.005		0.086	10.704	0.024
WR016	SOO	0.233	0.006	0.157	0.012	0.008		30.640	0.017	0.760	0.712	0.010		0.003		1.105	14.584	0.006
WR017	SST	4.245	0.005	0.021	0.003	0.008		12.850	0.340	0.868	0.085	0.043	0.025	0.012		1.070	29.262	0.222
WR018	SOO	0.265	0.010	0.129	0.008	0.008		25.510	0.008	0.688	0.569	0.016		0.003		0.239	20.988	0.006
WR019	OO	0.328	0.007	0.021	0.027	0.003		61.500	0.008	0.187	0.026	0.004	0.005	0.004		0.007	4.146	0.006
WR020	SST	3.742	0.001	0.050	0.014	0.005	0.001	14.560	0.174	2.002	0.085	0.053	0.003	0.007	0.007	1.935	26.504	0.192
WR021	OO	1.503	0.005	0.114	0.010	0.003		38.700	0.083	0.718	0.078	0.018		0.007		1.735	13.135	0.078
WR022	SST	0.386	0.007	0.107	0.018	0.014		25.340	0.033	0.874	0.586	0.021	0.007	0.004	0.007	2.570	17.015	0.012
WR023	SOO	0.212	0.004	0.107	0.043	0.005		50.620		0.356	0.261		0.016	0.002		0.699	6.007	
WR024	SOO	0.482	0.018	0.193	0.013	0.025		31.520	0.017	1.055	1.015	0.013	0.001	0.007		1.165	11.733	0.018
WR025	SST	5.451	0.001	0.007	0.013	0.002		7.040	0.573	1.134	0.009	0.063	0.003	0.012	0.003	1.515	31.646	0.276
WR026	SOO	0.259	0.004	0.050	0.079	0.002		48.240		0.314	0.114		0.010	0.002		0.087	11.406	0.006
WR027	SST	6.404	0.001	0.007	0.011	0.006		5.210	0.706	0.862	0.009	0.068	0.002	0.012	0.006	1.195	32.487	0.300
WR028	SST	3.387	0.002	0.007	0.007			3.160	0.332	0.229	0.014	0.006		0.009	0.001	1.590	37.582	0.192
WR029	SOO	2.450	0.003	0.114	0.009			21.150	0.116	1.713	0.133	0.039		0.008		3.570	20.287	0.114
WR030	SST	8.230	0.003	0.021	0.046	0.001		3.350	1.046	0.501	0.005	0.086		0.015		1.460	30.804	0.372
WR031	SST	4.218	0.002	0.021	0.012	0.002		10.740	0.249	2.032	0.032	0.054	0.001	0.011		1.475	29.823	0.192
WR032	SLT	1.678	0.012	0.050	0.014	0.013		38.140	0.108	0.573	0.379	0.024	0.002	0.006		1.580	12.340	0.072
WR033	SST	3.557		0.014	0.011	0.002		12.440	0.266	1.640	0.030	0.055	0.003	0.010		3.610	25.990	0.174
WR034	OO	1.466	0.004	0.014	0.014	0.003		25.860	0.050	0.555	0.046	0.035		0.004		1.400	24.213	0.072
WR035	OO	0.333		0.093				43.500	0.017	0.482						4.000	7.806	
WR036	OO	0.397	0.012	0.014	0.019	0.006	0.003	56.680	0.025	0.054	0.010	0.032	0.002	0.007		1.140	5.703	0.018
WR037	SST	2.143		0.150	0.006	0.002		17.680	0.091	1.399	0.116	0.045		0.008		2.890	24.260	0.096
WR038	SLT	4.779		0.043	0.009	0.002		12.780	0.266	2.599	0.066	0.054	0.002	0.012		1.715	26.457	0.240
WR039	SLT	5.049		0.029	0.009	0.002		9.330	0.398	1.671	0.018	0.060		0.012		2.870	28.187	0.240
WR040	SIDOO	0.254	0.019	0.164	0.017	0.016		37.190	0.008	1.061	0.582	0.009		0.005		1.055	9.769	0.006
WR041	OO	0.767	0.006	0.064	0.014	0.008		40.400	0.050	0.470	0.488	0.025		0.004	0.014	1.635	8.437	0.036
WR042	OO	0.529	0.005	0.036	0.094	0.004		56.760	0.017	0.464	0.089			0.002		0.022	5.539	0.012
WR043	SLT	4.520	0.001	0.014	0.012	0.013		6.850	0.656	0.362	0.018	0.034		0.009	0.006	2.320	31.879	0.210
WR044	SLT	5.663	0.009	0.014	0.017	0.011		5.170	1.245	0.513	0.016	0.041	0.002	0.011	0.009	1.125	33.095	0.270
WR045	OO	1.953	0.012	0.043	0.036	0.013		34.860	0.141	1.134	0.232	0.023	0.002	0.005		2.220	11.966	0.090
WR046	SOO	0.603	0.006	0.207	0.006	0.005		28.540	0.066	1.013	0.410		0.001	0.009		1.890	15.285	0.036
WR047	SST	2.318	0.003	0.029	0.016	0.001		8.880	0.125	1.526	0.098	0.042		0.007		1.925	32.814	0.120
WR048	SST	5.012	0.002	0.007	0.021	0.007	0.005	8.860	0.332	2.165	0.011	0.031	0.009	0.009		1.945	29.823	0.258
WR049	OO	1.006	0.010	0.014	0.010	0.002		17.660	0.042	0.609	0.032		0.002	0.007		1.510	30.010	0.042
WR050	SIDOO	0.365	0.002	0.179	0.031	0.006		40.780	0.017	0.929	0.563		0.002	0.004		0.168	10.891	0.006
WR051	SLT	1.625	0.020	0.100	0.045	0.017		37.530	0.108	1.375	0.239	0.016	0.003	0.006		1.325	11.078	0.084
WR052	SST	5.478		0.029	0.012	0.007		5.900	0.764	0.519	0.028	0.059		0.017	0.017	1.630	31.739	0.270
WR053	SOO	0.646	0.004	0.129	0.030	0.002		28.470	0.116	1.279	0.471	0.023	0.001	0.006		0.159	19.305	0.018
WR054	OO	0.286	0.005	0.014	0.059	0.002	0.003	61.570	0.008	0.271	0.030		0.004	0.002	0.011	0.002	4.277	0.006
WR055	OO	0.318	0.004	0.014	0.060	0.002	0.004	59.470	0.017	0.308	0.035		0.003	0.002	0.013	0.024	5.469	0.012
WR056	SLT	1.471	0.009	0.057	0.094	0.014		43.900	0.133	0.953	0.259		0.001	0.003		0.104	11.499	0.072
WR057	SLT	2.154	0.003	0.079	0.027	0.014	0.001	23.980	0.125	1.447	0.411	0.008	0.003	0.005	0.004	0.312	21.596	0.114
WR058	OO	0.910	0.009	0.036	0.075	0.005		50.680	0.100	0.579	0.096	0.010		0.003		0.080	9.232	0.036
WR059	SST	1.413	0.006	0.043	0.054	0.004		35.560	0.133	0.784	0.172	0.016		0.004		0.073	17.809	0.066

Average values of element concentration																		
Sample ID	Element																	
	Lithotype	Al	As	Ca	Cl	Co	Cu	Fe	K	Mg	Mn	Na	Ni	P	Pb	S	Si	Ti
WR060	SST	0.916	0.002	0.021	0.013			7.570	0.058	0.404	0.144	0.022		0.003		0.047	38.517	0.066
Area E South																		
WR061	SOO	1.408	0.005		0.007	0.001		37.200	0.050	0.078	0.142	0.018		0.019		0.033	17.809	0.054
WR062	SST	4.964		0.014				14.980	0.340	0.084		0.089		0.020		0.030	29.271	0.234
WR063	OO	1.021	0.008		0.013	0.004	0.001	47.880	0.042	0.036	0.411	0.024		0.009	0.005	0.008	12.153	0.036
WR064	SOO	0.450	0.004		0.010	0.002		34.590	0.017	0.103	0.269	0.026		0.004		0.016	21.783	0.018
WR065	SST	5.716	0.005	0.021	0.006			7.730	0.863	0.289	0.048	0.056		0.011		0.024	33.235	0.270
WR066	SOO	3.059	0.014		0.006	0.008		20.250	0.149	0.103	0.540	0.036	0.002	0.006		0.026	27.065	0.132
WR067	OO	1.122	0.011	0.014	0.011	0.007		46.290	0.050	0.157	0.730	0.006		0.008		0.012	12.107	0.036
WR068	OO	1.757		0.172				31.930	0.066	1.393		0.067				0.080	12.518	0.090
WR069	OST	4.462	0.003	0.007	0.007	0.003		9.100	0.755	0.181	0.031	0.018		0.007		0.011	33.749	0.204
WR070	OO	0.259	0.004		0.006	0.002		34.350			0.044	0.035		0.005		0.126	22.484	0.012
WR071	SST	3.615	0.002	0.014	0.012	0.002		11.480	0.382	0.639	0.142	0.051	0.002	0.009		0.174	32.207	0.192
WR072	SST	2.477	0.003	0.021	0.002	0.001		17.520	0.174	0.482	0.310	0.033		0.007		0.056	28.093	0.126
WR073	OST	2.001	0.006	0.014	0.008	0.004		18.580	0.083	0.157	0.258	0.031	0.005	0.007		0.601	28.514	0.102
WR074	SST	1.852	0.005	0.050	0.007	0.003		22.850	0.133	0.778	0.580	0.010		0.005		0.737	21.222	0.096
WR075	SST	3.620	0.004	0.021	0.009	0.003		16.790	0.324	0.748	0.271	0.027	0.002	0.007		0.525	26.223	0.192
WR076	SST	4.260	0.003	0.021	0.016	0.009	0.003	12.120	0.365	0.965	0.092	0.053	0.006	0.010		0.412	31.038	0.210
WR077	OO	0.318	0.003	0.129	0.031			52.500	0.008	0.893	0.469	0.001	0.002	0.004		0.008	4.604	0.006
WR078	SIDSOO	1.048	0.004	0.121	0.012	0.003		26.670	0.033	1.297	0.417	0.004		0.007		0.075	20.474	0.042
WR079	OST	2.895	0.002	0.007	0.010	0.004		10.410	0.257	0.513	0.110	0.037	0.003	0.006		0.829	32.861	0.156
WR080	SST	3.456		0.029				13.240	0.398	0.784		0.104				0.340	30.627	0.198
WR081	SLT	1.736	0.005	0.121	0.028	0.007		24.750	0.125	1.508	0.461	0.034		0.008		0.338	20.521	0.090
WR082	OO	2.313	0.004	0.064	0.050	0.002		27.840	0.166	1.429	0.331	0.026		0.005		0.592	19.679	0.114
WR083	OO	0.238		0.079				53.920	0.008	0.519						0.220	6.932	
WR084	SOO	2.413	0.004	0.100	0.036	0.003		31.630	0.149	1.906	0.537	0.011	0.002	0.006		0.069	14.163	0.108
WR085	OST	1.445	0.003	0.064	0.015	0.008	0.002	15.060	0.100	0.772	0.405	0.016	0.012	0.007	0.004	0.139	29.636	0.084
WR086	SLT	4.361	0.003	0.036	0.013	0.007	0.004	13.180	0.747	0.838	0.156	0.029	0.001	0.012	0.006	0.133	29.636	0.234
WR087	SST	5.716	0.004	0.021	0.002			9.310	0.581	0.103	0.006			0.012		0.035	32.440	0.258
WR088	SST	1.958		0.136				28.520	0.116	2.183		0.059				0.030	16.426	0.102
WR089	SIDOO	0.418	0.001	0.043	0.015	0.005	0.002	18.920	0.025	1.104	0.517	0.036		0.006		0.082	26.130	0.024
WR090	SST	4.255	0.004	0.021	0.015	0.003		17.130	0.374	0.820	0.170	0.028	0.003	0.010		0.144	26.691	0.216
WR091	SLT	4.631	0.004	0.014	0.011	0.005	0.001	14.510	0.697	0.881	0.172	0.050		0.012		0.109	28.280	0.234
WR092	SST	2.906		0.043				22.140	0.241	0.808		0.074		0.010		0.140	22.661	0.162
WR093	OO	0.291	0.041	0.086	0.019	0.033		52.800		0.525	0.243			0.002		0.035	7.058	0.000
WR094	SLT	2.562	0.008	0.064	0.042	0.003		23.980	0.166	1.550	0.387			0.004		0.613	21.175	0.126
WR095	SLT	2.445	0.003	0.021	0.012	0.005	0.005	10.850	0.315	0.663	0.171	0.036		0.008		0.125	33.469	0.144
Area F East Pit 1																		
WR096	OST	2.768		0.007				14.610	0.133	0.410		0.163				0.030	32.637	0.132
WR097	OO	1.111		0.007				34.400	0.025	0.133		0.037					22.063	0.048
WR098	SST	2.091		0.014				35.880	0.116	0.410		0.111				0.020	19.310	0.114
WR099	OO	0.254		0.079				49.310	0.017	0.296						2.050	8.582	
WR100	OO	1.016		0.043				47.580	0.050	0.645						0.350	10.101	0.042
WR101	OO	2.202		0.029				38.640	0.125	0.971		0.074				2.720	15.753	0.108
WR102	SST	4.975		0.007				11.940	0.365	1.942		0.111		0.020		2.140	30.028	0.246
WR103	SST	5.478		0.029				9.780	0.523	1.254		0.134				2.570	31.136	0.276
WR104	OO	0.688		0.014				66.100	0.025	0.193						0.140	1.496	0.018
WR105	SST	7.875		0.021				6.090	0.847	0.947		0.134		0.010		2.120	31.127	0.366
WR106	SST	8.113		0.021				6.160	0.930	1.182		0.134		0.010		0.800	30.982	0.366
WR107	SST	4.017		0.029				5.780	0.423	1.520		0.111		0.010		0.320	35.624	0.198
WR108	SST	1.291		0.021				8.490	0.058	0.917		0.096				0.120	37.839	0.072
WR109	OO	0.429		0.014				43.760	0.025	0.096		0.045				0.030	16.641	0.012
WR110	OO	3.445		0.014				29.300	0.191	1.526		0.059				0.020	21.395	0.168
WR111	SST	0.376		0.029				52.800	0.033	0.507				0.010		0.010	9.713	0.018
Area F East Pit 2																		
WR112	SOO	6.033		0.007				9.500	0.448	0.145		0.037		0.010		0.010	31.739	0.312
WR115	SST	2.186	0.005		0.018			17.980	0.199	0.241	0.032	0.055		0.007		0.025	31.085	0.102
WR116	SST	4.091		0.007				11.740	0.066	0.024		0.059		0.010		0.010	33.193	0.204
WR119	OST	3.440						19.100	0.241	0.163							29.308	0.180
WR120	OST	1.455						17.120	0.033	0.018		0.067					33.202	0.084

Average values of element concentration																		
Sample ID	Element																	
	Lithotype	Al	As	Ca	Cl	Co	Cu	Fe	K	Mg	Mn	Na	Ni	P	Pb	S	Si	Ti
WR122	OO	1.757	0.008	0.043	0.007	0.002		34.770	0.075	0.489	0.065	0.020		0.005		1.015	13.416	0.078
WR124	OO	0.349						40.900	0.017	0.103						0.280	17.903	0.012
Area F East Pit 3																		
WR148	SST	5.293						6.900	0.398	0.265							34.591	0.270
WR150	SST	2.916			0.008	0.002		5.690	0.257	0.054	0.008	0.062	0.004	0.007	0.008	0.006	38.611	0.150
WR152	SST	2.255	0.004		0.011			13.080	0.125	0.434	0.016	0.020		0.006		0.004	34.404	0.114
WR153	SST	5.213	0.004	0.036	0.008	0.003		8.360	0.606	0.452	0.303	0.053		0.011		0.399	30.243	0.252
WR157	SST	5.769	0.004	0.021	0.011	0.006		6.500	0.714	0.615	0.135	0.070		0.012	0.004	0.229	32.347	0.288
WR161	OO	0.752	0.004		0.012	0.002	0.002	64.270	0.033	0.211	0.040	0.022		0.005		0.005	2.160	0.036
WR163	OO	1.011	0.003	0.014	0.014	0.002		16.390	0.025	0.651	0.070	0.031		0.003		0.475	32.113	0.060
WR167	OO	2.540	0.004	0.007	0.013	0.003		31.810	0.083	0.868	0.027	0.033	0.006	0.006		0.016	20.848	0.114
WR170	SLT	5.637	0.003	0.007	0.009	0.027		4.170	0.822	0.537	0.003	0.056		0.013		0.239	35.245	0.276
WR172	SLT	5.398	0.008	0.014	0.012	0.006	0.004	4.010	1.129	0.507	0.010	0.065	0.002	0.010	0.005	0.209	35.666	0.258
Area F West																		
WR182	SST	2.461						11.700	0.199	0.036		0.074				0.020	35.011	0.132
WR183	OO	0.926		0.172				17.700	0.083	1.080		0.030				0.440	28.093	0.060
WR184	OO	1.635						54.100	0.091	0.139		0.037				0.010	5.703	0.072
WR185	SST	6.198		0.007				3.460	0.755	0.338		0.067		0.010		0.650	34.824	0.318
WR186	SOO	5.213		0.007				10.500	0.548	0.127		0.074		0.010		0.020	32.908	0.252
WR187	SST	3.578		0.014				10.660	0.141	0.657						0.120	34.137	0.180
WR188	SLT	3.763		0.021				12.060	0.208	0.495						0.060	33.445	0.198
WR189	SST	5.187						7.110	0.631	0.096		0.074				0.010	34.637	0.252
WR190	SST	1.630						7.310	0.058	0.060		0.074				0.010	39.405	0.090
WR191	OO	0.783		0.007				58.600	0.025	0.115						0.040	4.057	0.018
WR192	OO	2.228		0.014				43.600	0.149	0.259							14.304	0.102
WR193	OO	0.323		0.043				53.490	0.025	0.223						0.140	9.807	
WR194	SIDOO	0.445		0.186				43.400	0.025	3.009						0.050	1.954	0.018
WR195	OST	1.826		0.057				41.330	0.108	0.796						0.320	14.079	0.090
WR196	SST	5.753		0.007				9.270	0.556	0.121		0.037		0.010		0.020	32.604	0.270
WR197	SLT	4.705		0.007				8.070	0.465	0.109				0.010		0.010	34.801	0.228
WR198	OO	4.816		0.014				22.900	0.307	0.151		0.074				0.010	24.868	0.252
WR199	SOO	0.640						16.640	0.050	0.042							33.539	0.018
WR200	OO	1.133		0.079				57.070	0.042	0.603		0.067					5.936	0.054
WR201	OO	0.847		0.121				39.700	0.033	0.874		0.037		0.010		3.420	8.601	0.024
WR202	OO	1.450		0.036				52.400	0.091	0.844		0.000		0.010		0.320	7.479	0.054
WR203	OO	3.265		0.043				25.600	0.299	1.303		0.074		0.010		0.210	22.624	0.138
WR204	SST	3.890		0.050				22.920	0.340	1.321		0.045				0.080	24.302	0.204

Summary of major element enrichment													
Calculated concentrations using the Geochemical Abundance Index, GAI													
Sample ID	Element												
	Al	Ca	Cl	Fe	K	Mg	Mn	Na	Ni	P	S	Si	Ti
Area E East													
WR001	-2.7	-6.1	-2.1	1.8	-5.3	-1.8	3.1		-3.8	-4.8	0.8	-1.3	-3.5
WR002	-5.2	-4.8	-2.0	2.4	-7.9	-2.3	1.1	-8.7		-5.6	4.9	-2.2	-6.3
WR003	-1.6	-8.0	-3.1	-1.1	-3.2	-2.9	-6.1	-6.3	-3.8	-4.6	3.7	-0.2	-2.4
WR004	-5.0	-6.0	-2.3	1.5	-7.9	-3.1	-0.5	-7.9	-3.8	-4.8	4.6	-0.7	-5.3
WR005	-4.9	-4.9		2.4		-2.2		-6.8			5.7	-2.2	-6.3
WR006	-4.5	-6.0	-2.3	1.1	-7.3	-3.1	-1.0	-7.7	-3.8	-4.8	6.0	-0.4	-4.7
WR007	-1.6	-9.6	-2.1	0.3	-3.6	-2.2	-2.3	-6.7	-3.8	-4.6	4.0	-0.3	-2.2
WR008	-2.4	-6.8	-3.1	2.0	-5.0	-2.2	-0.9	-6.8	-2.8	-5.3	4.3	-1.3	-3.0
WR009	-4.5		-2.1	2.7	-7.3	-6.2	-2.0	-8.4		-5.6	-6.3	-1.8	-6.3
WR010	-2.6	-3.9	-3.1	2.2	-5.5	-1.3	0.8	-6.7	-2.5	-4.4	5.7	-1.6	-3.4
WR011	-4.1	-6.4	-2.4	1.7	-6.9	-3.2	-1.9	-8.4		-4.6	3.9	-0.7	-4.7
WR012	-5.1	-4.2		2.4		-1.7		-6.8			5.7	-2.5	-6.3
WR013	-2.5	-6.1	-0.5	2.2	-4.5	-1.7	2.2		-3.8	-4.6	2.7	-1.8	-3.3
WR014	-4.6	-4.8	-1.8	2.0	-7.3	-1.3	2.8	-8.6		-5.3	0.7	-1.7	-5.7
WR015	-4.1	-7.6	-0.4	2.7	-6.5	-3.0	-1.1	-9.9	-3.8	-5.3	0.1	-2.0	-5.3
WR016	-5.7	-5.1	-2.5	2.0	-7.9	-2.0	2.4	-8.6		-6.0	3.8	-1.5	-7.3
WR017	-1.5	-8.0	-4.5	0.8	-3.5	-1.8	-0.7	-6.6	-0.2	-4.0	3.8	-0.5	-2.1
WR018	-5.5	-5.4	-3.1	1.8	-8.9	-2.2	2.1	-8.0		-6.0	1.6	-1.0	-7.3
WR019	-5.2	-8.0	-1.3	3.0	-8.9	-4.1	-2.4	-10.1	-2.5	-5.6	-3.5	-3.3	-7.3
WR020	-1.7	-6.8	-2.3	0.9	-4.5	-0.6	-0.7	-6.3	-3.2	-4.8	4.6	-0.6	-2.3
WR021	-3.0	-5.6	-2.8	2.4	-5.5	-2.1	-0.8	-7.9		-4.8	4.5	-1.7	-3.6
WR022	-5.0	-5.7	-1.9	1.7	-6.9	-1.8	2.1	-7.6	-2.0	-5.6	5.0	-1.3	-6.3
WR023	-5.8	-5.7	-0.7	2.7		-3.1	1.0		-0.8	-6.6	3.2	-2.8	
WR024	-4.7	-4.8	-2.4	2.1	-7.9	-1.6	2.9	-8.4	-4.8	-4.8	3.9	-1.8	-5.7
WR025	-1.2	-9.6	-2.4	-0.1	-2.8	-1.5	-3.9	-6.0	-3.2	-4.0	4.3	-0.4	-1.8
WR026	-5.5	-6.8	0.2	2.7		-3.3	-0.2		-1.5	-6.6	0.2	-1.9	-7.3
WR027	-0.9	-9.6	-2.6	-0.5	-2.5	-1.9	-3.9	-5.9	-3.8	-4.0	3.9	-0.4	-1.6
WR028	-1.8	-9.6	-3.3	-1.3	-3.5	-3.8	-3.3	-9.4		-4.4	4.3	-0.1	-2.3
WR029	-2.3	-5.6	-2.9	1.5	-5.1	-0.9	0.0	-6.7		-4.6	5.5	-1.0	-3.0
WR030	-0.6	-8.0	-0.6	-1.2	-1.9	-2.6	-4.8	-5.6		-3.7	4.2	-0.4	-1.3
WR031	-1.5	-8.0	-2.5	0.5	-4.0	-0.6	-2.1	-6.3	-4.8	-4.1	4.2	-0.5	-2.3
WR032	-2.9	-6.8	-2.3	2.3	-5.2	-2.4	1.5	-7.4	-3.8	-5.0	4.3	-1.8	-3.7
WR033	-1.8	-8.6	-2.6	0.7	-3.9	-0.9	-2.2	-6.2	-3.2	-4.3	5.5	-0.7	-2.4
WR034	-3.0	-8.6	-2.3	1.8	-6.3	-2.5	-1.6	-6.9		-5.6	4.2	-0.8	-3.7
WR035	-5.2	-5.9		2.5	-7.9	-2.7					5.7	-2.4	
WR036	-4.9	-8.6	-1.8	2.9	-7.3	-5.8	-3.8	-7.0	-3.8	-4.8	3.9	-2.9	-5.7
WR037	-2.5	-5.2	-3.5	1.2	-5.4	-1.2	-0.2	-6.5		-4.6	5.2	-0.8	-3.3
WR038	-1.3	-7.0	-2.9	0.8	-3.9	-0.3	-1.0	-6.3	-3.8	-4.0	4.5	-0.7	-2.0
WR039	-1.3	-7.6	-2.9	0.3	-3.3	-0.9	-2.9	-6.1		-4.0	5.2	-0.6	-2.0
WR040	-5.6	-5.1	-2.0	2.3	-8.9	-1.6	2.1	-8.9		-5.3	3.8	-2.1	-7.3
WR041	-4.0	-6.4	-2.3	2.4	-6.3	-2.7	1.9	-7.4		-5.6	4.4	-2.3	-4.7
WR042	-4.5	-7.3	0.5	2.9	-7.9	-2.7	-0.6			-6.6	-1.8	-2.9	-6.3
WR043	-1.4	-8.6	-2.5	-0.1	-2.6	-3.1	-2.9	-6.9		-4.4	4.9	-0.4	-2.1
WR044	-1.1	-8.6	-2.0	-0.6	-1.6	-2.6	-3.1	-6.7	-3.8	-4.1	3.9	-0.3	-1.8
WR045	-2.6	-7.0	-0.9	2.2	-4.8	-1.5	0.8	-7.5	-3.8	-5.3	4.8	-1.8	-3.4

Calculated concentrations using the Geochemical Abundance Index, GAI													
Sample ID	Element												
	Al	Ca	Cl	Fe	K	Mg	Mn	Na	Ni	P	S	Si	Ti
WR046	-4.3	-4.7	-3.5	1.9	-5.9	-1.6	1.6		-4.8	-4.4	4.6	-1.4	-4.7
WR047	-2.4	-7.6	-2.1	0.2	-5.0	-1.0	-0.5	-6.6		-4.8	4.6	-0.3	-3.0
WR048	-1.3	-9.6	-1.7	0.2	-3.5	-0.5	-3.6	-7.0	-1.7	-4.4	4.6	-0.5	-1.9
WR049	-3.6	-8.6	-2.8	1.2	-6.5	-2.4	-2.1		-3.8	-4.8	4.3	-0.5	-4.5
WR050	-5.1	-4.9	-1.1	2.4	-7.9	-1.7	2.1		-3.8	-5.6	1.1	-1.9	-7.3
WR051	-2.9	-5.8	-0.6	2.3	-5.2	-1.2	0.8	-8.0	-3.2	-5.0	4.1	-1.9	-3.5
WR052	-1.1	-7.6	-2.5	-0.4	-2.3	-2.6	-2.3	-6.1		-3.5	4.4	-0.4	-1.8
WR053	-4.2	-5.4	-1.2	1.9	-5.1	-1.3	1.8	-7.5	-4.8	-5.0	1.0	-1.1	-5.7
WR054	-5.4	-8.6	-0.2	3.0	-8.9	-3.5	-2.2		-2.8	-6.6	-5.3	-3.3	-7.3
WR055	-5.3	-8.6	-0.2	3.0	-7.9	-3.3	-1.9		-3.2	-6.6	-1.7	-2.9	-6.3
WR056	-3.0	-6.6	0.5	2.5	-4.9	-1.7	0.9		-4.8	-6.0	0.4	-1.9	-3.7
WR057	-2.5	-6.1	-1.3	1.7	-5.0	-1.1	1.6	-9.0	-3.2	-5.3	2.0	-0.9	-3.0
WR058	-3.7	-7.3	0.2	2.7	-5.3	-2.4	-0.5	-8.6		-6.0	0.0	-2.2	-4.7
WR059	-3.1	-7.0	-0.3	2.2	-4.9	-2.0	0.3	-8.0		-5.6	-0.1	-1.2	-3.8
WR060	-3.7	-8.0	-2.4	0.0	-6.1	-2.9	0.1	-7.5		-6.0	-0.7	-0.1	-3.8
Area E South													
WR061	-3.1		-3.3	2.3	-6.3	-5.3	0.1	-7.9		-3.4	-1.2	-1.2	-4.1
WR062	-1.3	-8.6		1.0	-3.5	-5.2		-5.5		-3.3	-1.4	-0.5	-2.0
WR063	-3.6		-2.4	2.7	-6.5	-6.4	1.6	-7.4		-4.4	-3.3	-1.8	-4.7
WR064	-4.7		-2.8	2.2	-7.9	-4.9	1.0	-7.3		-5.6	-2.3	-0.9	-5.7
WR065	-1.1	-8.0	-3.5	0.0	-2.2	-3.4	-1.5	-6.2		-4.1	-1.7	-0.3	-1.8
WR066	-2.0		-3.5	1.4	-4.7	-4.9	2.0	-6.9	-3.8	-5.0	-1.6	-0.6	-2.8
WR067	-3.4	-8.6	-2.6	2.6	-6.3	-4.3	2.4	-9.4		-4.6	-2.7	-1.8	-4.7
WR068	-2.8	-5.0		2.1	-5.9	-1.2		-5.9				-1.7	-3.4
WR069	-1.4	-9.6	-3.3	0.3	-2.4	-4.1	-2.1	-7.9		-4.8	-2.8	-0.3	-2.2
WR070	-5.5		-3.5	2.2			-1.6	-6.9		-5.3	0.7	-0.9	-6.3
WR071	-1.7	-8.6	-2.5	0.6	-3.3	-2.3	0.1	-6.3	-3.8	-4.4	1.2	-0.4	-2.3
WR072	-2.3	-8.0	-5.1	1.2	-4.5	-2.7	1.2	-6.9		-4.8	-0.5	-0.6	-2.9
WR073	-2.6	-8.6	-3.1	1.3	-5.5	-4.3	0.9	-7.0	-2.5	-4.8	2.9	-0.5	-3.2
WR074	-2.7	-6.8	-3.3	1.6	-4.9	-2.0	2.1	-8.6		-5.3	3.2	-1.0	-3.3
WR075	-1.7	-8.0	-2.9	1.1	-3.6	-2.1	1.0	-7.2	-3.8	-4.8	2.8	-0.7	-2.3
WR076	-1.5	-8.0	-2.1	0.7	-3.4	-1.7	-0.6	-6.3	-2.2	-4.3	2.4	-0.4	-2.1
WR077	-5.3	-5.4	-1.1	2.8	-8.9	-1.8	1.8	-11.4	-3.8	-5.6	-3.3	-3.2	-7.3
WR078	-3.5	-5.5	-2.5	1.8	-6.9	-1.3	1.6	-10.1		-4.8	-0.1	-1.0	-4.5
WR079	-2.1	-9.6	-2.8	0.5	-3.9	-2.6	-0.3	-6.8	-3.2	-5.0	3.4	-0.3	-2.6
WR080	-1.8	-7.6		0.8	-3.3	-2.0		-5.3			2.1	-0.4	-2.2
WR081	-2.8	-5.5	-1.3	1.7	-5.0	-1.0	1.8	-6.9		-4.6	2.1	-1.0	-3.4
WR082	-2.4	-6.4	-0.4	1.9	-4.5	-1.1	1.3	-7.3		-5.3	2.9	-1.1	-3.0
WR083	-5.7	-6.1		2.8	-8.9	-2.6					1.5	-2.6	
WR084	-2.3	-5.8	-0.9	2.1	-4.7	-0.7	2.0	-8.5	-3.8	-5.0	-0.2	-1.6	-3.1
WR085	-3.1	-6.4	-2.2	1.0	-5.3	-2.0	1.6	-8.0	-1.2	-4.8	0.8	-0.5	-3.5
WR086	-1.5	-7.3	-2.4	0.8	-2.4	-1.9	0.2	-7.2	-4.8	-4.0	0.8	-0.5	-2.0
WR087	-1.1	-8.0	-5.1	0.3	-2.7	-4.9	-4.5			-4.0	-1.2	-0.4	-1.9
WR088	-2.6	-5.3		1.9	-5.1	-0.5		-6.1			-1.4	-1.3	-3.2
WR089	-4.9	-7.0	-2.2	1.3	-7.3	-1.5	1.9	-6.8		-5.0	0.1	-0.7	-5.3
WR090	-1.5	-8.0	-2.2	1.2	-3.4	-1.9	0.3	-7.2	-3.2	-4.3	0.9	-0.6	-2.1
WR091	-1.4	-8.6	-2.6	0.9	-2.5	-1.8	0.3	-6.4		-4.0	0.5	-0.6	-2.0

Calculated concentrations using the Geochemical Abundance Index, GAI													
Sample ID	Element												
	Al	Ca	Cl	Fe	K	Mg	Mn	Na	Ni	P	S	Si	Ti
WR092	-2.1	-7.0		1.5	-4.0	-1.9		-5.8		-4.3	0.8	-0.9	-2.5
WR093	-5.4	-6.0	-1.8	2.8		-2.6	0.8			-6.6	-1.2	-2.6	
WR094	-2.2	-6.4	-0.7	1.7	-4.5	-1.0	1.5			-5.6	3.0	-1.0	-2.9
WR095	-2.3	-8.0	-2.5	0.5	-3.6	-2.2	0.3	-6.9		-4.6	0.7	-0.3	-2.7
Area F East Pit 1													
WR096	-2.1	-9.6		0.9	-4.9	-2.9		-4.7			-1.4	-0.3	-2.8
WR097	-3.4	-9.6		2.2	-7.3	-4.6		-6.8				-0.9	-4.3
WR098	-2.5	-8.6		2.2	-5.1	-2.9		-5.2			-2.0	-1.1	-3.0
WR099	-5.6	-6.1		2.7	-7.9	-3.4					4.7	-2.3	
WR100	-3.6	-7.0		2.7	-6.3	-2.3					2.2	-2.0	-4.5
WR101	-2.5	-7.6		2.4	-5.0	-1.7		-5.8			5.1	-1.4	-3.1
WR102	-1.3	-9.6		0.7	-3.4	-0.7		-5.2		-3.3	4.8	-0.5	-1.9
WR103	-1.1	-7.6		0.4	-2.9	-1.3		-4.9			5.0	-0.4	-1.8
WR104	-4.1	-8.6		3.1	-7.3	-4.0					0.8	-4.8	-5.7
WR105	-0.6	-8.0		-0.3	-2.2	-1.7		-4.9		-4.3	4.8	-0.4	-1.3
WR106	-0.6	-8.0		-0.3	-2.1	-1.4		-4.9		-4.3	3.4	-0.4	-1.3
WR107	-1.6	-7.6		-0.4	-3.2	-1.0		-5.2		-4.3	2.0	-0.2	-2.2
WR108	-3.2	-8.0		0.2	-6.1	-1.8		-5.4			0.6	-0.1	-3.7
WR109	-4.8	-8.6		2.5	-7.3	-5.0		-6.5			-1.4	-1.3	-6.3
WR110	-1.8	-8.6		2.0	-4.3	-1.0		-6.1			-2.0	-1.0	-2.5
WR111	-5.0	-7.6		2.8	-6.9	-2.6				-4.3	-3.0	-2.1	-5.7
Area F East Pit 2													
WR112	-1.0	-9.6		0.3	-3.1	-4.4		-6.8		-4.3	-3.0	-0.4	-1.6
WR115	-2.5		-1.9	1.2	-4.3	-3.7	-2.1	-6.2		-4.8	-1.6	-0.4	-3.2
WR116	-1.6	-9.6		0.6	-5.9	-7.0		-6.1		-4.3	-3.0	-0.3	-2.2
WR119	-1.8			1.3	-4.0	-4.3						-0.5	-2.4
WR120	-3.1			1.2	-6.9	-7.4		-5.9				-0.3	-3.5
WR122	-2.8	-7.0	-3.3	2.2	-5.7	-2.7	-1.1	-7.7		-5.3	3.7	-1.6	-3.6
WR124	-5.1			2.4	-7.9	-4.9					1.8	-1.2	-6.3
Area F East Pit 3													
WR148	-1.2			-0.1	-3.3	-3.6						-0.3	-1.8
WR150	-2.1		-3.1	-0.4	-3.9	-5.8	-4.1	-6.1	-2.8	-4.8	-3.7	-0.1	-2.6
WR152	-2.4		-2.6	0.8	-5.0	-2.8	-3.1	-7.7		-5.0	-4.3	-0.3	-3.0
WR153	-1.2	-7.3	-3.1	0.1	-2.7	-2.8	1.2	-6.3		-4.1	2.4	-0.5	-1.9
WR157	-1.1	-8.0	-2.6	-0.2	-2.4	-2.3	0.0	-5.9		-4.0	1.6	-0.4	-1.7
WR161	-4.0		-2.5	3.1	-6.9	-3.9	-1.8	-7.5		-5.3	-4.0	-4.3	-4.7
WR163	-3.6	-8.6	-2.3	1.1	-7.3	-2.3	-0.9	-7.0		-6.0	2.6	-0.4	-4.0
WR167	-2.3	-9.6	-2.4	2.1	-5.5	-1.8	-2.3	-7.0	-2.2	-5.0	-2.3	-1.0	-3.0
WR170	-1.1	-9.6	-2.9	-0.9	-2.2	-2.5	-5.5	-6.2		-3.9	1.6	-0.2	-1.8
WR172	-1.2	-8.6	-2.5	-0.9	-1.8	-2.6	-3.8	-6.0	-3.8	-4.3	1.4	-0.2	-1.9
Area F West													
WR182	-2.3			0.6	-4.3	-6.4		-5.8			-2.0	-0.2	-2.8
WR183	-3.7	-5.0		1.2	-5.5	-1.5		-7.1			2.5	-0.6	-4.0
WR184	-2.9			2.8	-5.4	-4.5		-6.8			-3.0	-2.9	-3.7
WR185	-1.0	-9.6		-1.1	-2.4	-3.2		-5.9		-4.3	3.1	-0.3	-1.5
WR186	-1.2	-9.6		0.5	-2.8	-4.6		-5.8		-4.3	-2.0	-0.3	-1.9

Calculated concentrations using the Geochemical Abundance Index, GAI													
Sample ID	Element												
	Al	Ca	Cl	Fe	K	Mg	Mn	Na	Ni	P	S	Si	Ti
WR187	-1.8	-8.6		0.5	-4.8	-2.2					0.6	-0.3	-2.4
WR188	-1.7	-8.0		0.7	-4.2	-2.7					-0.4	-0.3	-2.2
WR189	-1.2			-0.1	-2.6	-5.0		-5.8			-3.0	-0.3	-1.9
WR190	-2.9			-0.1	-6.1	-5.7		-5.8			-3.0	-0.1	-3.4
WR191	-3.9	-9.6		3.0	-7.3	-4.8					-1.0	-3.4	-5.7
WR192	-2.4	-8.6		2.5	-4.7	-3.6						-1.5	-3.2
WR193	-5.2	-7.0		2.8	-7.3	-3.8					0.8	-2.1	
WR194	-4.8	-4.9		2.5	-7.3	-0.1					-0.6	-4.4	-5.7
WR195	-2.7	-6.6		2.4	-5.2	-2.0					2.0	-1.6	-3.4
WR196	-1.1	-9.6		0.3	-2.8	-4.7		-6.8		-4.3	-2.0	-0.3	-1.8
WR197	-1.4	-9.6		0.1	-3.1	-4.8				-4.3	-3.0	-0.3	-2.0
WR198	-1.3	-8.6		1.6	-3.7	-4.4		-5.8			-3.0	-0.7	-1.9
WR199	-4.2			1.1	-6.3	-6.2						-0.3	-5.7
WR200	-3.4	-6.1		2.9	-6.5	-2.4		-5.9				-2.8	-4.1
WR201	-3.8	-5.5		2.4	-6.9	-1.8		-6.8		-4.3	5.5	-2.3	-5.3
WR202	-3.1	-7.3		2.8	-5.4	-1.9				-4.3	2.0	-2.5	-4.1
WR203	-1.9	-7.0		1.8	-3.7	-1.3		-5.8		-4.3	1.4	-0.9	-2.8
WR204	-1.6	-6.8		1.6	-3.5	-1.2		-6.5			0.0	-0.8	-2.2

Appendix E

SEM, EDS and GAI Assessments

**Note that this document is in excess of 800 pages and has not been provided.
An electronic copy can be provided upon request.**

Appendix F

Acid Base Accounting Tests (ABA)

VDM Sample ID	Depth		Lithotype	Paste pH	NAG-pH	Final pH	Sulfate SO ₄ ²⁻		Total S	Sulfide S	ANC CaCO ₃	ANC H ₂ SO ₄	MPA	NAPP	NAG (pH 7.0)	APR	ABA Classification
	m From	m To		pH Unit			mg/kg	%	%	%	% CaCO ₄	kg H ₂ SO ₄ equiv/t					
	Area E East																
WR001	12	13	Sandstone	7.1	7.0		410	0.013	0.13	0.117	4.6	45.6	3.6	-42.0	<0.1	12.72	NAF
WR002	19	20	Oolite	5.4	2.4	6.2	1440	0.045	2.63	2.585	3.5	34.0	79.1	45.1	52.1	0.43	PAF
WR003	19	20	Sandstone	4.6	2.7	5.3	4260	0.133	1.16	1.027	<0.1	0.5	31.4	30.9	29.2	0.02	PAF
WR004	19	20	Oolite	4.8	2.4		11300	0.353	2.00	1.647	5.4	52.8	50.4	-2.4	39.8	1.05	NAF
WR005	20	21	Oolite	5.3	3.7	5.8	15100	0.472	4.16	3.688	3.2	31.0	112.9	81.9	86.9	0.27	PAF
WR006	20	21	Oolitic sandstone	3.7	2.1	3.3	26000	0.813	5.35	4.538	<0.1	0.5	138.8	138.3	133	0.00	PAF
WR007	20	21	Sandstone	4.6	2.7	6.0	3700	0.116	1.35	1.234	0.7	7.0	37.8	30.8	34.3	0.19	PAF
WR008	20	21	Oolite	4.5	2.6		8630	0.270	1.59	1.320	6.6	64.4	40.4	-24.0	30.9	1.59	NAF
WR009	21	22	Clay	6.1	7.2	6.5	100	0.003	0.01	0.007	<0.1	0.5	0.2	-0.3	<0.1	2.38	NAF
WR010	21	22	Oolite	4.9	3.0		18400	0.575	4.05	3.475	6	58.6	106.3	47.7	75.1	0.55	PAF
WR011	21	22	Sandy oolite	5.6	3.5		1380	0.043	0.51	0.467	2.2	21.8	14.3	-7.5	6.9	1.53	NAF
WR012	22	23	Sandstone	5.7	4.3	5.6	14100	0.441	4.09	3.649	2.7	26.7	111.7	85.0	79.2	0.24	PAF
WR013	22	23	Sandstone	4.1	4.6		1720	0.054	0.39	0.336	2.7	26.3	10.3	-16.0	2.7	2.56	NAF
WR014	23	24	Sandstone	7.4	7.9	6.7	460	0.014	0.13	0.116	6.4	63.0	3.5	-59.5	<0.1	17.81	NAF
WR015	24	25	Oolite	5.2	4.3		370	0.012	0.11	0.098	0.6	6.2	3.0	-3.2	1.7	2.06	NAF
WR016	25	26	Sandy oolite	5.8	4.9	5.8	2320	0.073	1.18	1.108	3.8	37.4	33.9	-3.5	7.8	1.10	NAF
WR017	25	26	Sandstone	5.8	2.9		2060	0.064	1.17	1.106	1	9.6	33.8	24.2	24.6	0.28	PAF
WR018	26	27	Sandy oolite	4.8	2.4		12100	0.378	4.04	3.662	1.1	11.0	112.1	101.1	86.6	0.10	PAF
WR019	28	29	Oolite	6.7	7.2		100	0.003	0.02	0.017	0.5	4.7	0.5	-4.2	<0.1	9.10	NAF
WR020	29	30	Sandstone	5.0	2.6		4080	0.128	2.07	1.943	1.4	14.0	59.4	45.4	44.8	0.24	PAF
WR021	30	31	Oolite	5.6	2.6	5.9	3770	0.118	1.93	1.812	5.7	55.9	55.5	-0.4	34.2	1.01	NAF
WR022	31	32	Sandstone	5.9	2.8	7.0	3600	0.113	2.82	2.708	4.2	41.4	82.8	41.4	38.1	0.50	PAF
WR023	32	33	Sandy oolite	6.2	6.7		1000	0.031	0.24	0.209	6.9	67.4	6.4	-61.0	0.4	10.55	NAF
WR024	32	33	Sandy oolite	5.0	2.9		1150	0.036	0.75	0.714	2.5	24.4	21.9	-2.5	9.8	1.12	NAF
WR025	32	33	Sandstone	4.7	2.5		3080	0.096	1.71	1.614	0.8	7.7	49.4	41.7	44.9	0.16	PAF
WR026	33	34	Sandy oolite	5.4	6.2	6.5	400	0.013	0.07	0.058	0.6	5.9	1.8	-4.1	3.5	3.35	NAF
WR027	33	34	Sandstone	4.8	2.6	6.3	2340	0.073	1.25	1.177	0.8	7.6	36.0	28.4	33.8	0.21	PAF
WR028	33	34	Sandstone	4.7	2.3		8220	0.257	1.80	1.543	<0.1	0.5	47.2	46.7	46.7	0.01	PAF
WR029	34	35	Sandy oolite	5.1	2.5		5830	0.182	1.22	1.038	0.1	1.2	31.8	30.6	28.4	0.04	PAF
WR030	34	35	Sandstone	3.7	2.4		4440	0.139	1.68	1.541	0.3	3.3	47.2	43.9	49.6	0.07	PAF
WR031	35	36	Sandstone	4.5	2.7		8040	0.251	1.57	1.319	1.1	11.0	40.4	29.4	30.4	0.27	PAF
WR032	36	37	Siltstone	3.8	2.6	4.8	7360	0.230	1.62	1.390	2.5	24.6	42.5	17.9	29.9	0.58	PAF
WR033	36	37	Sandstone	3.6	2.1		23800	0.744	5.97	5.226	<0.1	0.5	159.9	159.4	154	0.00	PAF
WR034	37	38	Oolite	4.0	2.5	4.6	7090	0.222	1.48	1.258	0.6	6.4	38.5	32.1	34.2	0.17	PAF
WR035	38	39	Oolite	3.9	4.3		19100	0.597	4.06	3.463	1.4	13.6	106.0	92.4	95.5	0.13	PAF
WR036	38	39	Oolite	2.5	2.4	3.1	8720	0.273	1.01	0.738	<0.1	0.5	22.6	22.1	31.1	0.02	PAF

VDM Sample ID	Depth		Lithotype	Paste pH	NAG-pH	Final pH	Sulfate SO ₄ ²⁻		Total S	Sulfide S	ANC CaCO ₃	ANC H ₂ SO ₄	MPA	NAPP	NAG (pH 7.0)	APR	ABA Classification
	m From	m To		pH Unit			mg/kg	%	%	%	% CaCO ₄	kg H ₂ SO ₄ equiv/t					
WR037	38	39	Sandstone	4.6	2.6	4.8	20400	0.638	3.04	2.403	<0.1	0.5	73.5	73.0	51	0.01	PAF
WR038	39	40	Siltstone	5.8	2.8		8640	0.270	1.82	1.550	1.1	10.8	47.4	36.6	28.9	0.23	PAF
WR039	40	41	Siltstone	5.6	2.5	6.0	6020	0.188	3.14	2.952	1.4	14.2	90.3	76.1	69	0.16	PAF
WR040	41	42	Siderite oolite	6.6	5.0	6.1	1310	0.041	1.10	1.059	4.6	44.8	32.4	-12.4	9.8	1.38	NAF
WR041	41	42	Oolite	5.0	2.7	5.4	8030	0.251	1.80	1.549	4.2	41.4	47.4	6.0	19.6	0.87	PAF
WR042	43	44	Oolite	6.4	7.2		100	0.003	0.03	0.027	1.5	14.5	0.8	-13.7	<0.1	17.63	NAF
WR043	45	46	Siltstone	4.1	2.2	4.7	5140	0.161	2.92	2.759	0.1	1.4	84.4	83.0	77.9	0.02	PAF
WR044	48	49	Siltstone	5.8	3.1	6.6	2450	0.077	1.35	1.273	0.8	7.4	39.0	31.6	33.6	0.19	PAF
WR045	48	49	Oolite	5.4	2.7		2140	0.067	2.27	2.203	4.7	45.9	67.4	21.5	40.2	0.68	PAF
WR046	55	56	Sandy oolite	6.4	4.9	6.1	2470	0.077	1.94	1.863	2	19.4	57.0	37.6	15.6	0.34	PAF
WR047	63	64	Sandstone	6.6	2.6	6.5	1450	0.045	2.18	2.135	1.8	17.3	65.3	48.0	39.1	0.26	PAF
WR048	67	68	Sandstone	6.2	2.7		2950	0.092	2.16	2.068	1.7	16.8	63.3	46.5	44.6	0.27	PAF
WR049	76	77	Oolite	3.7	2.5	3.9	15000	0.469	1.64	1.171	<0.1	0.5	35.8	35.3	37.4	0.01	PAF
WR050	84	85	Siderite oolite	6.3	7.0		100	0.003	0.16	0.157	6.2	60.5	4.8	-55.7	<0.1	12.60	NAF
WR051	88	89	Siltstone	5.7	3.3		1920	0.060	1.34	1.280	5.1	50.2	39.2	-11.0	14.8	1.28	NAF
WR052	92	93	Sandstone	4.2	5.8		6140	0.192	1.84	1.648	0.5	5.2	50.4	45.2	6.2	0.10	PAF
WR053	97	98	Sandy oolite	7.2	8.0	6.6	420	0.013	0.15	0.137	4.2	40.8	4.2	-36.6	<0.1	9.74	NAF
WR054	98	99	Oolite	7.0	7.5		100	0.003	0.01	0.007	1	9.5	0.2	-9.3	<0.1	45.16	NAF
WR055	99	100	Oolite	6.4	7.3	7.7	150	0.005	0.03	0.025	0.9	8.5	0.8	-7.7	<0.1	10.97	NAF
WR056	105	106	Siltstone	6.1	7.0		540	0.017	0.09	0.073	2.2	21.7	2.2	-19.5	<0.1	9.70	NAF
WR057	108	109	Siltstone	6.8	7.0		660	0.021	0.30	0.279	4.8	47.2	8.5	-38.7	<0.1	5.52	NAF
WR058	115	116	Oolite	6.7	6.6		220	0.007	0.09	0.083	1.1	10.6	2.5	-8.1	3.4	4.17	NAF
WR059	121	122	Sandstone	6.4	6.9		290	0.009	0.07	0.061	1.8	17.8	1.9	-15.9	0.2	9.55	NAF
WR060	128	129	Sandstone	7.3	7.2		100	0.003	0.05	0.047	1.7	17.0	1.4	-15.6	<0.1	11.85	NAF
Area E South																	
WR061	0	1	Sandy oolite	6.1	6.2		160	0.005	0.03	0.025	<0.1	0.5	0.8	0.3	0.4	0.65	PAF
WR062	1	2	Sandstone	5.4	5.5	6.8	160	0.005	0.02	0.015	0.1	0.9	0.5	-0.4	4.6	1.96	NAF
WR063	6	7	Oolite	5.6	7.4		100	0.003	0.01	0.007	0.2	1.8	0.2	-1.6	<0.1	8.56	NAF
WR064	9	10	Sandy oolite	5.8	6.4		250	0.008	0.01	0.002	<0.1	0.5	0.1	-0.4	0.3	7.47	NAF
WR065	9	10	Sandstone	6.8	7.6		210	0.007	0.05	0.043	2.5	24.9	1.3	-23.6	<0.1	18.73	NAF
WR066	11	12	Sandy oolite	5.3	6.7		470	0.015	0.02	0.005	<0.1	0.5	0.2	-0.3	0.2	3.08	NAF
WR067	14	15	Oolite	5.6	7.4		110	0.003	0.01	0.007	0.2	2.2	0.2	-2.0	<0.1	10.96	NAF
WR068	15	16	Oolite	7	7.2	8.5	250	0.008	0.07	0.062	5.5	53.7	1.9	-51.8	<0.1	28.22	NAF
WR069	15	16	Oolitic sandstone	6.7	6.5	6.7	100	0.003	0.01	0.007	0.6	6.0	0.2	-5.8	2	28.52	NAF
WR070	18	19	Oolite	4.1	3.2	6.4	1100	0.034	0.12	0.086	<0.1	0.5	2.6	2.1	5.8	0.19	PAF
WR071	19	20	Sandstone	6.6	5.4	6.7	450	0.014	0.18	0.166	1.3	12.4	5.1	-7.3	3.1	2.44	NAF
WR072	19	20	Sandstone	6.2	4.8		1600	0.050	1.36	1.310	7	68.5	40.1	-28.4	12.5	1.71	NAF

VDM Sample ID	Depth		Lithotype	Paste pH	NAG-pH	Final pH	Sulfate SO ₄ ²⁻		Total S	Sulfide S	ANC CaCO ₃	ANC H ₂ SO ₄	MPA	NAPP	NAG (pH 7.0)	APR	ABA Classification
	m From	m To		pH Unit			mg/kg	%	%	%	% CaCO ₄	kg H ₂ SO ₄ equiv/t					
WR073	20	21	Oolitic sandstone	6.6	2.9		3660	0.114	0.59	0.476	0.9	8.5	14.6	6.1	12.2	0.58	PAF
WR074	21	22	Sandstone	5.8	5.7	6.0	3780	0.118	0.72	0.602	4.1	40.0	18.4	-21.6	4.5	2.17	NAF
WR075	22	23	Sandstone	6.4	7.0		150	0.005	0.02	0.015	0.5	5.3	0.5	-4.8	<0.1	11.31	NAF
WR076	23	24	Sandstone	5.6	3.5	6.2	1470	0.046	0.43	0.384	0.9	9.0	11.8	2.8	7.9	0.77	PAF
WR077	23	24	Oolite	7.8	9.0		100	0.003	0.01	0.007	5.1	49.7	0.2	-49.5	<0.1	236.24	NAF
WR078	24	25	Strongly sideritic sandy oolite	7.2	8.0	7.6	390	0.012	0.07	0.058	5.8	56.5	1.8	-54.7	<0.1	31.94	NAF
WR079	24	25	Oolitic sandstone	5.5	3.2		2610	0.082	0.83	0.748	0.8	7.9	22.9	15.0	15.7	0.34	PAF
WR080	25	26	Sandstone	6.3	4.6		1180	0.037	0.34	0.303	0.8	7.0	9.3	2.3	4.2	0.75	PAF
WR081	26	27	Siltstone	6.9	7.0	7.5	430	0.013	0.36	0.347	2.8	27.9	10.6	-17.3	<0.1	2.63	NAF
WR082	27	28	Oolite	6.9	6.8	6.3	520	0.016	0.28	0.264	5.3	51.9	8.1	-43.8	0.2	6.43	NAF
WR083	29	30	Oolite	6.4	6.6	8.9	570	0.018	0.22	0.202	2.0	20.0	6.2	-13.8	0.6	3.23	NAF
WR084	29	30	Sandy oolite	7.4	7.6	7.6	160	0.005	0.07	0.065	4	39.1	2.0	-37.1	<0.1	19.66	NAF
WR085	31	32	Oolitic sandstone	5.8	7.2		380	0.012	0.14	0.128	5.8	56.9	3.9	-53.0	<0.1	14.51	NAF
WR086	34	35	Siltstone	7.1	6.9	5.9	470	0.015	0.13	0.115	1.4	14.2	3.5	-10.7	0.5	4.02	NAF
WR087	34	35	Strongly sideritic sandy oolite	5.7	5.8	6.8	370	0.012	0.03	0.018	0.3	3.1	0.6	-2.5	2.6	5.49	NAF
WR088	36	37	Sandstone	6.8	7.5		100	0.003	0.02	0.017	3.1	30.2	0.5	-29.7	<0.1	58.48	NAF
WR089	36	37	Siderite oolite	7.4	8.6	7.5	150	0.005	0.07	0.065	5	49.0	2.0	-47.0	<0.1	24.52	NAF
WR090	39	40	Sandstone	6.7	5.9	6.3	230	0.007	0.15	0.143	2.5	24.5	4.4	-20.1	3	5.61	NAF
WR091	40	41	Siltstone	6.9	6.8		440	0.014	0.11	0.096	1.5	15.1	2.9	-12.2	0.4	5.13	NAF
WR092	46	47	Sandstone	6.7	7.3		440	0.014	0.13	0.116	1.8	17.7	3.6	-14.1	<0.1	4.98	NAF
WR093	49	50	Oolite	7.1	7.8	7.6	140	0.004	0.04	0.036	4.6	44.9	1.1	-43.8	<0.1	41.19	NAF
WR094	57	58	Siltstone	7.0	4.9	7.5	320	0.010	0.56	0.550	3.3	32.0	16.8	-15.2	4.3	1.90	NAF
WR095	67	68	Siltstone	6.7	7.1		290	0.009	0.13	0.121	1.4	13.5	3.7	-9.8	<0.1	3.65	NAF
Area F East Pit 1																	
WR096	8	9	Oolitic sandstone	6.7	8.3	6.8	160	0.005	0.02	0.015	0.1	1.0	0.5	-0.5	<0.1	2.18	NAF
WR097	10	11	Oolite	6.3	6.4	7.2	100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	1.4	2.38	NAF
WR098	11	12	Sandstone	7	7.8	8.8	100	0.003	0.01	0.007	0.1	1.4	0.2	-1.2	<0.1	6.65	NAF
WR099	20	21	Oolite	4	2.4		7340	0.229	2.16	1.931	0.8	7.9	59.1	51.2	49.3	0.13	PAF
WR100	21	22	Oolite	6.8	4.9	7.2	850	0.027	0.33	0.303	1.2	12.3	9.3	-3.0	1.8	1.32	NAF
WR101	24	25	Oolite	3.4	2.3	4.1	14100	0.441	2.71	2.269	0.1	0.5	69.4	68.9	72.6	0.01	PAF
WR102	26	27	Sandstone	3.7	2.5		9080	0.284	2.28	1.996	0.1	0.5	61.1	60.6	54.7	0.01	PAF
WR103	28	29	Sandstone	3.6	2.4	4.4	10100	0.316	2.65	2.334	0.1	0.5	71.4	70.9	68.7	0.01	PAF
WR104	29	30	Oolite	3.7	3.3		990	0.031	0.14	0.109	0.3	3.0	3.3	0.3	6.4	0.90	PAF
WR105	29	30	Sandstone	6.4	2.4		12800	0.400	2.16	1.760	0.1	0.5	53.9	53.4	54.5	0.01	PAF
WR106	30	31	Sandstone	4.9	2.6		1900	0.059	0.74	0.681	0.5	5.2	20.8	15.6	20.1	0.25	PAF
WR107	40	41	Sandstone	6.3	4.4	8.9	670	0.021	0.31	0.289	1.7	16.4	8.8	-7.6	3.8	1.85	NAF
WR108	43	44	Sandstone	7.3	7.8		310	0.010	0.12	0.110	0.6	9.0	3.4	-5.6	<0.1	2.67	NAF

VDM Sample ID	Depth		Lithotype	Paste pH	NAG-pH	Final pH	Sulfate SO ₄ ²⁻		Total S	Sulfide S	ANC CaCO ₃	ANC H ₂ SO ₄	MPA	NAPP	NAG (pH 7.0)	APR	ABA Classification
	m From	m To		pH Unit			mg/kg	%	%	%	% CaCO ₄	kg H ₂ SO ₄ equiv/t					
WR109	48	49	Oolite	5	5.6	7.2	100	0.003	0.02	0.017	0.1	0.5	0.5	0.0	1.6	0.97	PAF
WR110	56	57	Oolite	6.1	6.5		100	0.003	0.01	0.007	0.3	3.0	0.2	-2.8	1.1	14.26	NAF
WR111	69	70	Sandstone	6.9	8.8	8.4	100	0.003	0.01	0.007	1.5	14.6	0.2	-14.4	<0.1	69.40	NAF
Area F East Pit 2																	
WR112	0	1	Sandy oolite	5.6	6.7		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	0.5	2.38	NAF
WR113	0	3	Clay	7	7.4		100	0.003	0.01	0.007	0.4	4.2	0.2	-4.0	<0.1	19.96	NAF
WR114	3	6	Clay	7.4	7.9	7.1	140	0.004	0.01	0.006	0.6	5.5	0.2	-5.3	<0.1	31.95	NAF
WR115	4	5	Sandstone	7.1	2.5		160	0.005	0.02	0.015	0.4	4.2	0.5	-3.7	45.1	9.15	NAF
WR116	4	5	Sandstone	4.7	5.5		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	5.5	2.38	NAF
WR117	6	9	Clay	7.2	7.7		100	0.003	0.01	0.007	0.5	5.3	0.2	-5.1	<0.1	25.19	NAF
WR118	9	12	Sandstone	7.6	7.2	7.8	100	0.003	0.01	0.007	0.6	5.4	0.2	-5.2	<0.1	25.67	NAF
WR119	11	12	Oolitic sandstone	6.2	6.7		100	0.003	0.01	0.007	0.3	3.2	0.2	-3.0	0.7	15.21	NAF
WR120	11	12	Oolitic sandstone	4.6	4.9		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	5.9	2.38	NAF
WR121	12	15	Sandstone	7.8	6.8		100	0.003	0.01	0.007	1.1	11.1	0.2	-10.9	1.8	52.76	NAF
WR122	15	16	Oolite	5.3	2.6		3680	0.115	1.08	0.965	6.1	59.7	29.5	-30.2	19.1	2.02	NAF
WR123	15	18	Sandstone	7.6	6.6		200	0.006	0.01	0.004	0.7	6.5	0.1	-6.4	2.2	56.64	NAF
WR124	17	18	Oolite	4.5	3	5.8	1100	0.034	0.31	0.276	0.1	1.2	8.4	7.2	6.8	0.14	PAF
WR125	18	21	Sandstone	7	3		910	0.028	0.67	0.642	1.3	12.9	19.6	6.7	17.9	0.66	PAF
WR126	21	24	Sandstone	7.8	3.4		310	0.010	0.42	0.410	1	9.4	12.6	3.2	10.1	0.75	PAF
WR127	24	27	Sandstone	7.6	3.1		1060	0.033	1.02	0.987	2	19.1	30.2	11.1	17.4	0.63	PAF
WR128	27	30	Sandstone	7.5	4.2		2140	0.067	1.29	1.223	3.1	30.8	37.4	6.6	8.4	0.82	PAF
WR129	30	33	Sandstone	7.1	3		3110	0.097	1.59	1.493	3.2	31.7	45.7	14.0	18.4	0.69	PAF
WR130	33	36	Sandstone	7.2	3.9		740	0.023	0.52	0.497	2.1	20.3	15.2	-5.1	7.7	1.34	NAF
WR131	36	39	Sandstone	7.5	6.5		160	0.005	0.13	0.125	1.2	12.2	3.8	-8.4	0.4	3.19	NAF
WR132	39	42	Sandstone	7.8	7	8.2	110	0.003	0.11	0.107	1.5	14.5	3.3	-11.2	0.2	4.45	NAF
WR133	42	45	Sandstone	7.8	7.3		100	0.003	0.08	0.077	1.5	14.6	2.4	-12.2	<0.1	6.21	NAF
WR134	45	48	Sandstone	7.6	7.2		140	0.004	0.10	0.096	2	19.2	2.9	-16.3	<0.1	6.56	NAF
WR135	48	51	Sandstone	7.9	5		120	0.004	0.14	0.136	1	10.0	4.2	-5.8	3.8	2.40	NAF
WR136	51	54	Sandstone	7.6	7.7		320	0.010	0.11	0.100	2.2	21.7	3.1	-18.6	<0.1	7.09	NAF
WR137	54	57	Sandstone	7.6	6.8		250	0.008	0.08	0.072	1.2	11.7	2.2	-9.5	0.2	5.30	NAF
WR138	57	60	Sandstone	7.4	6.5		290	0.009	0.14	0.131	0.8	7.5	4.0	-3.5	0.3	1.87	NAF
WR139	60	63	Sandstone	7.8	6		140	0.004	0.08	0.076	0.8	8.3	2.3	-6.0	0.8	3.59	NAF
WR140	63	66	Sandstone	7.7	5.2	8.4	100	0.003	0.10	0.097	0.9	8.8	3.0	-5.8	2.7	2.97	NAF
WR141	66	69	Sandstone	8	6.6		100	0.003	0.12	0.117	1.4	14.3	3.6	-10.7	0.2	4.00	NAF
WR142	69	72	Sandstone	8.1	7		100	0.003	0.10	0.097	1.1	11.2	3.0	-8.2	<0.1	3.78	NAF
WR143	72	75	Sandstone	7.4	7.1		100	0.003	0.09	0.087	1.7	17.0	2.7	-14.3	<0.1	6.39	NAF
WR144	75	78	Sandstone	7.7	6.9		120	0.004	0.10	0.096	1.4	13.5	2.9	-10.6	<0.1	4.58	NAF

VDM Sample ID	Depth		Lithotype	Paste pH	NAG-pH	Final pH	Sulfate SO ₄ ²⁻		Total S	Sulfide S	ANC CaCO ₃	ANC H ₂ SO ₄	MPA	NAPP	NAG (pH 7.0)	APR	ABA Classification
	m From	m To		pH Unit			mg/kg	%	%	%	% CaCO ₄	kg H ₂ SO ₄ equiv/t					
Area F East Pit 3																	
WR145	0	3	Clay	7	6.6	6.7	130	0.004	0.01	0.006	0.4	3.6	0.2	-3.4	3	19.81	NAF
WR146	3	6	Clay	7.9	8.9		220	0.007	0.01	0.003	0.6	6.3	0.1	-6.2	<0.1	65.88	NAF
WR147	6	9	Clay	7	8.3		630	0.020	0.02	0.000	0.2	2.1	0.0	-2.1	<0.1	219.61	NAF
WR148	6	7	Sandy oolite	6.5	6.4	8.4	100	0.003	0.01	0.007	0.4	4.2	0.2	-4.0	1.5	19.96	NAF
WR149	9	12	Siltstone	6.6	5.8		720	0.023	0.02	-0.003	0.3	2.6	-0.1	-2.7	11.2	-33.99	NAF
WR150	9	10	Sandstone	6.3	5.5		100	0.003	0.01	0.007	0.3	2.9	0.2	-2.7	27	13.78	NAF
WR151	12	15	Siltstone	6.5	6.1		830	0.026	0.04	0.014	0.3	2.7	0.4	-2.3	5.1	6.27	NAF
WR152	12	13	Sandstone	7.2	6.4		100	0.003	0.01	0.007	0.5	5.3	0.2	-5.1	2.4	25.19	NAF
WR153	14	15	Sandstone	5.3	5.8	6.0	1830	0.057	0.42	0.363	2.2	21.2	11.1	-10.1	1.1	1.91	NAF
WR154	15	18	Siltstone	6.4	5.8	7.2	850	0.027	0.24	0.213	0.3	3.1	6.5	3.4	9.6	0.47	PAF
WR155	18	21	Siltstone	6.3	5.8		940	0.029	0.26	0.231	0.2	2.4	7.1	4.7	9.6	0.34	PAF
WR156	21	24	Siltstone	6.5	5.9	7.2	800	0.025	0.21	0.185	0.3	3.2	5.7	2.5	12	0.57	PAF
WR157	23	24	Sandstone	5.9	4.7	6.2	850	0.027	0.29	0.263	1.2	11.6	8.1	-3.5	2.8	1.44	NAF
WR158	24	27	Siltstone	6.5	5.9		840	0.026	0.24	0.214	0.2	2.5	6.5	4.0	10.8	0.38	PAF
WR159	27	30	Siltstone	7.3	6		2540	0.079	0.76	0.681	0.2	1.9	20.8	18.9	13.3	0.09	PAF
WR160	30	33	Siltstone	6.5	6	7.2	1050	0.033	0.21	0.177	<0.1	0.8	5.4	4.6	10.5	0.15	PAF
WR161	30	31	Oolite	5.6	6.7		100	0.003	0.01	0.007	0.5	5.4	0.2	-5.2	0.4	25.67	NAF
WR162	33	36	Siltstone	6.7	5.5		780	0.024	0.08	0.056	0.2	1.7	1.7	0.0	9.4	1.00	PAF
WR163	36	37	Oolite	6.9	3.3		1680	0.053	0.48	0.428	1.4	14.0	13.1	-0.9	9	1.07	NAF
WR164	36	39	Siltstone	5.9	2.8		2240	0.070	0.79	0.720	0.9	8.6	22.0	13.4	19.8	0.39	PAF
WR165	39	42	Siltstone	7.3	2.8		940	0.029	0.79	0.761	0.6	6.2	23.3	17.1	19.9	0.27	PAF
WR166	42	45	Siltstone	6.6	2.8		3110	0.097	1.29	1.193	0.6	5.9	36.5	30.6	31.4	0.16	PAF
WR167	44	45	Oolite	7.2	8.5	7.3	100	0.003	0.02	0.017	1	10.3	0.5	-9.8	<0.1	19.95	NAF
WR168	45	48	Siltstone	5.8	2.4	6.8	5350	0.167	2.39	2.223	0.5	4.8	68.0	63.2	63.1	0.07	PAF
WR169	48	51	Siltstone	6.1	2.7		2340	0.073	1.29	1.217	0.6	5.9	37.2	31.3	33.9	0.16	PAF
WR170	50	51	Siltstone	6.0	3.6	6.7	630	0.020	0.24	0.220	0.5	5.4	6.7	1.3	7.9	0.80	PAF
WR171	51	54	Siltstone	6.4	2.7	6.9	1880	0.059	0.92	0.861	1.5	14.4	26.4	12.0	22.9	0.55	PAF
WR172	53	54	Siltstone	5.7	3.8		1110	0.035	0.26	0.225	0.8	7.6	6.9	-0.7	5.8	1.10	NAF
WR173	54	57	Siltstone	6.6	3.1		2170	0.068	0.93	0.862	0.9	8.8	26.4	17.6	23.2	0.33	PAF
WR174	57	60	Siltstone	6.5	2.8		1460	0.046	0.82	0.774	0.6	6.4	23.7	17.3	20.6	0.27	PAF
WR175	60	63	Siltstone	6.4	2.5	6.9	2140	0.067	2.16	2.093	0.3	2.8	64.0	61.2	57.2	0.04	PAF
WR176	63	66	Siltstone	7.2	2.8		970	0.030	1.10	1.070	0.5	4.8	32.7	27.9	26.7	0.15	PAF
WR177	66	69	Siltstone	7.4	2.8		960	0.030	0.85	0.820	0.7	7.2	25.1	17.9	19.4	0.29	PAF
WR178	69	72	Siltstone	7.4	3.4		580	0.018	0.39	0.372	0.1	1.4	11.4	10.0	9.2	0.12	PAF
WR179	72	75	Siltstone	7.5	3.3	7.9	560	0.018	0.42	0.403	0.8	8.3	12.3	4.0	8.4	0.67	PAF
WR180	75	78	Siltstone	7.4	3.1		620	0.019	0.54	0.521	0.7	7.0	15.9	8.9	11.8	0.44	PAF

VDM Sample ID	Depth		Lithotype	Paste pH	NAG-pH	Final pH	Sulfate SO ₄ ²⁻		Total S	Sulfide S	ANC CaCO ₃	ANC H ₂ SO ₄	MPA	NAPP	NAG (pH 7.0)	APR	ABA Classification
	m From	m To		pH Unit			mg/kg	%	%	%	% CaCO ₄	kg H ₂ SO ₄ equiv/t					
WR181	78	79.97	Siltstone	7.6	4.2	7.8	380	0.012	0.22	0.208	1	10.1	6.4	-3.7	3.7	1.59	NAF
Area F West																	
WR182	10	11	Sandstone	6.4	6.2		250	0.008	0.02	0.012	0.2	1.8	0.4	-1.4	3.1	4.83	NAF
WR183	16	17	Oolite	7.1	7.1	8.4	1090	0.034	0.43	0.396	4.3	42.0	12.1	-29.9	<0.1	3.47	NAF
WR184	18	19	Oolite	6.1	7.5	7.4	100	0.003	0.01	0.007	0.3	2.7	0.2	-2.5	<0.1	12.83	NAF
WR185	21	22	Sandstone	4.7	2.7	8.7	2200	0.069	0.86	0.791	0.2	2.4	24.2	21.8	27.4	0.10	PAF
WR186	21	22	Sandy oolite	5.6	5.4		100	0.003	0.01	0.007	0.1	1.2	0.2	-1.0	7.2	5.70	NAF
WR187	23	24	Sandstone	6.1	4.2	6.9	410	0.013	0.11	0.097	0.3	2.6	3.0	0.4	2.7	0.87	PAF
WR188	28	29	Siltstone	6.8	6.3	8.3	140	0.004	0.05	0.046	0.3	2.6	1.4	-1.2	1.7	1.86	NAF
WR189	28	29	Sandstone	6.3	5.6		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	7.5	2.38	NAF
WR190	30	31	Sandstone	5.8	6.6	7.6	100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	0.6	2.38	NAF
WR191	32	33	Oolite	5.5	6.3		260	0.008	0.03	0.022	0.1	0.9	0.7	-0.2	0.3	1.34	NAF
WR192	33	34	Oolite	6.3	6.7		100	0.003	0.01	0.007	0.2	1.8	0.2	-1.6	0.4	8.56	NAF
WR193	34	35	Oolite	5.1	6.8	6	1030	0.032	0.13	0.098	0.3	2.6	3.0	0.4	0.3	0.87	PAF
WR194	34	35	Siderite oolite	7.7	6.1		100	0.003	0.06	0.057	5.5	53.8	1.7	-52.1	3.5	30.91	NAF
WR195	36	37	Oolitic sandstone	6.3	4.6	6.8	890	0.028	0.35	0.322	0.8	8.2	9.9	1.7	2.1	0.83	PAF
WR196	38	39	Sandstone	5.5	7.5	7.5	220	0.007	0.01	0.003	0.1	0.5	0.1	-0.4	<0.1	5.23	NAF
WR197	39	40	Siltstone	5.8	6.6		130	0.004	0.01	0.006	0.1	0.5	0.2	-0.3	0.2	2.75	NAF
WR198	40	41	Sandstone	5.7	6		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	0.7	2.38	NAF
WR199	40	41	Sandy oolite	5.6	6		100	0.003	0.01	0.007	0.1	0.5	0.2	-0.3	0.2	2.38	NAF
WR200	42	43	Oolite	7.9	8		100	0.003	0.01	0.007	1.3	12.9	0.2	-12.7	<0.1	61.32	NAF
WR201	54	55	Oolite	3.8	2.5	5	25800	0.806	3.35	2.544	1.6	15.2	77.8	62.6	58.5	0.20	PAF
WR202	55	56	Oolite	5.2	5.4		2120	0.066	0.34	0.274	0.9	8.8	8.4	-0.4	0.9	1.05	NAF
WR203	57	58	Oolite	6.4	6.9	6.8	640	0.020	0.06	0.040	1.5	14.6	1.2	-13.4	0.4	11.93	NAF
WR204	57	58	Sandstone	7.3	7.4	7.5	180	0.006	0.07	0.064	1.1	10.5	2.0	-8.5	<0.1	5.33	NAF
APR = Acid Potential Ratio; TS = Total Sulfide-S (calculated); MPA = Maximum Potential of Acidity [kg H ₂ SO ₄ /ton]; ANC = Acid Neutralising Capacity [kg H ₂ SO ₄ /ton]; NAPP = Net Acid Producing Potential [kg H ₂ SO ₄ /ton]; NAG = Net Acid Generation [kg H ₂ SO ₄ /ton]; NAG pH 7 = [kg H ₂ SO ₄ /ton]; NAG pH = pH units; NAF = Non-Acid Forming; PAF = Potential-Acid Forming; NAF in green = further assessment required preferable using kinetic tests.																	



Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EP1108259	Page	: 1 of 31
Client	: VDM ENVIRONMENTAL	Laboratory	: Environmental Division Perth
Contact	: EDGARDO ALARCONLEON	Contact	: Scott James
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Telephone	: +61 08 9241 1800	Telephone	: +61-8-9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 25-NOV-2011
C-O-C number	: ----	Issue Date	: 16-DEC-2011
Sampler	: ----	No. of samples received	: 97
Site	: ----	No. of samples analysed	: 97
Quote number	: EP-169-10		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics
Chas Tucker	Inorganic Chemist	Perth Inorganics
Cicelia Bartels	Metals Instrument Chemist	Perth Inorganics
Leanne Cooper	Acid Sulfate Soils Supervisor	Perth ASS
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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

- **ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.**
- **TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				34729	35536	61343	31417	62269
				29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-001	EP1108259-002	EP1108259-003	EP1108259-004	EP1108259-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.73	3.00	3.92	3.48	6.16
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	88	846	808	475	146
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	309	569	550	257	112
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	3	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	20	196	380	131	54
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	5	1	2	4	2
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	<1	2	4	13	4
Magnesium	7439-95-4	1	mg/L	7	12	57	26	11
Sodium	7440-23-5	1	mg/L	4	2	2	4	2
Potassium	7440-09-7	1	mg/L	<1	2	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.16	9.31	10.5	0.03	<0.01
Arsenic	7440-38-2	0.001	mg/L	0.006	0.004	0.003	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0004	0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	0.005	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.049	0.007	0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	0.013	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.011	1.03	4.39	0.597	1.45
Nickel	7440-02-0	0.001	mg/L	<0.001	0.050	0.063	0.002	0.011
Uranium	7440-61-1	0.001	mg/L	<0.001	0.004	0.007	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.068	0.457	0.140	0.211	0.142
Iron	7439-89-6	0.05	mg/L	0.98	51.8	51.1	0.46	0.08



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				61407	62665	31444	32307	35511
				29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-006	EP1108259-007	EP1108259-008	EP1108259-009	EP1108259-010
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	3.30	6.99	6.73	6.66	4.78
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1300	192	69	72	608
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	865	139	59	55	392
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	11	<1	5	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	11	<1	5	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	657	60	17	16	201
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	6	6	5	3	2
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	20	4	<1	<1	3
Magnesium	7439-95-4	1	mg/L	46	17	6	3	47
Sodium	7440-23-5	1	mg/L	2	2	3	3	3
Potassium	7440-09-7	1	mg/L	<1	<1	<1	10	1
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	6.12	0.02	0.07	0.93	0.37
Arsenic	7440-38-2	0.001	mg/L	0.002	0.001	<0.001	<0.001	0.003
Cadmium	7440-43-9	0.0001	mg/L	0.0004	<0.0001	<0.0001	<0.0001	0.0035
Chromium	7440-47-3	0.001	mg/L	0.004	<0.001	<0.001	0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.013	<0.001	<0.001	<0.001	0.001
Lead	7439-92-1	0.001	mg/L	0.004	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	8.54	1.17	0.013	0.020	11.8
Nickel	7440-02-0	0.001	mg/L	0.095	0.010	<0.001	0.001	0.082
Uranium	7440-61-1	0.001	mg/L	0.005	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.565	0.176	0.091	0.099	0.319
Iron	7439-89-6	0.05	mg/L	178	0.46	0.49	2.74	34.6



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				60321	31429	30484	34674	35170
				29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-011	EP1108259-012	EP1108259-013	EP1108259-014	EP1108259-015
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.67	5.77	6.45	6.46	6.20
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	210	419	40	295	115
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	149	220	28	220	83
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	<1	1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	84	161	10	114	44
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	3	9	2	4	1
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	2	3	<1	2	<1
Magnesium	7439-95-4	1	mg/L	13	41	3	28	10
Sodium	7440-23-5	1	mg/L	2	2	2	2	2
Potassium	7440-09-7	1	mg/L	<1	6	<1	2	2
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	1.26	0.02	0.12	<0.01	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.678	0.222	0.017	3.62	0.280
Nickel	7440-02-0	0.001	mg/L	0.030	0.002	<0.001	0.003	0.005
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.338	0.210	0.042	0.189	0.059
Iron	7439-89-6	0.05	mg/L	8.18	0.22	0.43	0.05	0.06



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				60015	60024	60124	61427	61872
				29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-016	EP1108259-017	EP1108259-018	EP1108259-019	EP1108259-020
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.18	6.35	4.82	4.72	6.71
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	134	79	204	1260	243
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	103	54	150	784	187
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1	1	<1	<1	5
Total Alkalinity as CaCO3	----	1	mg/L	1	1	<1	<1	5
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	50	29	80	692	94
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	2	2	2	3	4
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	38	6
Magnesium	7439-95-4	1	mg/L	8	4	14	106	20
Sodium	7440-23-5	1	mg/L	3	2	3	2	2
Potassium	7440-09-7	1	mg/L	6	7	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.24	0.06	0.47	1.20	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
Copper	7440-50-8	0.001	mg/L	0.002	<0.001	0.010	0.001	0.002
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	2.90	0.222	0.477	8.84	4.07
Nickel	7440-02-0	0.001	mg/L	0.012	0.004	0.017	0.030	0.006
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	0.003	<0.001
Zinc	7440-66-6	0.005	mg/L	0.130	0.094	0.185	0.191	0.116
Iron	7439-89-6	0.05	mg/L	0.98	0.28	9.19	94.4	0.29



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				62436	61786	62992	31336	61640
				29-NOV-2011 12:00	29-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-021	EP1108259-022	EP1108259-023	EP1108259-024	EP1108259-025
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.94	6.45	6.49	6.87	6.75
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	262	19	46	95	348
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	186	48	68	68	248
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	8	<1	<1	6	<1
Total Alkalinity as CaCO3	----	1	mg/L	8	<1	<1	6	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	97	2	7	18	134
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	6	1	5	4	7
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	6	<1	<1	2	6
Magnesium	7439-95-4	1	mg/L	22	<1	3	6	32
Sodium	7440-23-5	1	mg/L	2	3	3	7	2
Potassium	7440-09-7	1	mg/L	3	<1	<1	<1	2
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.11	0.07	0.04	0.22	0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.002	0.002	0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0002	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	0.007	0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	1.64	0.020	0.031	0.020	4.69
Nickel	7440-02-0	0.001	mg/L	0.008	0.002	<0.001	<0.001	0.021
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.231	0.080	0.069	0.142	0.234
Iron	7439-89-6	0.05	mg/L	0.84	1.55	1.16	1.34	<0.05



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				31346	32295	30472	31436	34671
				30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-026	EP1108259-027	EP1108259-028	EP1108259-029	EP1108259-030
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.28	6.94	6.80	6.80	5.69
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	76	69	50	41	54
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	60	56	40	32	48
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	9	6	1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	9	6	1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	21	8	9	16
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	6	2	5	3	3
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	1	<1	<1	<1	<1
Magnesium	7439-95-4	1	mg/L	6	6	5	3	1
Sodium	7440-23-5	1	mg/L	4	2	2	3	3
Potassium	7440-09-7	1	mg/L	<1	<1	<1	1	2
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.04	0.29	0.04	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.003	0.067	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.028	0.011	0.009	<0.001	3.39
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	0.002	0.008
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.082	0.060	0.053	0.045	0.176
Iron	7439-89-6	0.05	mg/L	<0.05	0.19	1.48	0.30	<0.05



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				60047	61652	30458	61732	61882
				30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-031	EP1108259-032	EP1108259-033	EP1108259-034	EP1108259-035
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.90	5.42	6.66	6.99	6.29
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	31	463	23	90	56
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	32	274	18	69	44
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	2	<1	<1	7	1
Total Alkalinity as CaCO3	----	1	mg/L	2	<1	<1	7	1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1	201	<1	23	16
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	4	2	2	5	3
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	<1	5	<1	<1	<1
Magnesium	7439-95-4	1	mg/L	1	35	<1	6	4
Sodium	7440-23-5	1	mg/L	4	2	3	3	2
Potassium	7440-09-7	1	mg/L	<1	<1	4	4	<1
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.14	0.04	0.60	0.04	0.02
Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	<0.001	0.002	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	<0.001	16.5	0.009	0.018	0.145
Nickel	7440-02-0	0.001	mg/L	<0.001	0.038	<0.001	<0.001	0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.065	0.253	0.046	0.137	0.058
Iron	7439-89-6	0.05	mg/L	0.98	17.4	0.40	0.23	0.25



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				32278	33597	61558	61870	60055
				30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-036	EP1108259-037	EP1108259-038	EP1108259-039	EP1108259-040
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.65	6.47	6.67	7.12	6.16
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	28	52	178	96	73
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	20	41	111	60	50
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	2	9	1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	2	9	1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	14	61	22	24
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	1	2	11	6	2
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	2	1	<1
Magnesium	7439-95-4	1	mg/L	<1	3	16	8	2
Sodium	7440-23-5	1	mg/L	3	3	3	2	3
Potassium	7440-09-7	1	mg/L	5	4	2	<1	10
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.03	0.04	<0.01	<0.01	0.02
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	<0.001	0.002	0.144	0.064	0.002
Nickel	7440-02-0	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
Zinc	7440-66-6	0.005	mg/L	0.058	0.051	0.156	0.100	0.103
Iron	7439-89-6	0.05	mg/L	0.27	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				60324	61608	61867	60594	----
				30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	----
Compound	CAS Number	LOR	Unit	EP1108259-041	EP1108259-042	EP1108259-043	EP1108259-044	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	3.06	4.79	5.34	4.48	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	557	189	207	341	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	160	115	158	268	----
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	<1	<1	<1	<1	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	79	67	84	142	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	5	4	2	2	----
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	1	1	1	2	----
Magnesium	7439-95-4	1	mg/L	9	13	18	21	----
Sodium	7440-23-5	1	mg/L	6	7	3	3	----
Potassium	7440-09-7	1	mg/L	32	4	1	<1	----
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.07	0.01	0.01	1.13	----
Arsenic	7440-38-2	0.001	mg/L	0.003	<0.001	0.002	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0001	0.0002	0.0002	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	0.002	0.004	<0.001	0.002	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	0.088	0.178	1.69	2.57	----
Nickel	7440-02-0	0.001	mg/L	0.005	0.002	0.014	0.041	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	0.003	----
Zinc	7440-66-6	0.005	mg/L	0.219	0.266	0.609	0.934	----
Iron	7439-89-6	0.05	mg/L	0.16	0.58	1.63	23.5	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				34729	35536	61343	31417	62269
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-001	EP1108259-002	EP1108259-003	EP1108259-004	EP1108259-005
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.8	2.4	2.5	2.6	2.4
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	20.3	29.0	26.2	43.4
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.2	31.1	37.4	34.2	52.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	51.9	<0.5	<0.5	55.9	34.0
ANC as CaCO3	----	0.1	% CaCO3	5.3	<0.1	<0.1	5.7	3.5
Fizz Rating	----	0	Fizz Unit	2	1	1	2	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.9	2.5	3.7	5.6	5.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	184	3530	2870	1310	639
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	520	8720	15000	3770	1440
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.28	1.01	1.64	1.93	2.63
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.3	3.1	3.9	5.9	6.2
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.14	0.12	0.65	0.04	0.06



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				61407	62665	31444	32307	35511
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-006	EP1108259-007	EP1108259-008	EP1108259-009	EP1108259-010
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.1	5.0	4.9	6.9	2.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	105	<0.1	<0.1	<0.1	21.2
NAG (pH 7.0)	----	0.1	kg H2SO4/t	133	9.8	4.3	0.5	29.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	44.8	32.0	14.2	24.6
ANC as CaCO3	----	0.1	% CaCO3	<0.1	4.6	3.3	1.4	2.5
Fizz Rating	----	0	Fizz Unit	1	2	2	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	3.7	6.6	7.0	7.1	3.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	4830	781	331	326	2420
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	26000	1310	320	470	7360
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	5.35	1.10	0.56	0.13	1.62
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	3.3	6.1	7.5	5.9	4.8
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.04	0.05	0.27	0.55	0.22



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60321	31429	30484	34674	35170
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-011	EP1108259-012	EP1108259-013	EP1108259-014	EP1108259-015
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.2	2.5	5.9	5.7	3.5
NAG (pH 4.5)	----	0.1	kg H2SO4/t	67.6	54.0	<0.1	<0.1	4.2
NAG (pH 7.0)	----	0.1	kg H2SO4/t	77.9	69.0	3.0	4.5	7.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	1.4	14.2	24.5	40.0	9.0
ANC as CaCO3	----	0.1	% CaCO3	0.1	1.4	2.5	4.1	0.9
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	4.1	5.6	6.7	5.8	5.6
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	845	1570	19300	1200	496
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	5140	6020	230	3780	1470
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	2.92	3.14	0.15	0.72	0.43
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	4.7	6.0	6.3	6.0	6.2
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.42	0.04	0.53	0.24	0.45



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60015	60024	60124	61427	61872
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-016	EP1108259-017	EP1108259-018	EP1108259-019	EP1108259-020
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	5.8	4.7	2.7	2.6	4.9
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	21.9	38.7	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	1.1	2.8	29.2	51.0	7.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	21.2	11.6	<0.5	<0.5	37.4
ANC as CaCO3	----	0.1	% CaCO3	2.2	1.2	<0.1	<0.1	3.8
Fizz Rating	----	0	Fizz Unit	1	1	1	1	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.3	5.9	4.6	4.6	5.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	544	409	822	4490	1160
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	1830	850	4260	20400	2320
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.42	0.29	1.16	3.04	1.18
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.0	6.2	5.3	4.8	5.8
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.59	0.87	0.46	0.06	0.06



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				62436	61786	62992	31336	61640
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-021	EP1108259-022	EP1108259-023	EP1108259-024	EP1108259-025
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	4.9	7.2	7.3	7.0	2.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	3.0	<0.1	<0.1	<0.1	18.5
NAG (pH 7.0)	----	0.1	kg H2SO4/t	15.6	<0.1	<0.1	<0.1	38.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	19.4	<0.5	8.5	27.9	41.4
ANC as CaCO3	----	0.1	% CaCO3	2.0	<0.1	0.9	2.8	4.2
Fizz Rating	----	0	Fizz Unit	1	1	1	1	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.4	6.1	6.4	6.9	5.9
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	1130	75	252	132	554
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	2470	<100	150	430	3600
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	1.94	<0.01	0.03	0.36	2.82
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.1	6.5	7.7	7.5	7.0
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.07	0.05	0.04	0.16	0.05



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				31346	32295	30472	31436	34671
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-026	EP1108259-027	EP1108259-028	EP1108259-029	EP1108259-030
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	8.6	8.0	7.6	7.8	3.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	2.2
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	5.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	49.0	56.5	39.1	44.9	<0.5
ANC as CaCO3	----	0.1	% CaCO3	5.0	5.8	4.0	4.6	<0.1
Fizz Rating	----	0	Fizz Unit	2	2	2	2	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.4	7.2	7.4	7.1	4.1
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	57	374	226	86	170
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	150	390	160	140	1100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.07	0.07	0.07	0.04	0.12
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.5	7.6	7.6	7.6	6.4
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.10	0.13	0.26	0.04	0.04



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60047	61652	30458	61732	61882
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-031	EP1108259-032	EP1108259-033	EP1108259-034	EP1108259-035
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	8.5	2.7	6.5	8.0	6.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	11.7	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	19.6	2.0	<0.1	3.5
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	10.3	41.4	6.0	40.8	5.9
ANC as CaCO3	----	0.1	% CaCO3	1.0	4.2	0.6	4.2	0.6
Fizz Rating	----	0	Fizz Unit	1	2	1	2	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.2	5.0	6.7	7.2	5.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	408	1980	107	406	297
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	8030	<100	420	400
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.02	1.80	0.01	0.15	0.07
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.3	5.4	6.7	6.6	6.5
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.04	0.10	0.18	0.11	0.06



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				32278	33597	61558	61870	60055
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-036	EP1108259-037	EP1108259-038	EP1108259-039	EP1108259-040
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	5.8	5.4	2.6	7.9	3.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	30.5	<0.1	3.6
NAG (pH 7.0)	----	0.1	kg H2SO4/t	2.6	3.1	39.1	<0.1	7.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.1	12.4	17.3	63.0	5.4
ANC as CaCO3	----	0.1	% CaCO3	0.3	1.3	1.8	6.4	0.5
Fizz Rating	----	0	Fizz Unit	1	1	1	2	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.7	6.6	6.6	7.4	6.0
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	111	275	321	385	310
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	370	450	1450	460	630
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.03	0.18	2.18	0.13	0.24
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.8	6.7	6.5	6.7	6.7
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.08	0.45	0.04	0.08	0.64



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60324	61608	61867	60594	30309
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-041	EP1108259-042	EP1108259-043	EP1108259-044	EP1108259-045
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.1	2.6	2.7	2.5	7.4
NAG (pH 4.5)	----	0.1	kg H2SO4/t	21.5	28.2	25.4	27.8	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	33.6	33.8	34.3	34.2	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.4	7.6	7.0	6.4	1.8
ANC as CaCO3	----	0.1	% CaCO3	0.8	0.8	0.7	0.6	0.2
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.8	4.8	4.6	4.0	5.6
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	867	752	802	1360	56
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	2450	2340	3700	7090	100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	1.35	1.25	1.35	1.48	<0.01
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.6	6.3	6.0	4.6	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.78	0.10	0.37	0.03	0.04



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				30466	32285	60033	60039	60918
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-046	EP1108259-047	EP1108259-048	EP1108259-049	EP1108259-050
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	9.0	7.4	6.7	3.3	2.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	1.6	11.9
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.4	9.0	19.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	49.7	2.2	5.4	14.0	59.7
ANC as CaCO3	----	0.1	% CaCO3	5.1	0.2	0.5	1.4	6.1
Fizz Rating	----	0	Fizz Unit	2	1	1	1	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.8	5.6	5.6	6.9	5.3
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	175	70	132	743	989
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	110	<100	1680	3680
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.01	<0.01	0.48	1.08
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.03	0.05	0.02	0.02	0.04



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				61406	61527	61528	61752	61892
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-051	EP1108259-052	EP1108259-053	EP1108259-054	EP1108259-055
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.4	2.6	3.0	6.6	7.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	29.1	22.2	14.5	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	39.8	30.9	75.1	3.4	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	52.8	64.4	58.6	10.6	14.5
ANC as CaCO3	----	0.1	% CaCO3	5.4	6.6	6.0	1.1	1.5
Fizz Rating	----	0	Fizz Unit	2	2	2	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	4.8	4.5	4.9	6.7	6.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	3380	2070	4990	413	248
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	11300	8630	18400	220	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	2.00	1.59	4.05	0.09	0.03
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.02	0.02	0.03	0.11	0.04



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				62324	62330	62608	62991	32304
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-056	EP1108259-057	EP1108259-058	EP1108259-059	EP1108259-060
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	4.3	7.2	2.7	7.5	7.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	0.4	<0.1	28.2	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	1.7	<0.1	40.2	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	6.2	4.7	45.9	9.5	56.9
ANC as CaCO3	----	0.1	% CaCO3	0.6	0.5	4.7	1.0	5.8
Fizz Rating	----	0	Fizz Unit	1	1	2	1	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.2	6.7	5.4	7.0	5.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	516	624	774	327	994
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	370	<100	2140	<100	380
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.11	0.02	2.27	<0.01	0.14
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.08	0.03	0.22	0.03	0.22



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				34673	34679	62977	31352	31456
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-061	EP1108259-062	EP1108259-063	EP1108259-064	EP1108259-065
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.9	3.2	7.0	6.8	7.1
NAG (pH 4.5)	----	0.1	kg H2SO4/t	5.8	8.0	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	12.2	15.7	<0.1	0.4	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	8.5	7.9	60.5	15.1	13.5
ANC as CaCO3	----	0.1	% CaCO3	0.9	0.8	6.2	1.5	1.4
Fizz Rating	----	0	Fizz Unit	1	1	2	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.6	5.5	6.3	6.9	6.7
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	415	795	582	311	273
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	3660	2610	<100	440	290
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.59	0.83	0.16	0.11	0.13
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.24	0.39	0.07	0.56	0.35



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60058	61428	62493	62998	63003
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-066	EP1108259-067	EP1108259-068	EP1108259-069	EP1108259-070
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.8	2.8	3.3	7.0	7.0
NAG (pH 4.5)	----	0.1	kg H2SO4/t	1.3	17.1	4.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	5.8	28.9	14.8	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.6	10.8	50.2	21.7	47.2
ANC as CaCO3	----	0.1	% CaCO3	0.8	1.1	5.1	2.2	4.8
Fizz Rating	----	0	Fizz Unit	1	1	2	1	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.7	5.8	5.7	6.1	6.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	607	2360	914	484	500
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	1110	8640	1920	540	660
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.26	1.82	1.34	0.09	0.30
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.74	0.05	0.16	0.17	0.25



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				33587	34653	34664	61408	61541
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-071	EP1108259-072	EP1108259-073	EP1108259-074	EP1108259-075
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.4	6.2	6.7	3.5	2.5
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	2.0	17.5
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.3	0.4	0.2	6.9	28.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	<0.5	21.8	1.2
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	2.2	0.1
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.8	6.1	5.3	5.6	5.1
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	114	100	70	406	2180
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	250	160	470	1380	5830
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.01	0.03	0.02	0.51	1.22
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.03	0.08	0.04	0.49	0.04



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				61873	61881	62006	30322	31317
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-076	EP1108259-077	EP1108259-078	EP1108259-079	EP1108259-080
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.4	6.7	2.9	4.8	7.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	69.9	<0.1	5.0	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	86.6	0.4	9.8	12.5	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	11.0	67.4	24.4	68.5	24.9
ANC as CaCO3	----	0.1	% CaCO3	1.1	6.9	2.5	7.0	2.5
Fizz Rating	----	0	Fizz Unit	1	2	1	2	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	4.8	6.2	5.0	6.2	6.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	3740	692	571	916	4780
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	12100	1000	1150	1600	210
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	4.04	0.24	0.75	1.36	0.05
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.04	0.04	0.04	0.06	0.25



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				34677	60010	60287	60505	60907
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-081	EP1108259-082	EP1108259-083	EP1108259-084	EP1108259-085
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.0	5.5	5.8	2.3	2.5
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	36.8	41.0
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	27.0	6.2	46.7	45.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	5.3	2.9	5.2	<0.5	4.2
ANC as CaCO3	----	0.1	% CaCO3	0.5	0.3	0.5	<0.1	0.4
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.4	6.3	4.2	4.7	7.1
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	122	40	937	1280	319
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	150	<100	6140	8220	160
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.02	<0.01	1.84	1.80	0.02
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.12	0.04	0.95	0.11	0.10



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60913	61453	61542	61543	61604
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-086	EP1108259-087	EP1108259-088	EP1108259-089	EP1108259-090
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.4	2.7	2.7	2.1	2.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	32.2	22.0	127	34.5
NAG (pH 7.0)	----	0.1	kg H2SO4/t	2.4	44.6	30.4	154	44.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	5.3	16.8	11.0	<0.5	14.0
ANC as CaCO3	----	0.1	% CaCO3	0.5	1.7	1.1	<0.1	1.4
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.2	6.2	4.5	3.6	5.0
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	132	997	2280	4430	1460
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	2950	8040	23800	4080
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	2.16	1.57	5.97	2.07
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.07	0.04	0.05	0.05	0.06



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				61607	61609	61758	61765	62089
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-091	EP1108259-092	EP1108259-093	EP1108259-094	EP1108259-095
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.5	2.4	6.9	7.2	2.9
NAG (pH 4.5)	----	0.1	kg H2SO4/t	37.5	41.7	<0.1	<0.1	14.5
NAG (pH 7.0)	----	0.1	kg H2SO4/t	44.9	49.6	0.2	<0.1	24.6
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.7	3.3	17.8	17.0	9.6
ANC as CaCO3	----	0.1	% CaCO3	0.8	0.3	1.8	1.7	1.0
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	4.7	3.7	6.4	7.3	5.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	959	1110	361	187	651
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	3080	4440	290	<100	2060
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	1.71	1.68	0.07	0.05	1.17
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.09	1.24	0.19	0.14	0.46



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				62312	62322	----	----	----
				25-NOV-2011 12:21	25-NOV-2011 12:21	----	----	----
Compound	CAS Number	LOR	Unit	EP1108259-096	EP1108259-097	----	----	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.0	4.6	----	----	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	----	----	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	2.7	----	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	45.6	26.3	----	----	----
ANC as CaCO3	----	0.1	% CaCO3	4.6	2.7	----	----	----
Fizz Rating	----	0	Fizz Unit	2	1	----	----	----
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.1	4.1	----	----	----
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	316	1430	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	----	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	410	1720	----	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.13	0.39	----	----	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.19	0.26	----	----	----



Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EP1108946	Page	: 1 of 26
Client	: VDM ENVIRONMENTAL	Laboratory	: Environmental Division Perth
Contact	: EDGARDO ALARCONLEON	Contact	: Scott James
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	OSBORNE PARK WA, AUSTRALIA 6017		
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Telephone	: +61 08 9241 1800	Telephone	: +61-8-9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 15-DEC-2011
Sampler	: ----	Issue Date	: 27-JAN-2012
Site	: ----		
Quote number	: EP-169-10	No. of samples received	: 54
		No. of samples analysed	: 54

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics
Chas Tucker	Inorganic Chemist	Perth Inorganics
Cicelia Bartels	Metals Instrument Chemist	Perth Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
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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

- **ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.**
- **Ionic Balance out of acceptable limits for various samples due to analytes not quantified in this report.**
- **TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				5764	7053	6954	5759	7004
				[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-001	EP1108946-002	EP1108946-003	EP1108946-004	EP1108946-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.71	7.02	7.68	7.72	7.88
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	157	92	109	171	99
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	162	83	90	131	65
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	4	6	25	7
Total Alkalinity as CaCO3	----	1	mg/L	<1	4	6	25	7
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	54	11	17	47	<1
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	<1	<1	1	1	11
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	1	3	<1
Magnesium	7439-95-4	1	mg/L	9	6	8	14	<1
Sodium	7440-23-5	1	mg/L	5	4	2	2	18
Potassium	7440-09-7	1	mg/L	9	1	<1	<1	<1
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	0.38
Arsenic	7440-38-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	7440-43-9	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	7440-47-3	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	7440-50-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L	0.56	0.10	<0.05	<0.05	6.38
Lead	7439-92-1	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	7439-96-5	0.01	mg/L	0.22	<0.01	0.02	0.01	<0.01
Nickel	7440-02-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.01	mg/L	0.46	0.10	0.05	0.17	0.06
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	1.12	0.31	0.50	1.51	0.45



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				5764	7053	6954	5759	7004
				[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-001	EP1108946-002	EP1108946-003	EP1108946-004	EP1108946-005
EN055: Ionic Balance - Continued								
Total Cations	----	0.01	meq/L	1.19	0.69	0.80	1.39	0.78



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				6387	7084	3668	6689	5365
				[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-006	EP1108946-007	EP1108946-008	EP1108946-009	EP1108946-010
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.94	7.20	7.01	7.34	5.56
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	36	27	41	70	1040
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	25	25	22	222	2510
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
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	4	5	5	10	4
Total Alkalinity as CaCO3	----	1	mg/L	4	5	5	10	4
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	<1	19	565
ED045G: Chloride 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	<1	<1	<1	<1	33
Magnesium	7439-95-4	1	mg/L	2	<1	<1	7	107
Sodium	7440-23-5	1	mg/L	3	5	7	<1	2
Potassium	7440-09-7	1	mg/L	<1	<1	<1	2	<1
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	<0.10	0.38	0.22	<0.10
Arsenic	7440-38-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	7440-43-9	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	7440-47-3	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	7440-50-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L	<0.05	7.42	0.56	0.78	3.66
Lead	7439-92-1	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	7439-96-5	0.01	mg/L	<0.01	<0.01	<0.01	0.05	22.3
Nickel	7440-02-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.20
Zinc	7440-66-6	0.01	mg/L	0.06	0.03	0.07	0.08	0.47
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.08	0.10	0.10	0.62	11.9



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				6387	7084	3668	6689	5365
				[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-006	EP1108946-007	EP1108946-008	EP1108946-009	EP1108946-010
EN055: Ionic Balance - Continued								
Total Cations	----	0.01	meq/L	0.30	0.22	0.30	0.63	10.5
Ionic Balance	----	0.01	%	----	----	----	----	6.07



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	7014	5367	6382	7017	6393
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
				EP1108946-011	EP1108946-012	EP1108946-013	EP1108946-014	EP1108946-015
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.09	5.72	6.11	4.10	6.13
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	121	1020	54	790	124
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	338	2490	204	2050	509
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
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	19	8	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	19	8	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	37	561	19	361	48
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	3	3	3	4	1
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	1	46	<1	5	2
Magnesium	7439-95-4	1	mg/L	9	107	5	45	10
Sodium	7440-23-5	1	mg/L	7	<1	1	2	3
Potassium	7440-09-7	1	mg/L	4	<1	2	<1	3
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	<0.10	<0.10	7.32	<0.10
Arsenic	7440-38-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	7440-43-9	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	7440-47-3	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	7440-50-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L	<0.05	0.74	<0.05	84.6	0.17
Lead	7439-92-1	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	7439-96-5	0.01	mg/L	0.01	14.9	0.02	3.47	0.86
Nickel	7440-02-0	0.01	mg/L	<0.01	0.27	<0.01	0.02	<0.01
Zinc	7440-66-6	0.01	mg/L	0.13	0.42	0.08	0.08	0.20
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	1.23	11.9	0.48	7.63	1.03



Analytical Results

Sub-Matrix: DI WATER LEACHATE

				Client sample ID	7014	5367	6382	7017	6393
				Client sampling date / time	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit		EP1108946-011	EP1108946-012	EP1108946-013	EP1108946-014	EP1108946-015
EN055: Ionic Balance - Continued									
Total Cations	----	0.01	meq/L		1.20	11.1	0.51	4.04	1.13
Ionic Balance	----	0.01	%		----	3.58	----	30.8	----



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				6296	6999	7021	6069	6172
				[16-DEC-2011]	[16-DEC-2011]	[03-JAN-2012]	[03-JAN-2012]	[03-JAN-2012]
Compound	CAS Number	LOR	Unit	EP1108946-016	EP1108946-017	EP1108946-022	EP1108946-037	EP1108946-038
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.06	6.64	4.43	6.75	6.71
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	100	105	496	18	10
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	376	520	430	15	12
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	1	<1	6	4
Total Alkalinity as CaCO3	----	1	mg/L	3	1	<1	6	4
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	33	9	243	2	<1
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	2	21	4	<1	2
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	8	<1	<1
Magnesium	7439-95-4	1	mg/L	8	<1	37	<1	<1
Sodium	7440-23-5	1	mg/L	4	25	5	<1	3
Potassium	7440-09-7	1	mg/L	4	<1	1	6	<1
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	0.19	5.84	<0.10	<0.10
Arsenic	7440-38-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	7440-43-9	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	7440-47-3	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	7440-50-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L	<0.05	0.86	19.5	<0.05	<0.05
Lead	7439-92-1	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	7439-96-5	0.01	mg/L	<0.01	<0.01	1.23	<0.01	0.01
Nickel	7440-02-0	0.01	mg/L	<0.01	<0.01	0.02	<0.01	<0.01
Zinc	7440-66-6	0.01	mg/L	<0.01	0.04	0.06	<0.01	<0.01
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.006	<0.001	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.80	0.80	5.17	0.16	0.14



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				6296	6999	7021	6069	6172
				[16-DEC-2011]	[16-DEC-2011]	[03-JAN-2012]	[03-JAN-2012]	[03-JAN-2012]
Compound	CAS Number	LOR	Unit	EP1108946-016	EP1108946-017	EP1108946-022	EP1108946-037	EP1108946-038
EN055: Ionic Balance - Continued								
Total Cations	----	0.01	meq/L	0.93	1.09	3.69	0.15	0.13
Ionic Balance	----	0.01	%	----	----	16.8	----	----



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				6338	7061	3680	6673	6395
				[03-JAN-2012]	[03-JAN-2012]	[03-JAN-2012]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-039	EP1108946-040	EP1108946-041	EP1108946-053	EP1108946-054
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.72	6.40	5.84	6.80	7.05
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	20	41	90	13	129
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	27	42	80	32	466
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
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	4	5	5	<1	6
Total Alkalinity as CaCO3	----	1	mg/L	4	5	5	<1	6
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	6	34	2	44
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	1	8	2	<1	2
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	2
Magnesium	7439-95-4	1	mg/L	<1	1	6	<1	12
Sodium	7440-23-5	1	mg/L	5	7	4	4	5
Potassium	7440-09-7	1	mg/L	2	2	<1	<1	<1
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic	7440-38-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	7440-43-9	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	7440-47-3	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	7440-50-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.82	0.14	<0.05
Lead	7439-92-1	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	7439-96-5	0.01	mg/L	0.04	0.02	0.25	<0.01	0.03
Nickel	7440-02-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.14
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.19	0.45	0.86	0.04	1.09



Analytical Results

Sub-Matrix: DI WATER LEACHATE

				Client sample ID	6338	7061	3680	6673	6395
				Client sampling date / time	[03-JAN-2012]	[03-JAN-2012]	[03-JAN-2012]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit		EP1108946-039	EP1108946-040	EP1108946-041	EP1108946-053	EP1108946-054
EN055: Ionic Balance - Continued									
Total Cations	----	0.01	meq/L		0.27	0.44	0.67	0.17	1.30



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				4554	----	----	----	----
				[03-JAN-2012]	----	----	----	----
Compound	CAS Number	LOR	Unit	EP1108946-055	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.82	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	12	----	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	24	----	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	4	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	4	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	2	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
Sodium	7440-23-5	1	mg/L	4	----	----	----	----
Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	----	----	----	----
Arsenic	7440-38-2	0.01	mg/L	<0.01	----	----	----	----
Cadmium	7440-43-9	0.005	mg/L	<0.005	----	----	----	----
Chromium	7440-47-3	0.01	mg/L	<0.01	----	----	----	----
Copper	7440-50-8	0.01	mg/L	<0.01	----	----	----	----
Iron	7439-89-6	0.05	mg/L	2.10	----	----	----	----
Lead	7439-92-1	0.01	mg/L	<0.01	----	----	----	----
Manganese	7439-96-5	0.01	mg/L	<0.01	----	----	----	----
Nickel	7440-02-0	0.01	mg/L	<0.01	----	----	----	----
Zinc	7440-66-6	0.01	mg/L	0.03	----	----	----	----
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.16	----	----	----	----



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

4554

Client sampling date / time

[03-JAN-2012]

Compound	CAS Number	LOR	Unit	EP1108946-055	----	----	----	----
EN055: Ionic Balance - Continued								
Total Cations	----	0.01	meq/L	0.17	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				5764	7053	6954	5759	7004
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-001	EP1108946-002	EP1108946-003	EP1108946-004	EP1108946-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	4.7	6.3	6.4	7.1	7.0
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	840	545	618	729	619
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.7	4.4	6.6	7.1	7.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	19.0	0.2	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	27.4	3.8	0.6	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.4	16.4	20.0	42.0	1.4
ANC as CaCO3	----	0.1	% CaCO3	0.2	1.7	2.0	4.3	0.1
Fizz Rating	----	0	Fizz Unit	1	1	1	2	1
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	2200	670	570	1090	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.86	0.31	0.22	0.43	<0.01
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	8.7	8.9	8.9	8.4	8.8



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				6387	7084	3668	6689	5365
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-006	EP1108946-007	EP1108946-008	EP1108946-009	EP1108946-010
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.8	6.9	6.5	7.0	5.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	179	109	92	388	4420
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.3	8.8	6.4	7.2	3.7
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	3.5
NAG (pH 7.0)	----	0.1	kg H2SO4/t	1.7	<0.1	1.5	<0.1	86.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.6	14.6	4.2	53.7	31.0
ANC as CaCO3	----	0.1	% CaCO3	0.3	1.5	0.4	5.5	3.2
Fizz Rating	----	0	Fizz Unit	1	1	1	2	2
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	140	<100	<100	250	15100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.05	<0.01	<0.01	0.07	4.16
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	8.3	8.4	8.4	8.5	5.8



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				7014	5367	6382	7017	6393
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-011	EP1108946-012	EP1108946-013	EP1108946-014	EP1108946-015
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.8	5.7	6.1	3.4	5.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	614	4350	343	3590	806
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	4.9	4.3	4.2	2.3	6.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	0.9	0.8	61.0	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	1.8	79.2	2.7	72.6	0.3
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	12.3	26.7	2.6	<0.5	2.6
ANC as CaCO3	----	0.1	% CaCO3	1.2	2.7	0.3	<0.1	0.3
Fizz Rating	----	0	Fizz Unit	2	1	1	1	1
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	850	14100	410	14100	1030
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.33	4.09	0.11	2.71	0.13
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.2	5.6	6.9	4.1	6.0



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				6296	6999	7013	6339	6699
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-016	EP1108946-017	EP1108946-018	EP1108946-019	EP1108946-020
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.4	6.7	4.0	5.8	6.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	585	759	2210	77	745
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.9	8.3	2.4	6.6	4.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	42.2	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.4	<0.1	49.3	0.2	4.2
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	14.6	1.0	7.9	<0.5	7.9
ANC as CaCO3	----	0.1	% CaCO3	1.5	0.1	0.8	<0.1	0.8
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	----	----	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	640	160	7340	130	1180
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.06	0.02	2.16	<0.01	0.34
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.8	6.8	----	----	----



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				7019	7021	7022	7023	6175
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-021	EP1108946-022	EP1108946-023	EP1108946-024	EP1108946-025
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	3.7	3.6	6.4	4.9	6.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	2950	2800	2630	1020	47
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.5	2.4	2.4	2.6	6.7
NAG (pH 4.5)	----	0.1	kg H2SO4/t	43.0	52.9	43.9	15.9	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	54.7	68.7	54.5	20.1	0.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	<0.5	5.2	1.8
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	0.5	0.2
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	----	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	9080	10100	12800	1900	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	2.28	2.65	2.16	0.74	<0.01
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	4.4	----	----	----



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				6961	4978	6167	5787	7056
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-026	EP1108946-027	EP1108946-028	EP1108946-029	EP1108946-030
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.8	3.9	5.7	7.9	7.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	227	4920	54	248	381
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.5	4.3	6.0	8.0	7.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	0.7	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	95.5	0.7	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	30.2	13.6	<0.5	12.9	9.0
ANC as CaCO3	----	0.1	% CaCO3	3.1	1.4	<0.1	1.3	0.9
Fizz Rating	----	0	Fizz Unit	2	1	1	1	1
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	19100	<100	<100	310
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.02	4.06	<0.01	<0.01	0.12



Analytical Results

Sub-Matrix: SOIL

				Client sample ID	6971	6293	6294	7069	6314
				Client sampling date / time	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit		EP1108946-031	EP1108946-032	EP1108946-033	EP1108946-034	EP1108946-035
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		6.7	3.8	5.2	6.1	7.3
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		----	4.88	----	----	7.27
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		335	5830	1330	120	208
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		----	1550	----	----	44
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit		7.3	2.5	5.4	6.5	7.4
NAG (pH 4.5)	----	0.1	kg H2SO4/t		<0.1	45.0	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t		<0.1	58.5	0.9	1.1	<0.1
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		17.7	15.2	8.8	3.0	10.5
ANC as CaCO3	----	0.1	% CaCO3		1.8	1.6	0.9	0.3	1.1
Fizz Rating	----	0	Fizz Unit		1	1	1	1	1
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L		----	1570	----	----	68
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		<1.0	<1.0	<1.0	<1.0	<1.0
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		----	2	----	----	12
Total Alkalinity as CaCO3	----	1	mg/L		----	2	----	----	12
ED040: Sulfur as SO4 2-									
Sulfate as SO4 2-	14808-79-8	100	mg/kg		440	25800	2120	<100	180
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	999	----	----	6
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.13	3.35	0.34	0.01	0.07
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		----	3	----	----	2
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	17	----	----	1
Magnesium	7439-95-4	1	mg/L		----	92	----	----	3



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				6971	6293	6294	7069	6314
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-031	EP1108946-032	EP1108946-033	EP1108946-034	EP1108946-035
ED093F: Dissolved Major Cations - Continued								
Sodium	7440-23-5	1	mg/L	----	4	----	----	5
Potassium	7440-09-7	1	mg/L	----	2	----	----	2
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	----	0.10	----	----	<0.10
Arsenic	7440-38-2	0.01	mg/L	----	<0.01	----	----	<0.01
Cadmium	7440-43-9	0.005	mg/L	----	<0.005	----	----	<0.005
Chromium	7440-47-3	0.01	mg/L	----	<0.01	----	----	<0.01
Copper	7440-50-8	0.01	mg/L	----	<0.01	----	----	<0.01
Iron	7439-89-6	0.05	mg/L	----	245	----	----	0.62
Lead	7439-92-1	0.01	mg/L	----	<0.01	----	----	<0.01
Manganese	7439-96-5	0.01	mg/L	----	10.1	----	----	<0.01
Nickel	7440-02-0	0.01	mg/L	----	0.07	----	----	<0.01
Zinc	7440-66-6	0.01	mg/L	----	<0.01	----	----	0.03
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	----	<0.001	----	----	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	----	17.4	----	----	0.42
Total Cations	----	0.01	meq/L	----	8.65	----	----	0.57
Ionic Balance	----	0.01	%	----	33.7	----	----	----
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	5.0	----	----	7.5



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				6069	6172	6338	7061	3680
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-037	EP1108946-038	EP1108946-039	EP1108946-040	EP1108946-041
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.1	5.8	5.5	5.0	4.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	115	89	96	276	457
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.5	6.6	7.5	5.6	3.0
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	2.0
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	0.6	<0.1	1.6	6.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.7	<0.5	<0.5	<0.5	1.2
ANC as CaCO3	----	0.1	% CaCO3	0.3	<0.1	<0.1	<0.1	0.1
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	220	<100	1100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	0.01	0.02	0.31
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.4	7.6	7.5	7.2	5.8



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				3661	3672	4165	4172	4573
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-042	EP1108946-043	EP1108946-044	EP1108946-045	EP1108946-046
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.6	6.2	4.7	4.6	3.7
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	62	64	66	72	574
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.7	6.7	5.5	4.9	3.3
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	1.2
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.5	0.7	5.5	5.9	6.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	3.2	<0.5	<0.5	3.0
ANC as CaCO3	----	0.1	% CaCO3	<0.1	0.3	<0.1	<0.1	0.3
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	<100	100	990
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	<0.01	0.14



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				5963	6061	6081	6163	6332
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-047	EP1108946-048	EP1108946-049	EP1108946-050	EP1108946-051
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.7	6.4	6.3	5.6	5.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	340	128	67	59	102
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.1	6.2	5.6	5.4	6.3
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	3.5	3.1	7.5	7.2	0.3
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	53.8	1.8	<0.5	1.2	0.9
ANC as CaCO3	----	0.1	% CaCO3	5.5	0.2	<0.1	0.1	<0.1
Fizz Rating	----	0	Fizz Unit	2	1	1	1	1
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	250	<100	<100	260
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.06	0.02	0.01	<0.01	0.03



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				6340	6673	6395	4554	----
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	----
Compound	CAS Number	LOR	Unit	EP1108946-052	EP1108946-053	EP1108946-054	EP1108946-055	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.6	5.4	6.3	6.3	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	60	57	647	84	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.0	5.5	4.6	6.4	----
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	0.2	4.6	2.1	1.4	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	0.9	8.2	<0.5	----
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	0.8	<0.1	----
Fizz Rating	----	0	Fizz Unit	1	1	1	1	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	----	----	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	160	890	<100	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.02	0.35	<0.01	----
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	6.8	6.8	7.2	----



Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EP1201090	Page	: 1 of 16
Client	: VDM ENVIRONMENTAL	Laboratory	: Environmental Division Perth
Contact	: EDGARDO ALARCONLEON	Contact	: Scott James
Address	: 310 SELBY STREET NORTH OSBORNE PARK WA, AUSTRALIA 6017	Address	: 10 Hod Way Malaga WA Australia 6090
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Telephone	: +61 08 9241 1800	Telephone	: +61-8-9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 14-FEB-2012
Sampler	: ----	Issue Date	: 28-MAR-2012
Site	: ----		
Quote number	: EP-169-10	No. of samples received	: 53
		No. of samples analysed	: 53

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics
Chas Tucker	Inorganic Chemist	Perth Inorganics
Cicelia Bartels	Metals Instrument Chemist	Perth Inorganics
Daniel Fisher	Inorganics Analyst	Perth Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
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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

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



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				WR144400	WR144503	WR144509	WR144415	WR144421
				28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00
Compound	CAS Number	LOR	Unit	EP1201090-001	EP1201090-004	EP1201090-008	EP1201090-011	EP1201090-015
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.01	6.99	7.48	6.69	6.84
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	59	211	112	312	198
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	60	160	106	234	190
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	2	5	2	2
Total Alkalinity as CaCO3	----	1	mg/L	3	2	5	2	2
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	5	2	24	18
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	9	42	21	54	38
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	<1
Magnesium	7439-95-4	1	mg/L	<1	6	<1	2	<1
Sodium	7440-23-5	1	mg/L	13	24	16	44	32
Potassium	7440-09-7	1	mg/L	2	10	12	16	10
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.31	0.18	0.46	0.72	0.46
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	0.002	<0.001	0.003	0.002	0.001
Copper	7440-50-8	0.001	mg/L	0.001	<0.001	<0.001	0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.002	0.006	0.005	0.005	<0.001
Nickel	7440-02-0	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
Zinc	7440-66-6	0.005	mg/L	0.079	0.118	0.054	0.110	0.079
Iron	7439-89-6	0.05	mg/L	0.12	0.09	0.26	0.18	0.14
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.38	1.33	0.73	2.06	1.49
Total Cations	----	0.01	meq/L	0.62	1.79	1.00	2.49	1.65



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				WR144430	WR144539	WR144445	WR144451	WR144460
				28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00
Compound	CAS Number	LOR	Unit	EP1201090-021	EP1201090-028	EP1201090-031	EP1201090-035	EP1201090-041
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.98	8.05	6.48	6.66	6.86
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	180	49	327	197	190
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	104	54	300	160	134
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	6	3	2	2
Total Alkalinity as CaCO3	----	1	mg/L	3	6	3	2	2
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	18	4	117	59	122
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	29	3	8	8	6
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	4	<1	<1
Magnesium	7439-95-4	1	mg/L	<1	<1	12	4	2
Sodium	7440-23-5	1	mg/L	28	7	21	17	16
Potassium	7440-09-7	1	mg/L	12	8	29	22	27
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	1.28	0.62	0.05	0.14	0.15
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.005	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	0.002	0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.002	<0.001	0.039	0.018	0.002
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.014	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.107	0.035	0.268	0.185	0.169
Iron	7439-89-6	0.05	mg/L	0.54	0.20	<0.05	<0.05	<0.05
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	1.25	0.29	2.72	1.49	2.75
Total Cations	----	0.01	meq/L	1.52	0.51	2.84	1.63	1.55



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				WR144563	WR144472	WR144478	----	----
				28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00	----	----
Compound	CAS Number	LOR	Unit	EP1201090-044	EP1201090-049	EP1201090-053	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.21	7.39	7.44	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	31	74	67	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	36	50	62	----	----
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	5	4	5	----	----
Total Alkalinity as CaCO3	----	1	mg/L	5	4	5	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	18	15	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	2	4	3	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	----	----
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	----	----
Sodium	7440-23-5	1	mg/L	5	13	12	----	----
Potassium	7440-09-7	1	mg/L	4	9	7	----	----
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	3.45	2.40	0.57	----	----
Arsenic	7440-38-2	0.001	mg/L	0.006	0.003	0.002	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	0.005	0.003	0.002	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L	0.008	0.002	0.001	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	0.067	0.048	0.036	----	----
Iron	7439-89-6	0.05	mg/L	1.86	0.80	0.19	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.22	0.57	0.50	----	----
Total Cations	----	0.01	meq/L	0.32	0.80	0.70	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144400	WR144500	WR144403	WR144503	WR144406
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-001	EP1201090-002	EP1201090-003	EP1201090-004	EP1201090-005
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.6	7.4	8.9	7.9	8.3
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	3.0	<0.1	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.6	4.2	6.3	5.5	2.1
ANC as CaCO3	----	0.1	% CaCO3	0.4	0.4	0.6	0.6	0.2
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.0	7.0	7.9	7.4	7.0
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	390	370	1190	1260	2240
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	130	<100	220	140	630
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	<0.01	0.02
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.7	----	----	7.1	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144506	WR144409	WR144509	WR144412	WR144512
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-006	EP1201090-007	EP1201090-008	EP1201090-009	EP1201090-010
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.7	5.8	7.2	6.1	6.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	11.2	<0.1	5.1	1.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	5.3	2.6	5.4	2.7	11.1
ANC as CaCO3	----	0.1	% CaCO3	0.5	0.3	0.6	0.3	1.1
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.2	6.6	7.6	6.5	7.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	1270	2750	751	2200	491
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	720	<100	830	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.02	<0.01	0.04	<0.01
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	----	7.8	----	----



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				WR144415	WR144515	WR144418	WR144518	WR144421
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-011	EP1201090-012	EP1201090-013	EP1201090-014	EP1201090-015
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	5.8	6.6	5.8	3.0	5.9
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	8.6	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	9.6	2.2	9.6	17.9	12.0
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.1	6.5	2.4	12.9	3.2
ANC as CaCO3	----	0.1	% CaCO3	0.3	0.7	0.2	1.3	0.3
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.4	7.6	6.3	7.0	6.5
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	1100	425	1480	724	741
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	850	200	940	910	800
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.24	0.01	0.26	0.67	0.21
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.2	----	----	----	7.2



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144521	WR144424	WR144524	WR144427	WR144527
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-016	EP1201090-017	EP1201090-018	EP1201090-019	EP1201090-020
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.4	5.9	3.1	6.0	4.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	3.1	<0.1	7.9	<0.1	0.9
NAG (pH 7.0)	----	0.1	kg H2SO4/t	10.1	10.8	17.4	13.3	8.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	9.4	2.5	19.1	1.9	30.8
ANC as CaCO3	----	0.1	% CaCO3	1.0	0.2	2.0	0.2	3.1
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.8	6.5	7.6	7.3	7.5
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	396	1090	762	1060	1100
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	310	840	1060	2540	2140
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.42	0.24	1.02	0.76	1.29



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144430	WR144530	WR144433	WR144533	WR144436
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-021	EP1201090-022	EP1201090-023	EP1201090-024	EP1201090-025
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.0	3.0	5.5	3.9	2.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	9.5	<0.1	1.8	13.3
NAG (pH 7.0)	----	0.1	kg H2SO4/t	10.5	18.4	9.4	7.7	19.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	0.8	31.7	1.7	20.3	8.6
ANC as CaCO3	----	0.1	% CaCO3	<0.1	3.2	0.2	2.1	0.9
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.5	7.1	6.7	7.2	5.9
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	934	1620	903	641	1200
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	1050	3110	780	740	2240
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.21	1.59	0.08	0.52	0.79
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.2	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144536	WR144439	WR144539	WR144442	WR144542
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-026	EP1201090-027	EP1201090-028	EP1201090-029	EP1201090-030
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.5	2.8	7.0	2.8	7.3
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	13.2	<0.1	24.9	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.4	19.9	0.2	31.4	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	12.2	6.2	14.5	5.9	14.6
ANC as CaCO3	----	0.1	% CaCO3	1.2	0.6	1.5	0.6	1.5
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.5	7.3	7.8	6.6	7.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	283	831	242	1580	299
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	160	940	110	3110	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.13	0.79	0.11	1.29	0.08
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	----	8.2	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144445	WR144545	WR144448	WR144548	WR144451
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-031	EP1201090-032	EP1201090-033	EP1201090-034	EP1201090-035
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.4	7.2	2.7	5.0	2.7
NAG (pH 4.5)	----	0.1	kg H2SO4/t	53.9	<0.1	26.1	<0.1	16.8
NAG (pH 7.0)	----	0.1	kg H2SO4/t	63.1	<0.1	33.9	3.8	22.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	4.8	19.2	5.9	10.0	14.4
ANC as CaCO3	----	0.1	% CaCO3	0.5	2.0	0.6	1.0	1.5
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.8	7.6	6.1	7.9	6.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	1700	104	1200	275	1000
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	5350	140	2340	120	1880
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	2.39	0.10	1.29	0.14	0.92
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.8	----	----	----	6.9



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144551	WR144454	WR144554	WR144457	WR144557
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-036	EP1201090-037	EP1201090-038	EP1201090-039	EP1201090-040
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.7	3.1	6.8	2.8	6.5
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	13.6	<0.1	13.5	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	23.2	0.2	20.6	0.3
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	21.7	8.8	11.7	6.4	7.5
ANC as CaCO3	----	0.1	% CaCO3	2.2	0.9	1.2	0.6	0.8
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.6	6.6	7.6	6.5	7.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	353	890	321	820	359
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	320	2170	250	1460	290
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.11	0.93	0.08	0.82	0.14



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144460	WR144560	WR144463	WR144563	WR144466
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-041	EP1201090-042	EP1201090-043	EP1201090-044	EP1201090-045
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.5	6.0	2.8	5.2	2.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	47.1	<0.1	19.6	<0.1	14.3
NAG (pH 7.0)	----	0.1	kg H2SO4/t	57.2	0.8	26.7	2.7	19.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.8	8.3	4.8	8.8	7.2
ANC as CaCO3	----	0.1	% CaCO3	0.3	0.8	0.5	0.9	0.7
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.4	7.8	7.2	7.7	7.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	1110	237	1050	337	680
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	2140	140	970	<100	960
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	2.16	0.08	1.10	0.10	0.85
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.9	----	----	8.4	----



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				WR144566	WR144469	WR144569	WR144472	WR144572
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-046	EP1201090-047	EP1201090-048	EP1201090-049	EP1201090-050
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.6	3.4	7.0	3.3	7.1
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	4.0	<0.1	4.0	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.2	9.2	<0.1	8.4	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	14.3	1.4	11.2	8.3	17.0
ANC as CaCO3	----	0.1	% CaCO3	1.4	0.1	1.1	0.8	1.7
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	8.0	7.4	8.1	7.5	7.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	206	578	174	488	447
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	580	<100	560	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.12	0.39	0.10	0.42	0.09
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	----	----	7.9	----



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				WR144475	WR144575	WR144478	----	----
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	----	----
Compound	CAS Number	LOR	Unit	EP1201090-051	EP1201090-052	EP1201090-053	----	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.1	6.9	4.2	----	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t	6.4	<0.1	0.5	----	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t	11.8	<0.1	3.7	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.0	13.5	10.1	----	----
ANC as CaCO3	----	0.1	% CaCO3	0.7	1.4	1.0	----	----
Fizz Rating	----	0	Fizz Unit	1	1	1	----	----
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.4	7.7	7.6	----	----
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	496	209	380	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	620	120	380	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.54	0.10	0.22	----	----
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	----	7.8	----	----

Appendix G

Hydrogeochemical Assessment of Leachates

Sample ID	Depth (m)		Analyses	pH Value	EC @ 25°C	TDS	Hydroxide Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulfate as SO4	Chloride	Calcium	Magnesium	Sodium	Potassium	Aluminium	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc	Uranium
	mFrom	mTo	Lithotype	pH Unit	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Area E East																											
WR002	19	20	OO	6.16	146	112	<1	<1	<1	<1	54	2	4	11	2	<1	<0.01	<0.001	<0.0001	<0.001	<0.001	0.08	<0.001	1.45	0.011	0.142	<0.001
WR003	19	20	SST	4.82	204	150	<1	<1	<1	<1	80	2	<1	14	3	<1	0.47	<0.001	<0.0001	<0.001	0.01	9.19	<0.001	0.477	0.017	0.185	<0.001
WR005	20	21	OO	5.56	1040	2510	<1	<1	4	4	565	2	33	107	2	<1	<0.10	<0.01	<0.005	<0.01	<0.01	3.66	<0.01	22.3	0.2	0.47	<0.001
WR006	20	21	OST	3.3	1300	865	<1	<1	<1	<1	657	6	20	46	2	<1	6.12	0.002	0.0004	0.004	0.013	178	0.004	8.54	0.095	0.565	0.005
WR007	20	21	SST	5.34	207	158	<1	<1	<1	<1	84	2	1	18	3	1	0.01	0.002	0.0002	<0.001	<0.001	1.63	<0.001	1.69	0.014	0.609	<0.001
WR009	21	22	CY	6.45	19	48	<1	<1	<1	<1	2	1	<1	<1	3	<1	0.07	<0.001	<0.0001	0.007	0.001	1.55	<0.001	0.02	0.002	0.08	<0.001
WR012	22	23	SST	5.72	1020	2490	<1	<1	8	8	561	3	46	107	<1	<1	<0.10	<0.01	<0.005	<0.01	<0.01	0.74	<0.01	14.9	0.27	0.42	<0.001
WR014	23	24	SST	7.12	96	60	<1	<1	9	9	22	6	1	8	2	<1	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.064	<0.001	0.1	<0.001
WR016	25	26	SOO	6.71	243	187	<1	<1	5	5	94	4	6	20	2	<1	<0.01	<0.001	<0.0001	<0.001	0.002	0.29	<0.001	4.07	0.006	0.116	<0.001
WR021	30	31	OO	3.48	475	257	<1	<1	<1	<1	131	4	13	26	4	<1	0.03	<0.001	<0.0001	<0.001	0.001	0.46	<0.001	0.597	0.002	0.211	<0.001
WR022	31	32	SST	6.75	348	248	<1	<1	<1	<1	134	7	6	32	2	2	0.01	0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	4.69	0.021	0.234	<0.001
WR026	33	34	SOO	6.29	56	44	<1	<1	1	1	16	3	<1	4	2	<1	0.02	<0.001	<0.0001	<0.001	<0.001	0.25	<0.001	0.145	0.001	0.058	<0.001
WR027	33	34	SST	4.79	189	115	<1	<1	<1	<1	67	4	1	13	7	4	0.01	<0.001	0.0001	<0.001	0.004	0.58	<0.001	0.178	0.002	0.266	<0.001
WR032	36	37	SLT	4.78	608	392	<1	<1	<1	<1	201	2	3	47	3	1	0.37	0.003	0.0035	<0.001	0.001	34.6	<0.001	11.8	0.082	0.319	<0.001
WR034	37	38	OO	4.48	341	268	<1	<1	<1	<1	142	2	2	21	3	<1	1.13	<0.001	0.0002	<0.001	0.002	23.5	<0.001	2.57	0.041	0.934	0.003
WR036	38	39	OO	3	846	569	<1	<1	<1	<1	196	1	2	12	2	2	9.31	0.004	0.0004	0.005	0.049	51.8	0.013	1.03	0.05	0.457	0.004
WR037	38	39	SST	4.72	1260	784	<1	<1	<1	<1	692	3	38	106	2	<1	1.2	<0.001	<0.0001	0.002	0.001	94.4	<0.001	8.84	0.03	0.191	0.003
WR039	40	41	SLT	5.77	419	220	<1	<1	<1	<1	161	9	3	41	2	6	0.02	<0.001	<0.0001	<0.001	<0.001	0.22	<0.001	0.222	0.002	0.21	<0.001
WR040	41	42	SIDOO	6.99	192	139	<1	<1	11	11	60	6	4	17	2	<1	0.02	0.001	<0.0001	<0.001	<0.001	0.46	<0.001	1.17	0.01	0.176	<0.001
WR041	41	42	OO	5.42	463	274	<1	<1	<1	<1	201	2	5	35	2	<1	0.04	0.002	0.0001	<0.001	<0.001	17.4	<0.001	16.5	0.038	0.253	<0.001
WR043	45	46	SLT	4.67	210	149	<1	<1	<1	<1	84	3	2	13	2	<1	1.26	<0.001	0.0001	<0.001	0.002	8.18	<0.001	0.678	0.03	0.338	<0.001
WR044	48	49	SLT	3.06	557	160	<1	<1	<1	<1	79	5	1	9	6	32	0.07	0.003	<0.0001	<0.001	0.002	0.16	<0.001	0.088	0.005	0.219	<0.001
WR046	55	56	SOO	6.94	262	186	<1	<1	8	8	97	6	6	22	2	3	0.11	<0.001	<0.0001	<0.001	<0.001	0.84	<0.001	1.64	0.008	0.231	<0.001
WR047	63	64	SST	6.67	178	111	<1	<1	2	2	61	11	2	16	3	2	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.144	<0.001	0.156	<0.001
WR049	76	77	OO	3.92	808	550	<1	<1	<1	<1	380	2	4	57	2	<1	10.5	0.003	0.0001	<0.001	0.007	51.1	<0.001	4.39	0.063	0.14	0.007
WR053	97	98	SOO	6.99	90	69	<1	<1	7	7	23	5	<1	6	3	4	0.04	0.002	<0.0001	<0.001	0.002	0.23	<0.001	0.018	<0.001	0.137	<0.001
WR055	99	100	OO	6.49	46	68	<1	<1	<1	<1	7	5	<1	3	3	<1	0.04	0.002	0.0002	0.001	<0.001	1.16	<0.001	0.031	<0.001	0.069	<0.001
Area E South																											
WR062	1	2		6.8	13	32	<1	<1	<1	<1	2	<1	<1	<1	4	<1	<0.10	<0.01	<0.005	<0.01	<0.01	0.14	<0.01	<0.01	<0.01	<0.01	<0.001
WR068	15	16	OO	7.34	70	222	<1	<1	10	10	19	1	<1	7	<1	2	0.22	<0.01	<0.005	<0.01	<0.01	0.78	<0.01	0.05	<0.01	0.08	<0.001
WR069	15	16	OST	6.66	23	18	<1	<1	<1	<1	<1	2	<1	<1	3	4	0.6	<0.001	<0.0001	<0.001	<0.001	0.4	<0.001	0.009	<0.001	0.046	<0.001
WR070	18	19	OO	5.69	54	48	<1	<1	<1	<1	16	3	<1	1	3	2	<0.01	<0.001	0.0002	<0.001	<0.001	<0.05	<0.001	3.39	0.008	0.176	<0.001
WR071	19	20	SST	6.47	52	41	<1	<1	<1	<1	14	2	<1	3	3	4	0.04	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.002	<0.001	0.051	<0.001
WR074	21	22	SST	6.46	295	220	<1	<1	<1	<1	114	4	2	28	2	2	<0.01	<0.001	<0.0001	<0.001	<0.001	0.05	<0.001	3.62	0.003	0.189	<0.001
WR076	23	24	SST	6.2	115	83	<1	<1	1	1	44	1	<1	10	2	2	<0.01	<0.001	<0.0001	<0.001	<0.001	0.06	<0.001	0.28	0.005	0.059	<0.001
WR078	24	25	SIDSOO	6.94	69	56	<1	<1	6	6	21	2	<1	6	2	<1	0.04	<0.001	<0.0001	<0.001	<0.001	0.19	<0.001	0.011	<0.001	0.06	<0.001
WR081	26	27	SLT	6.87	95	68	<1	<1	6	6	18	4	2	6	7	<1	0.22	0.002	<0.0001	<0.001	<0.001	1.34	<0.001	0.02	<0.001	0.142	<0.001
WR082	27	28	OO	6.73	88	309	<1	<1	3	3	20	5	<1	7	4	<1	0.16	0.006	<0.0001	<0.001	<0.001	0.98	<0.001	0.011	<0.001	0.068	<0.001
WR083	29	30	OO	7.68	109	90	<1	<1	6	6	17	1	1	8	2	<1	<0.10	<0.01	<0.005	<0.01	<0.01	<0.05	<0.01	0.02	<0.01	0.05	<0.001
WR084	29	30	SOO	6.8	50	40	<1	<1	1	1	8	5	<1	5	2	<1	0.29	0.003	<0.0001	<0.001	<0.001	1.48	<0.001	0.009	<0.001	0.053	<0.001
WR086	34	35	SLT	6.66	72	55	<1	<1	5	5	16	3	<1	3	3	10	0.93	<0.001	<0.0001	0.001	<0.001	2.74	<0.001	0.02	0.001	0.099	<0.001
WR087	34	35	SIDSOO	5.65	28	20	<1	<1	<1	<1	5	1	<1	<1	3	5	0.03	<0.001	<0.0001	<0.001	<0.001	0.27	<0.001	<0.001	<0.001	0.058	<0.001

Sample ID	Depth (m)		Analyses	pH Value	EC @ 25°C	TDS	Hydroxide Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulfate as SO4	Chloride	Calcium	Magnesium	Sodium	Potassium	Aluminium	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc	Uranium
	mFrom	mTo	Lithotype	pH Unit	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
WR089	36	37	SIDOO	7.28	76	60	<1	<1	9	9	6	6	1	6	4	<1	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.028	<0.001	0.082	<0.001
WR090	39	40	SST	6.45	40	28	<1	<1	<1	<1	10	2	<1	3	2	<1	0.12	<0.001	<0.0001	<0.001	<0.001	0.43	<0.001	0.017	<0.001	0.042	<0.001
WR093	49	50	OO	6.8	41	32	<1	<1	<1	<1	9	3	<1	3	3	1	0.04	0.067	<0.0001	<0.001	<0.001	0.3	<0.001	<0.001	0.002	0.045	<0.001
WR094	57	58	SLT	6.73	69	59	<1	<1	<1	<1	17	5	<1	6	3	<1	0.07	<0.001	<0.0001	<0.001	<0.001	0.49	<0.001	0.013	<0.001	0.091	<0.001
Area F East Pit 1																											
WR096	8	9	OST	6.64	105	520	<1	<1	1	1	9	21	<1	<1	25	<1	0.19	<0.01	<0.005	<0.01	<0.01	0.86	<0.01	<0.01	<0.01	0.04	<0.001
WR097	10	11	OST	6.82	12	24	<1	<1	4	4	1	2	<1	<1	4	<1	<0.10	<0.01	<0.005	<0.01	<0.01	2.1	<0.01	<0.01	<0.01	0.03	<0.001
WR098	11	12	SST	7.88	99	65	<1	<1	7	7	<1	11	<1	<1	18	<1	0.38	<0.01	<0.005	<0.01	<0.01	6.38	<0.01	<0.01	<0.01	0.06	<0.001
WR100	21	22	OO	7.09	121	338	<1	<1	19	19	37	3	1	9	7	4	<0.10	<0.01	<0.005	<0.01	<0.01	<0.05	<0.01	0.01	<0.01	0.13	<0.001
WR101	24	25	OO	4.1	790	2050	<1	<1	<1	<1	361	4	5	45	2	<1	7.32	<0.01	<0.005	<0.01	<0.01	84.6	<0.01	3.47	0.02	0.08	0.002
WR103	28	29	SST	4.43	496	430	<1	<1	<1	<1	243	4	8	37	5	1	5.84	<0.01	<0.005	<0.01	<0.01	19.5	<0.01	1.23	0.02	0.06	0.006
WR107	40	41	SST	7.02	92	83	<1	<1	4	4	11	<1	<1	6	4	1	<0.10	<0.01	<0.005	<0.01	<0.01	0.1	<0.01	<0.01	<0.01	0.1	<0.001
WR109	48	49	OO	6.4	41	42	<1	<1	5	5	6	8	<1	1	7	2	<0.10	<0.01	<0.005	<0.01	<0.01	<0.05	<0.01	0.02	<0.01	<0.01	<0.001
WR111	69	70	SST	7.2	27	25	<1	<1	5	5	<1	<1	<1	<1	5	<1	<0.10	<0.01	<0.005	<0.01	<0.01	7.42	<0.01	<0.01	0.03	<0.001	
Area F East Pit 2																											
WR114	3	6	CY	6.99	211	160	<1	<1	2	2	5	42	<1	6	24	10	0.18	<0.001	<0.0001	<0.001	<0.001	0.09	<0.001	0.006	<0.001	0.118	<0.001
WR118	9	12	SST	7.48	112	106	<1	<1	5	5	2	21	<1	<1	16	12	0.46	<0.001	0.0001	0.003	<0.001	0.26	<0.001	0.005	<0.001	0.054	<0.001
WR124	17	18	OO	5.84	90	80	<1	<1	5	5	34	2	<1	6	4	<1	<0.10	<0.01	<0.005	<0.01	<0.01	0.82	<0.01	0.25	<0.01	<0.01	<0.001
WR132	39	42	SST	8.05	49	54	<1	<1	6	6	4	3	<1	<1	7	8	0.62	0.005	<0.0001	0.001	<0.001	0.2	<0.001	<0.001	<0.001	0.035	<0.001
WR140	63	66	SST	8.21	31	36	<1	<1	5	5	3	2	<1	<1	5	4	3.45	0.006	<0.0001	0.005	<0.001	1.86	<0.001	0.008	<0.001	0.067	<0.001
Area F East Pit 3																											
WR145	0	3	CY	7.01	59	60	<1	<1	3	3	3	9	<1	<1	13	2	0.31	<0.001	<0.0001	0.002	0.001	0.12	<0.001	0.002	<0.001	0.079	<0.001
WR148	6	7	SOO	7.01	41	22	<1	<1	5	5	<1	<1	<1	<1	7	<1	0.38	<0.01	<0.005	<0.01	<0.01	0.56	<0.01	<0.01	<0.01	0.07	<0.001
WR153	14	15	SST	6.18	134	103	<1	<1	1	1	50	2	<1	8	3	6	0.24	<0.001	<0.0001	<0.001	0.002	0.98	<0.001	2.9	0.012	0.13	<0.001
WR154	15	18	SLT	6.69	312	234	<1	<1	2	2	24	54	<1	2	44	16	0.72	<0.001	<0.0001	0.002	0.001	0.18	<0.001	0.005	<0.001	0.11	<0.001
WR156	21	24	SLT	6.84	198	190	<1	<1	2	2	18	38	<1	<1	32	10	0.46	<0.001	<0.0001	0.001	<0.001	0.14	<0.001	<0.001	<0.001	0.079	<0.001
WR157	23	24	SST	6.35	79	54	<1	<1	1	1	29	2	<1	4	2	7	0.06	<0.001	<0.0001	<0.001	<0.001	0.28	<0.001	0.222	0.004	0.094	<0.001
WR160	30	33	SLT	6.98	180	104	<1	<1	3	3	18	29	<1	<1	28	12	1.28	<0.001	<0.0001	0.002	<0.001	0.54	<0.001	0.002	<0.001	0.107	<0.001
WR167	44	45	OO	6.9	31	32	<1	<1	2	2	1	4	<1	1	4	<1	0.14	0.002	<0.0001	<0.001	<0.001	0.98	<0.001	<0.001	<0.001	0.065	<0.001
WR168	45	48	SLT	6.48	327	300	<1	<1	3	3	117	8	4	12	21	29	0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.039	0.014	0.268	<0.001
WR170	50	51	SLT	6.16	73	50	<1	<1	1	1	24	2	<1	2	3	10	0.02	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.002	<0.001	0.103	<0.001
WR171	51	54	SLT	6.66	197	160	<1	<1	2	2	59	8	<1	4	17	22	0.14	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.018	<0.001	0.185	<0.001
WR175	60	63	SLT	6.86	190	134	<1	<1	2	2	122	6	<1	2	16	27	0.15	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.002	<0.001	0.169	<0.001
WR179	72	75	SLT	7.39	74	50	<1	<1	4	4	18	4	<1	<1	13	9	2.4	0.003	<0.0001	0.003	<0.001	0.8	<0.001	0.002	<0.001	0.048	<0.001
WR181	78	79.97	SLT	7.44	67	62	<1	<1	5	5	15	3	<1	<1	12	7	0.57	0.002	<0.0001	0.002	<0.001	0.19	<0.001	0.001	<0.001	0.036	<0.001
Area F West																											
WR183	16	17	OO	7.72	171	131	<1	<1	25	25	47	1	3	14	2	<1	<0.10	<0.01	<0.005	<0.01	<0.01	<0.05	<0.01	0.01	<0.01	0.17	<0.001
WR184	18	19	OO	6.75	18	15	<1	<1	6	6	2	<1	<1	<1	<1	6	<0.10	<0.01	<0.005	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.001
WR185	21	22	SST	6.71	157	162	<1	<1	<1	<1	54	<1	<1	9	5	9	<0.10	<0.01	<0.005	<0.01	<0.01	0.56	<0.01	0.22	<0.01	0.46	<0.001
WR187	23	24	SST	6.11	54	204	<1	<1	<1	<1	19	3	<1	5	1	2	<0.10	<0.01	<0.005	<0.01	<0.01	<0.05	<0.01	0.02	<0.01	0.08	<0.001
WR188	28	29	SST	6.94	36	25	<1	<1	4	4	<1	<1	<1	2	3	<1	<0.10	<0.01	<0.005	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	0.06	<0.001
WR190	30	31	SST	6.71	10	12	<1	<1	4	4	<1	2	<1	<1	3	<1	<0.10	<0.01	<0.005	<0.01	<0.01	<0.05	<0.01	0.01	<0.01	<0.01	<0.001
WR193	34	35		6.13	124	509	<1	<1	<1	<1	48	1	2	10	3	3	<0.10	<0.01	<0.005	<0.01	<0.01	0.17	<0.01	0.86	<0.01	0.2	<0.001
WR195	36	37	OST	7.05	129	466	<1	<1	6	6	44	2	2	12	5	<1	<0.10	<0.01	<0.005	<0.01	<0.01	<0.05	<0.01	0.03	<0.01	0.14	<0.001

Sample ID	Depth (m)		Analyses	pH Value	EC @ 25°C	TDS	Hydroxide Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulfate as SO4	Chloride	Calcium	Magnesium	Sodium	Potassium	Aluminium	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc	Uranium
	mFrom	mTo	Lithotype	pH Unit	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
WR196	38	39	SST	6.72	20	27	<1	<1	4	4	4	1	<1	<1	5	2	<0.10	<0.01	<0.005	<0.01	<0.01	<0.05	<0.01	0.04	<0.01	<0.01	<0.001
WR203	57	58	OO	7.06	100	376	<1	<1	3	3	33	2	<1	8	4	4	<0.10	<0.01	<0.005	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.001
Average				6.3	217.3	242.9	<1	<1	5.1	5.1	86.6	6.1	7.1	17.7	6.3	7.0	1.07	0.01	0.0005	0.003	0.01	10.00	0.01	1.84	0.03	0.16	0.004
Maximum				8.2	1300.0	2510.0	<1	<1	25.0	25.0	692.0	54.0	46.0	107.0	44.0	32.0	10.5	0.067	0.0035	0.007	0.049	178	0.013	22.3	0.27	0.934	0.007
Minimum				3.0	10.0	12.0	<1	<1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.01	0.001	0.0001	0.001	0.001	0.05	0.004	0.001	0.001	0.030	0.002

Appendix H

ABA, Hydrogeochemical Laboratory Certificates



Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EP1108259	Page	: 1 of 31
Client	: VDM ENVIRONMENTAL	Laboratory	: Environmental Division Perth
Contact	: EDGARDO ALARCONLEON	Contact	: Scott James
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Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 25-NOV-2011
C-O-C number	: ----	Issue Date	: 16-DEC-2011
Sampler	: ----	No. of samples received	: 97
Site	: ----	No. of samples analysed	: 97
Quote number	: EP-169-10		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
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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

- **ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.**
- **TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				34729	35536	61343	31417	62269
				29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-001	EP1108259-002	EP1108259-003	EP1108259-004	EP1108259-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.73	3.00	3.92	3.48	6.16
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	88	846	808	475	146
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	309	569	550	257	112
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	3	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	20	196	380	131	54
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	5	1	2	4	2
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	<1	2	4	13	4
Magnesium	7439-95-4	1	mg/L	7	12	57	26	11
Sodium	7440-23-5	1	mg/L	4	2	2	4	2
Potassium	7440-09-7	1	mg/L	<1	2	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.16	9.31	10.5	0.03	<0.01
Arsenic	7440-38-2	0.001	mg/L	0.006	0.004	0.003	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0004	0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	0.005	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.049	0.007	0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	0.013	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.011	1.03	4.39	0.597	1.45
Nickel	7440-02-0	0.001	mg/L	<0.001	0.050	0.063	0.002	0.011
Uranium	7440-61-1	0.001	mg/L	<0.001	0.004	0.007	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.068	0.457	0.140	0.211	0.142
Iron	7439-89-6	0.05	mg/L	0.98	51.8	51.1	0.46	0.08



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				61407	62665	31444	32307	35511
				29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-006	EP1108259-007	EP1108259-008	EP1108259-009	EP1108259-010
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	3.30	6.99	6.73	6.66	4.78
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1300	192	69	72	608
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	865	139	59	55	392
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	11	<1	5	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	11	<1	5	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	657	60	17	16	201
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	6	6	5	3	2
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	20	4	<1	<1	3
Magnesium	7439-95-4	1	mg/L	46	17	6	3	47
Sodium	7440-23-5	1	mg/L	2	2	3	3	3
Potassium	7440-09-7	1	mg/L	<1	<1	<1	10	1
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	6.12	0.02	0.07	0.93	0.37
Arsenic	7440-38-2	0.001	mg/L	0.002	0.001	<0.001	<0.001	0.003
Cadmium	7440-43-9	0.0001	mg/L	0.0004	<0.0001	<0.0001	<0.0001	0.0035
Chromium	7440-47-3	0.001	mg/L	0.004	<0.001	<0.001	0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.013	<0.001	<0.001	<0.001	0.001
Lead	7439-92-1	0.001	mg/L	0.004	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	8.54	1.17	0.013	0.020	11.8
Nickel	7440-02-0	0.001	mg/L	0.095	0.010	<0.001	0.001	0.082
Uranium	7440-61-1	0.001	mg/L	0.005	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.565	0.176	0.091	0.099	0.319
Iron	7439-89-6	0.05	mg/L	178	0.46	0.49	2.74	34.6



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				60321	31429	30484	34674	35170
				29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-011	EP1108259-012	EP1108259-013	EP1108259-014	EP1108259-015
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.67	5.77	6.45	6.46	6.20
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	210	419	40	295	115
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	149	220	28	220	83
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	<1	1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	84	161	10	114	44
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	3	9	2	4	1
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	2	3	<1	2	<1
Magnesium	7439-95-4	1	mg/L	13	41	3	28	10
Sodium	7440-23-5	1	mg/L	2	2	2	2	2
Potassium	7440-09-7	1	mg/L	<1	6	<1	2	2
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	1.26	0.02	0.12	<0.01	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.678	0.222	0.017	3.62	0.280
Nickel	7440-02-0	0.001	mg/L	0.030	0.002	<0.001	0.003	0.005
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.338	0.210	0.042	0.189	0.059
Iron	7439-89-6	0.05	mg/L	8.18	0.22	0.43	0.05	0.06



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				60015	60024	60124	61427	61872
				29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00	29-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-016	EP1108259-017	EP1108259-018	EP1108259-019	EP1108259-020
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.18	6.35	4.82	4.72	6.71
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	134	79	204	1260	243
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	103	54	150	784	187
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1	1	<1	<1	5
Total Alkalinity as CaCO3	----	1	mg/L	1	1	<1	<1	5
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	50	29	80	692	94
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	2	2	2	3	4
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	38	6
Magnesium	7439-95-4	1	mg/L	8	4	14	106	20
Sodium	7440-23-5	1	mg/L	3	2	3	2	2
Potassium	7440-09-7	1	mg/L	6	7	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.24	0.06	0.47	1.20	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
Copper	7440-50-8	0.001	mg/L	0.002	<0.001	0.010	0.001	0.002
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	2.90	0.222	0.477	8.84	4.07
Nickel	7440-02-0	0.001	mg/L	0.012	0.004	0.017	0.030	0.006
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	0.003	<0.001
Zinc	7440-66-6	0.005	mg/L	0.130	0.094	0.185	0.191	0.116
Iron	7439-89-6	0.05	mg/L	0.98	0.28	9.19	94.4	0.29



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				62436	61786	62992	31336	61640
				29-NOV-2011 12:00	29-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-021	EP1108259-022	EP1108259-023	EP1108259-024	EP1108259-025
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.94	6.45	6.49	6.87	6.75
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	262	19	46	95	348
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	186	48	68	68	248
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	8	<1	<1	6	<1
Total Alkalinity as CaCO3	----	1	mg/L	8	<1	<1	6	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	97	2	7	18	134
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	6	1	5	4	7
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	6	<1	<1	2	6
Magnesium	7439-95-4	1	mg/L	22	<1	3	6	32
Sodium	7440-23-5	1	mg/L	2	3	3	7	2
Potassium	7440-09-7	1	mg/L	3	<1	<1	<1	2
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.11	0.07	0.04	0.22	0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.002	0.002	0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0002	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	0.007	0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	1.64	0.020	0.031	0.020	4.69
Nickel	7440-02-0	0.001	mg/L	0.008	0.002	<0.001	<0.001	0.021
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.231	0.080	0.069	0.142	0.234
Iron	7439-89-6	0.05	mg/L	0.84	1.55	1.16	1.34	<0.05



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				31346	32295	30472	31436	34671
				30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-026	EP1108259-027	EP1108259-028	EP1108259-029	EP1108259-030
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.28	6.94	6.80	6.80	5.69
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	76	69	50	41	54
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	60	56	40	32	48
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	9	6	1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	9	6	1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	21	8	9	16
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	6	2	5	3	3
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	1	<1	<1	<1	<1
Magnesium	7439-95-4	1	mg/L	6	6	5	3	1
Sodium	7440-23-5	1	mg/L	4	2	2	3	3
Potassium	7440-09-7	1	mg/L	<1	<1	<1	1	2
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.04	0.29	0.04	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.003	0.067	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.028	0.011	0.009	<0.001	3.39
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	0.002	0.008
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.082	0.060	0.053	0.045	0.176
Iron	7439-89-6	0.05	mg/L	<0.05	0.19	1.48	0.30	<0.05



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				60047	61652	30458	61732	61882
				30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-031	EP1108259-032	EP1108259-033	EP1108259-034	EP1108259-035
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.90	5.42	6.66	6.99	6.29
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	31	463	23	90	56
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	32	274	18	69	44
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	2	<1	<1	7	1
Total Alkalinity as CaCO3	----	1	mg/L	2	<1	<1	7	1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1	201	<1	23	16
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	4	2	2	5	3
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	<1	5	<1	<1	<1
Magnesium	7439-95-4	1	mg/L	1	35	<1	6	4
Sodium	7440-23-5	1	mg/L	4	2	3	3	2
Potassium	7440-09-7	1	mg/L	<1	<1	4	4	<1
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.14	0.04	0.60	0.04	0.02
Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	<0.001	0.002	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	<0.001	16.5	0.009	0.018	0.145
Nickel	7440-02-0	0.001	mg/L	<0.001	0.038	<0.001	<0.001	0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.065	0.253	0.046	0.137	0.058
Iron	7439-89-6	0.05	mg/L	0.98	17.4	0.40	0.23	0.25



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				32278	33597	61558	61870	60055
				30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00
Compound	CAS Number	LOR	Unit	EP1108259-036	EP1108259-037	EP1108259-038	EP1108259-039	EP1108259-040
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.65	6.47	6.67	7.12	6.16
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	28	52	178	96	73
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	20	41	111	60	50
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	2	9	1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	2	9	1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	14	61	22	24
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	1	2	11	6	2
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	2	1	<1
Magnesium	7439-95-4	1	mg/L	<1	3	16	8	2
Sodium	7440-23-5	1	mg/L	3	3	3	2	3
Potassium	7440-09-7	1	mg/L	5	4	2	<1	10
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.03	0.04	<0.01	<0.01	0.02
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	<0.001	0.002	0.144	0.064	0.002
Nickel	7440-02-0	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
Zinc	7440-66-6	0.005	mg/L	0.058	0.051	0.156	0.100	0.103
Iron	7439-89-6	0.05	mg/L	0.27	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				60324	61608	61867	60594	----
				30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	30-NOV-2011 12:00	----
Compound	CAS Number	LOR	Unit	EP1108259-041	EP1108259-042	EP1108259-043	EP1108259-044	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	3.06	4.79	5.34	4.48	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	557	189	207	341	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	160	115	158	268	----
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	<1	<1	<1	<1	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	79	67	84	142	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	5	4	2	2	----
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	1	1	1	2	----
Magnesium	7439-95-4	1	mg/L	9	13	18	21	----
Sodium	7440-23-5	1	mg/L	6	7	3	3	----
Potassium	7440-09-7	1	mg/L	32	4	1	<1	----
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.07	0.01	0.01	1.13	----
Arsenic	7440-38-2	0.001	mg/L	0.003	<0.001	0.002	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0001	0.0002	0.0002	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	0.002	0.004	<0.001	0.002	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	0.088	0.178	1.69	2.57	----
Nickel	7440-02-0	0.001	mg/L	0.005	0.002	0.014	0.041	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	0.003	----
Zinc	7440-66-6	0.005	mg/L	0.219	0.266	0.609	0.934	----
Iron	7439-89-6	0.05	mg/L	0.16	0.58	1.63	23.5	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				34729	35536	61343	31417	62269
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-001	EP1108259-002	EP1108259-003	EP1108259-004	EP1108259-005
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.8	2.4	2.5	2.6	2.4
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	20.3	29.0	26.2	43.4
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.2	31.1	37.4	34.2	52.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	51.9	<0.5	<0.5	55.9	34.0
ANC as CaCO3	----	0.1	% CaCO3	5.3	<0.1	<0.1	5.7	3.5
Fizz Rating	----	0	Fizz Unit	2	1	1	2	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.9	2.5	3.7	5.6	5.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	184	3530	2870	1310	639
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	520	8720	15000	3770	1440
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.28	1.01	1.64	1.93	2.63
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.3	3.1	3.9	5.9	6.2
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.14	0.12	0.65	0.04	0.06



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				61407	62665	31444	32307	35511
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-006	EP1108259-007	EP1108259-008	EP1108259-009	EP1108259-010
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.1	5.0	4.9	6.9	2.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	105	<0.1	<0.1	<0.1	21.2
NAG (pH 7.0)	----	0.1	kg H2SO4/t	133	9.8	4.3	0.5	29.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	44.8	32.0	14.2	24.6
ANC as CaCO3	----	0.1	% CaCO3	<0.1	4.6	3.3	1.4	2.5
Fizz Rating	----	0	Fizz Unit	1	2	2	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	3.7	6.6	7.0	7.1	3.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	4830	781	331	326	2420
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	26000	1310	320	470	7360
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	5.35	1.10	0.56	0.13	1.62
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	3.3	6.1	7.5	5.9	4.8
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.04	0.05	0.27	0.55	0.22



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60321	31429	30484	34674	35170
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-011	EP1108259-012	EP1108259-013	EP1108259-014	EP1108259-015
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.2	2.5	5.9	5.7	3.5
NAG (pH 4.5)	----	0.1	kg H2SO4/t	67.6	54.0	<0.1	<0.1	4.2
NAG (pH 7.0)	----	0.1	kg H2SO4/t	77.9	69.0	3.0	4.5	7.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	1.4	14.2	24.5	40.0	9.0
ANC as CaCO3	----	0.1	% CaCO3	0.1	1.4	2.5	4.1	0.9
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	4.1	5.6	6.7	5.8	5.6
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	845	1570	19300	1200	496
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	5140	6020	230	3780	1470
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	2.92	3.14	0.15	0.72	0.43
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	4.7	6.0	6.3	6.0	6.2
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.42	0.04	0.53	0.24	0.45



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60015	60024	60124	61427	61872
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-016	EP1108259-017	EP1108259-018	EP1108259-019	EP1108259-020
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	5.8	4.7	2.7	2.6	4.9
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	21.9	38.7	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	1.1	2.8	29.2	51.0	7.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	21.2	11.6	<0.5	<0.5	37.4
ANC as CaCO3	----	0.1	% CaCO3	2.2	1.2	<0.1	<0.1	3.8
Fizz Rating	----	0	Fizz Unit	1	1	1	1	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.3	5.9	4.6	4.6	5.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	544	409	822	4490	1160
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	1830	850	4260	20400	2320
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.42	0.29	1.16	3.04	1.18
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.0	6.2	5.3	4.8	5.8
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.59	0.87	0.46	0.06	0.06



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				62436	61786	62992	31336	61640
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-021	EP1108259-022	EP1108259-023	EP1108259-024	EP1108259-025
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	4.9	7.2	7.3	7.0	2.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	3.0	<0.1	<0.1	<0.1	18.5
NAG (pH 7.0)	----	0.1	kg H2SO4/t	15.6	<0.1	<0.1	<0.1	38.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	19.4	<0.5	8.5	27.9	41.4
ANC as CaCO3	----	0.1	% CaCO3	2.0	<0.1	0.9	2.8	4.2
Fizz Rating	----	0	Fizz Unit	1	1	1	1	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.4	6.1	6.4	6.9	5.9
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	1130	75	252	132	554
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	2470	<100	150	430	3600
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	1.94	<0.01	0.03	0.36	2.82
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.1	6.5	7.7	7.5	7.0
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.07	0.05	0.04	0.16	0.05



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				31346	32295	30472	31436	34671
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-026	EP1108259-027	EP1108259-028	EP1108259-029	EP1108259-030
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	8.6	8.0	7.6	7.8	3.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	2.2
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	5.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	49.0	56.5	39.1	44.9	<0.5
ANC as CaCO3	----	0.1	% CaCO3	5.0	5.8	4.0	4.6	<0.1
Fizz Rating	----	0	Fizz Unit	2	2	2	2	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.4	7.2	7.4	7.1	4.1
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	57	374	226	86	170
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	150	390	160	140	1100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.07	0.07	0.07	0.04	0.12
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.5	7.6	7.6	7.6	6.4
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.10	0.13	0.26	0.04	0.04



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60047	61652	30458	61732	61882
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-031	EP1108259-032	EP1108259-033	EP1108259-034	EP1108259-035
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	8.5	2.7	6.5	8.0	6.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	11.7	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	19.6	2.0	<0.1	3.5
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	10.3	41.4	6.0	40.8	5.9
ANC as CaCO3	----	0.1	% CaCO3	1.0	4.2	0.6	4.2	0.6
Fizz Rating	----	0	Fizz Unit	1	2	1	2	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.2	5.0	6.7	7.2	5.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	408	1980	107	406	297
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	8030	<100	420	400
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.02	1.80	0.01	0.15	0.07
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.3	5.4	6.7	6.6	6.5
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.04	0.10	0.18	0.11	0.06



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				32278	33597	61558	61870	60055
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-036	EP1108259-037	EP1108259-038	EP1108259-039	EP1108259-040
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	5.8	5.4	2.6	7.9	3.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	30.5	<0.1	3.6
NAG (pH 7.0)	----	0.1	kg H2SO4/t	2.6	3.1	39.1	<0.1	7.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.1	12.4	17.3	63.0	5.4
ANC as CaCO3	----	0.1	% CaCO3	0.3	1.3	1.8	6.4	0.5
Fizz Rating	----	0	Fizz Unit	1	1	1	2	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.7	6.6	6.6	7.4	6.0
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	111	275	321	385	310
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	370	450	1450	460	630
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.03	0.18	2.18	0.13	0.24
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.8	6.7	6.5	6.7	6.7
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.08	0.45	0.04	0.08	0.64



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60324	61608	61867	60594	30309
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-041	EP1108259-042	EP1108259-043	EP1108259-044	EP1108259-045
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.1	2.6	2.7	2.5	7.4
NAG (pH 4.5)	----	0.1	kg H2SO4/t	21.5	28.2	25.4	27.8	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	33.6	33.8	34.3	34.2	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.4	7.6	7.0	6.4	1.8
ANC as CaCO3	----	0.1	% CaCO3	0.8	0.8	0.7	0.6	0.2
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.8	4.8	4.6	4.0	5.6
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	867	752	802	1360	56
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	2450	2340	3700	7090	100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	1.35	1.25	1.35	1.48	<0.01
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.6	6.3	6.0	4.6	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.78	0.10	0.37	0.03	0.04



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				30466	32285	60033	60039	60918
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-046	EP1108259-047	EP1108259-048	EP1108259-049	EP1108259-050
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	9.0	7.4	6.7	3.3	2.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	1.6	11.9
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.4	9.0	19.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	49.7	2.2	5.4	14.0	59.7
ANC as CaCO3	----	0.1	% CaCO3	5.1	0.2	0.5	1.4	6.1
Fizz Rating	----	0	Fizz Unit	2	1	1	1	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.8	5.6	5.6	6.9	5.3
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	175	70	132	743	989
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	110	<100	1680	3680
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.01	<0.01	0.48	1.08
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.03	0.05	0.02	0.02	0.04



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				61406	61527	61528	61752	61892
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-051	EP1108259-052	EP1108259-053	EP1108259-054	EP1108259-055
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.4	2.6	3.0	6.6	7.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	29.1	22.2	14.5	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	39.8	30.9	75.1	3.4	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	52.8	64.4	58.6	10.6	14.5
ANC as CaCO3	----	0.1	% CaCO3	5.4	6.6	6.0	1.1	1.5
Fizz Rating	----	0	Fizz Unit	2	2	2	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	4.8	4.5	4.9	6.7	6.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	3380	2070	4990	413	248
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	11300	8630	18400	220	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	2.00	1.59	4.05	0.09	0.03
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.02	0.02	0.03	0.11	0.04



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				62324	62330	62608	62991	32304
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-056	EP1108259-057	EP1108259-058	EP1108259-059	EP1108259-060
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	4.3	7.2	2.7	7.5	7.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	0.4	<0.1	28.2	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	1.7	<0.1	40.2	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	6.2	4.7	45.9	9.5	56.9
ANC as CaCO3	----	0.1	% CaCO3	0.6	0.5	4.7	1.0	5.8
Fizz Rating	----	0	Fizz Unit	1	1	2	1	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.2	6.7	5.4	7.0	5.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	516	624	774	327	994
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	370	<100	2140	<100	380
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.11	0.02	2.27	<0.01	0.14
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.08	0.03	0.22	0.03	0.22



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				34673	34679	62977	31352	31456
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-061	EP1108259-062	EP1108259-063	EP1108259-064	EP1108259-065
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.9	3.2	7.0	6.8	7.1
NAG (pH 4.5)	----	0.1	kg H2SO4/t	5.8	8.0	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	12.2	15.7	<0.1	0.4	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	8.5	7.9	60.5	15.1	13.5
ANC as CaCO3	----	0.1	% CaCO3	0.9	0.8	6.2	1.5	1.4
Fizz Rating	----	0	Fizz Unit	1	1	2	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.6	5.5	6.3	6.9	6.7
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	415	795	582	311	273
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	3660	2610	<100	440	290
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.59	0.83	0.16	0.11	0.13
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.24	0.39	0.07	0.56	0.35



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60058	61428	62493	62998	63003
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-066	EP1108259-067	EP1108259-068	EP1108259-069	EP1108259-070
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.8	2.8	3.3	7.0	7.0
NAG (pH 4.5)	----	0.1	kg H2SO4/t	1.3	17.1	4.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	5.8	28.9	14.8	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.6	10.8	50.2	21.7	47.2
ANC as CaCO3	----	0.1	% CaCO3	0.8	1.1	5.1	2.2	4.8
Fizz Rating	----	0	Fizz Unit	1	1	2	1	2
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.7	5.8	5.7	6.1	6.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	607	2360	914	484	500
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	1110	8640	1920	540	660
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.26	1.82	1.34	0.09	0.30
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.74	0.05	0.16	0.17	0.25



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				33587	34653	34664	61408	61541
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-071	EP1108259-072	EP1108259-073	EP1108259-074	EP1108259-075
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.4	6.2	6.7	3.5	2.5
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	2.0	17.5
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.3	0.4	0.2	6.9	28.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	<0.5	21.8	1.2
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	2.2	0.1
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.8	6.1	5.3	5.6	5.1
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	114	100	70	406	2180
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	250	160	470	1380	5830
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.01	0.03	0.02	0.51	1.22
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.03	0.08	0.04	0.49	0.04



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				61873	61881	62006	30322	31317
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-076	EP1108259-077	EP1108259-078	EP1108259-079	EP1108259-080
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.4	6.7	2.9	4.8	7.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	69.9	<0.1	5.0	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	86.6	0.4	9.8	12.5	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	11.0	67.4	24.4	68.5	24.9
ANC as CaCO3	----	0.1	% CaCO3	1.1	6.9	2.5	7.0	2.5
Fizz Rating	----	0	Fizz Unit	1	2	1	2	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	4.8	6.2	5.0	6.2	6.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	3740	692	571	916	4780
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	12100	1000	1150	1600	210
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	4.04	0.24	0.75	1.36	0.05
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.04	0.04	0.04	0.06	0.25



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				34677	60010	60287	60505	60907
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-081	EP1108259-082	EP1108259-083	EP1108259-084	EP1108259-085
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.0	5.5	5.8	2.3	2.5
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	36.8	41.0
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	27.0	6.2	46.7	45.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	5.3	2.9	5.2	<0.5	4.2
ANC as CaCO3	----	0.1	% CaCO3	0.5	0.3	0.5	<0.1	0.4
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.4	6.3	4.2	4.7	7.1
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	122	40	937	1280	319
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	150	<100	6140	8220	160
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.02	<0.01	1.84	1.80	0.02
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.12	0.04	0.95	0.11	0.10



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				60913	61453	61542	61543	61604
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-086	EP1108259-087	EP1108259-088	EP1108259-089	EP1108259-090
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.4	2.7	2.7	2.1	2.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	32.2	22.0	127	34.5
NAG (pH 7.0)	----	0.1	kg H2SO4/t	2.4	44.6	30.4	154	44.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	5.3	16.8	11.0	<0.5	14.0
ANC as CaCO3	----	0.1	% CaCO3	0.5	1.7	1.1	<0.1	1.4
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.2	6.2	4.5	3.6	5.0
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	132	997	2280	4430	1460
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	2950	8040	23800	4080
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	2.16	1.57	5.97	2.07
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.07	0.04	0.05	0.05	0.06



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				61607	61609	61758	61765	62089
				25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21	25-NOV-2011 12:21
Compound	CAS Number	LOR	Unit	EP1108259-091	EP1108259-092	EP1108259-093	EP1108259-094	EP1108259-095
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.5	2.4	6.9	7.2	2.9
NAG (pH 4.5)	----	0.1	kg H2SO4/t	37.5	41.7	<0.1	<0.1	14.5
NAG (pH 7.0)	----	0.1	kg H2SO4/t	44.9	49.6	0.2	<0.1	24.6
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.7	3.3	17.8	17.0	9.6
ANC as CaCO3	----	0.1	% CaCO3	0.8	0.3	1.8	1.7	1.0
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	4.7	3.7	6.4	7.3	5.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	959	1110	361	187	651
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	3080	4440	290	<100	2060
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	1.71	1.68	0.07	0.05	1.17
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.09	1.24	0.19	0.14	0.46



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				62312	62322	----	----	----
				25-NOV-2011 12:21	25-NOV-2011 12:21	----	----	----
Compound	CAS Number	LOR	Unit	EP1108259-096	EP1108259-097	----	----	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.0	4.6	----	----	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	----	----	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	2.7	----	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	45.6	26.3	----	----	----
ANC as CaCO3	----	0.1	% CaCO3	4.6	2.7	----	----	----
Fizz Rating	----	0	Fizz Unit	2	1	----	----	----
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.1	4.1	----	----	----
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	316	1430	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	----	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	410	1720	----	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.13	0.39	----	----	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.19	0.26	----	----	----



Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EP1108946	Page	: 1 of 26
Client	: VDM ENVIRONMENTAL	Laboratory	: Environmental Division Perth
Contact	: EDGARDO ALARCONLEON	Contact	: Scott James
Address	: 310 SELBY STREET NORTH	Address	: 10 Hod Way Malaga WA Australia 6090
	OSBORNE PARK WA, AUSTRALIA 6017		
E-mail	: edgardo.alarconleon@vdmgroup.com.au	E-mail	: perth.enviro.services@alsglobal.com
Telephone	: +61 08 9241 1800	Telephone	: +61-8-9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 15-DEC-2011
Sampler	: ----	Issue Date	: 27-JAN-2012
Site	: ----		
Quote number	: EP-169-10	No. of samples received	: 54
		No. of samples analysed	: 54

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics
Chas Tucker	Inorganic Chemist	Perth Inorganics
Cicelia Bartels	Metals Instrument Chemist	Perth Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Leanne Cooper	Acid Sulfate Soils Supervisor	Perth ASS

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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

- **ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.**
- **Ionic Balance out of acceptable limits for various samples due to analytes not quantified in this report.**
- **TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				5764	7053	6954	5759	7004
				[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-001	EP1108946-002	EP1108946-003	EP1108946-004	EP1108946-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.71	7.02	7.68	7.72	7.88
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	157	92	109	171	99
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	162	83	90	131	65
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	4	6	25	7
Total Alkalinity as CaCO3	----	1	mg/L	<1	4	6	25	7
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	54	11	17	47	<1
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	<1	<1	1	1	11
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	1	3	<1
Magnesium	7439-95-4	1	mg/L	9	6	8	14	<1
Sodium	7440-23-5	1	mg/L	5	4	2	2	18
Potassium	7440-09-7	1	mg/L	9	1	<1	<1	<1
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	0.38
Arsenic	7440-38-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	7440-43-9	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	7440-47-3	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	7440-50-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L	0.56	0.10	<0.05	<0.05	6.38
Lead	7439-92-1	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	7439-96-5	0.01	mg/L	0.22	<0.01	0.02	0.01	<0.01
Nickel	7440-02-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.01	mg/L	0.46	0.10	0.05	0.17	0.06
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	1.12	0.31	0.50	1.51	0.45



Analytical Results

Sub-Matrix: DI WATER LEACHATE

				Client sample ID	5764	7053	6954	5759	7004
				Client sampling date / time	[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]
Compound	CAS Number	LOR	Unit		EP1108946-001	EP1108946-002	EP1108946-003	EP1108946-004	EP1108946-005
EN055: Ionic Balance - Continued									
Total Cations	----	0.01	meq/L		1.19	0.69	0.80	1.39	0.78



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				6387	7084	3668	6689	5365
				[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-006	EP1108946-007	EP1108946-008	EP1108946-009	EP1108946-010
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.94	7.20	7.01	7.34	5.56
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	36	27	41	70	1040
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	25	25	22	222	2510
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
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	4	5	5	10	4
Total Alkalinity as CaCO3	----	1	mg/L	4	5	5	10	4
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	<1	19	565
ED045G: Chloride 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	<1	<1	<1	<1	33
Magnesium	7439-95-4	1	mg/L	2	<1	<1	7	107
Sodium	7440-23-5	1	mg/L	3	5	7	<1	2
Potassium	7440-09-7	1	mg/L	<1	<1	<1	2	<1
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	<0.10	0.38	0.22	<0.10
Arsenic	7440-38-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	7440-43-9	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	7440-47-3	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	7440-50-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L	<0.05	7.42	0.56	0.78	3.66
Lead	7439-92-1	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	7439-96-5	0.01	mg/L	<0.01	<0.01	<0.01	0.05	22.3
Nickel	7440-02-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.20
Zinc	7440-66-6	0.01	mg/L	0.06	0.03	0.07	0.08	0.47
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.08	0.10	0.10	0.62	11.9



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				6387	7084	3668	6689	5365
				[29-DEC-2011]	[29-DEC-2011]	[29-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-006	EP1108946-007	EP1108946-008	EP1108946-009	EP1108946-010
EN055: Ionic Balance - Continued								
Total Cations	----	0.01	meq/L	0.30	0.22	0.30	0.63	10.5
Ionic Balance	----	0.01	%	----	----	----	----	6.07



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				7014	5367	6382	7017	6393
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-011	EP1108946-012	EP1108946-013	EP1108946-014	EP1108946-015
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.09	5.72	6.11	4.10	6.13
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	121	1020	54	790	124
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	338	2490	204	2050	509
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
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	19	8	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	19	8	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	37	561	19	361	48
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	3	3	3	4	1
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	1	46	<1	5	2
Magnesium	7439-95-4	1	mg/L	9	107	5	45	10
Sodium	7440-23-5	1	mg/L	7	<1	1	2	3
Potassium	7440-09-7	1	mg/L	4	<1	2	<1	3
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	<0.10	<0.10	7.32	<0.10
Arsenic	7440-38-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	7440-43-9	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	7440-47-3	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	7440-50-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L	<0.05	0.74	<0.05	84.6	0.17
Lead	7439-92-1	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	7439-96-5	0.01	mg/L	0.01	14.9	0.02	3.47	0.86
Nickel	7440-02-0	0.01	mg/L	<0.01	0.27	<0.01	0.02	<0.01
Zinc	7440-66-6	0.01	mg/L	0.13	0.42	0.08	0.08	0.20
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	1.23	11.9	0.48	7.63	1.03



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				7014	5367	6382	7017	6393
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-011	EP1108946-012	EP1108946-013	EP1108946-014	EP1108946-015
EN055: Ionic Balance - Continued								
Total Cations	----	0.01	meq/L	1.20	11.1	0.51	4.04	1.13
Ionic Balance	----	0.01	%	----	3.58	----	30.8	----



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				6296	6999	7021	6069	6172
				[16-DEC-2011]	[16-DEC-2011]	[03-JAN-2012]	[03-JAN-2012]	[03-JAN-2012]
Compound	CAS Number	LOR	Unit	EP1108946-016	EP1108946-017	EP1108946-022	EP1108946-037	EP1108946-038
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.06	6.64	4.43	6.75	6.71
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	100	105	496	18	10
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	376	520	430	15	12
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	1	<1	6	4
Total Alkalinity as CaCO3	----	1	mg/L	3	1	<1	6	4
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	33	9	243	2	<1
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	2	21	4	<1	2
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	8	<1	<1
Magnesium	7439-95-4	1	mg/L	8	<1	37	<1	<1
Sodium	7440-23-5	1	mg/L	4	25	5	<1	3
Potassium	7440-09-7	1	mg/L	4	<1	1	6	<1
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	0.19	5.84	<0.10	<0.10
Arsenic	7440-38-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	7440-43-9	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	7440-47-3	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	7440-50-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L	<0.05	0.86	19.5	<0.05	<0.05
Lead	7439-92-1	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	7439-96-5	0.01	mg/L	<0.01	<0.01	1.23	<0.01	0.01
Nickel	7440-02-0	0.01	mg/L	<0.01	<0.01	0.02	<0.01	<0.01
Zinc	7440-66-6	0.01	mg/L	<0.01	0.04	0.06	<0.01	<0.01
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.006	<0.001	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.80	0.80	5.17	0.16	0.14



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				6296	6999	7021	6069	6172
				[16-DEC-2011]	[16-DEC-2011]	[03-JAN-2012]	[03-JAN-2012]	[03-JAN-2012]
Compound	CAS Number	LOR	Unit	EP1108946-016	EP1108946-017	EP1108946-022	EP1108946-037	EP1108946-038
EN055: Ionic Balance - Continued								
Total Cations	----	0.01	meq/L	0.93	1.09	3.69	0.15	0.13
Ionic Balance	----	0.01	%	----	----	16.8	----	----



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	6338	7061	3680	6673	6395
				[03-JAN-2012]	[03-JAN-2012]	[03-JAN-2012]	[16-DEC-2011]	[16-DEC-2011]
				EP1108946-039	EP1108946-040	EP1108946-041	EP1108946-053	EP1108946-054
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.72	6.40	5.84	6.80	7.05
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	20	41	90	13	129
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	27	42	80	32	466
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
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	4	5	5	<1	6
Total Alkalinity as CaCO3	----	1	mg/L	4	5	5	<1	6
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	6	34	2	44
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	1	8	2	<1	2
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	2
Magnesium	7439-95-4	1	mg/L	<1	1	6	<1	12
Sodium	7440-23-5	1	mg/L	5	7	4	4	5
Potassium	7440-09-7	1	mg/L	2	2	<1	<1	<1
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic	7440-38-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	7440-43-9	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	7440-47-3	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	7440-50-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.82	0.14	<0.05
Lead	7439-92-1	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	7439-96-5	0.01	mg/L	0.04	0.02	0.25	<0.01	0.03
Nickel	7440-02-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.14
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.19	0.45	0.86	0.04	1.09



Analytical Results

Sub-Matrix: DI WATER LEACHATE

				Client sample ID	6338	7061	3680	6673	6395
				Client sampling date / time	[03-JAN-2012]	[03-JAN-2012]	[03-JAN-2012]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit		EP1108946-039	EP1108946-040	EP1108946-041	EP1108946-053	EP1108946-054
EN055: Ionic Balance - Continued									
Total Cations	----	0.01	meq/L		0.27	0.44	0.67	0.17	1.30



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				4554	----	----	----	----
				[03-JAN-2012]	----	----	----	----
Compound	CAS Number	LOR	Unit	EP1108946-055	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.82	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	12	----	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	24	----	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	4	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	4	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	2	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
Sodium	7440-23-5	1	mg/L	4	----	----	----	----
Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	<0.10	----	----	----	----
Arsenic	7440-38-2	0.01	mg/L	<0.01	----	----	----	----
Cadmium	7440-43-9	0.005	mg/L	<0.005	----	----	----	----
Chromium	7440-47-3	0.01	mg/L	<0.01	----	----	----	----
Copper	7440-50-8	0.01	mg/L	<0.01	----	----	----	----
Iron	7439-89-6	0.05	mg/L	2.10	----	----	----	----
Lead	7439-92-1	0.01	mg/L	<0.01	----	----	----	----
Manganese	7439-96-5	0.01	mg/L	<0.01	----	----	----	----
Nickel	7440-02-0	0.01	mg/L	<0.01	----	----	----	----
Zinc	7440-66-6	0.01	mg/L	0.03	----	----	----	----
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.16	----	----	----	----



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

4554

Client sampling date / time

[03-JAN-2012]

Compound	CAS Number	LOR	Unit	EP1108946-055	----	----	----	----
EN055: Ionic Balance - Continued								
Total Cations	----	0.01	meq/L	0.17	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				5764	7053	6954	5759	7004
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-001	EP1108946-002	EP1108946-003	EP1108946-004	EP1108946-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	4.7	6.3	6.4	7.1	7.0
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	840	545	618	729	619
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.7	4.4	6.6	7.1	7.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	19.0	0.2	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	27.4	3.8	0.6	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.4	16.4	20.0	42.0	1.4
ANC as CaCO3	----	0.1	% CaCO3	0.2	1.7	2.0	4.3	0.1
Fizz Rating	----	0	Fizz Unit	1	1	1	2	1
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	2200	670	570	1090	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.86	0.31	0.22	0.43	<0.01
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	8.7	8.9	8.9	8.4	8.8



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				6387	7084	3668	6689	5365
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-006	EP1108946-007	EP1108946-008	EP1108946-009	EP1108946-010
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.8	6.9	6.5	7.0	5.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	179	109	92	388	4420
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.3	8.8	6.4	7.2	3.7
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	3.5
NAG (pH 7.0)	----	0.1	kg H2SO4/t	1.7	<0.1	1.5	<0.1	86.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.6	14.6	4.2	53.7	31.0
ANC as CaCO3	----	0.1	% CaCO3	0.3	1.5	0.4	5.5	3.2
Fizz Rating	----	0	Fizz Unit	1	1	1	2	2
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	140	<100	<100	250	15100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.05	<0.01	<0.01	0.07	4.16
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	8.3	8.4	8.4	8.5	5.8



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				7014	5367	6382	7017	6393
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-011	EP1108946-012	EP1108946-013	EP1108946-014	EP1108946-015
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.8	5.7	6.1	3.4	5.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	614	4350	343	3590	806
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	4.9	4.3	4.2	2.3	6.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	0.9	0.8	61.0	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	1.8	79.2	2.7	72.6	0.3
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	12.3	26.7	2.6	<0.5	2.6
ANC as CaCO3	----	0.1	% CaCO3	1.2	2.7	0.3	<0.1	0.3
Fizz Rating	----	0	Fizz Unit	2	1	1	1	1
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	850	14100	410	14100	1030
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.33	4.09	0.11	2.71	0.13
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.2	5.6	6.9	4.1	6.0



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				6296	6999	7013	6339	6699
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-016	EP1108946-017	EP1108946-018	EP1108946-019	EP1108946-020
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.4	6.7	4.0	5.8	6.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	585	759	2210	77	745
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.9	8.3	2.4	6.6	4.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	42.2	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.4	<0.1	49.3	0.2	4.2
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	14.6	1.0	7.9	<0.5	7.9
ANC as CaCO3	----	0.1	% CaCO3	1.5	0.1	0.8	<0.1	0.8
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	----	----	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	640	160	7340	130	1180
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.06	0.02	2.16	<0.01	0.34
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.8	6.8	----	----	----



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				7019	7021	7022	7023	6175
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-021	EP1108946-022	EP1108946-023	EP1108946-024	EP1108946-025
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	3.7	3.6	6.4	4.9	6.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	2950	2800	2630	1020	47
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.5	2.4	2.4	2.6	6.7
NAG (pH 4.5)	----	0.1	kg H2SO4/t	43.0	52.9	43.9	15.9	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	54.7	68.7	54.5	20.1	0.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	<0.5	5.2	1.8
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	0.5	0.2
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	----	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	9080	10100	12800	1900	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	2.28	2.65	2.16	0.74	<0.01
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	4.4	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				6961	4978	6167	5787	7056
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-026	EP1108946-027	EP1108946-028	EP1108946-029	EP1108946-030
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.8	3.9	5.7	7.9	7.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	227	4920	54	248	381
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.5	4.3	6.0	8.0	7.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	0.7	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	95.5	0.7	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	30.2	13.6	<0.5	12.9	9.0
ANC as CaCO3	----	0.1	% CaCO3	3.1	1.4	<0.1	1.3	0.9
Fizz Rating	----	0	Fizz Unit	2	1	1	1	1
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	19100	<100	<100	310
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.02	4.06	<0.01	<0.01	0.12



Analytical Results

Sub-Matrix: SOIL

				Client sample ID	6971	6293	6294	7069	6314
				Client sampling date / time	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit		EP1108946-031	EP1108946-032	EP1108946-033	EP1108946-034	EP1108946-035
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		6.7	3.8	5.2	6.1	7.3
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		----	4.88	----	----	7.27
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		335	5830	1330	120	208
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		----	1550	----	----	44
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit		7.3	2.5	5.4	6.5	7.4
NAG (pH 4.5)	----	0.1	kg H2SO4/t		<0.1	45.0	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t		<0.1	58.5	0.9	1.1	<0.1
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		17.7	15.2	8.8	3.0	10.5
ANC as CaCO3	----	0.1	% CaCO3		1.8	1.6	0.9	0.3	1.1
Fizz Rating	----	0	Fizz Unit		1	1	1	1	1
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L		----	1570	----	----	68
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		<1.0	<1.0	<1.0	<1.0	<1.0
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		----	2	----	----	12
Total Alkalinity as CaCO3	----	1	mg/L		----	2	----	----	12
ED040: Sulfur as SO4 2-									
Sulfate as SO4 2-	14808-79-8	100	mg/kg		440	25800	2120	<100	180
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	999	----	----	6
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.13	3.35	0.34	0.01	0.07
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		----	3	----	----	2
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	17	----	----	1
Magnesium	7439-95-4	1	mg/L		----	92	----	----	3



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				6971	6293	6294	7069	6314
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-031	EP1108946-032	EP1108946-033	EP1108946-034	EP1108946-035
ED093F: Dissolved Major Cations - Continued								
Sodium	7440-23-5	1	mg/L	----	4	----	----	5
Potassium	7440-09-7	1	mg/L	----	2	----	----	2
EG005W: Water Leachable Metals by ICPAES								
Aluminium	7429-90-5	0.10	mg/L	----	0.10	----	----	<0.10
Arsenic	7440-38-2	0.01	mg/L	----	<0.01	----	----	<0.01
Cadmium	7440-43-9	0.005	mg/L	----	<0.005	----	----	<0.005
Chromium	7440-47-3	0.01	mg/L	----	<0.01	----	----	<0.01
Copper	7440-50-8	0.01	mg/L	----	<0.01	----	----	<0.01
Iron	7439-89-6	0.05	mg/L	----	245	----	----	0.62
Lead	7439-92-1	0.01	mg/L	----	<0.01	----	----	<0.01
Manganese	7439-96-5	0.01	mg/L	----	10.1	----	----	<0.01
Nickel	7440-02-0	0.01	mg/L	----	0.07	----	----	<0.01
Zinc	7440-66-6	0.01	mg/L	----	<0.01	----	----	0.03
EG020W: Water Leachable Metals by ICP-MS								
Uranium	7440-61-1	0.001	mg/L	----	<0.001	----	----	<0.001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	----	17.4	----	----	0.42
Total Cations	----	0.01	meq/L	----	8.65	----	----	0.57
Ionic Balance	----	0.01	%	----	33.7	----	----	----
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	5.0	----	----	7.5



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				6069	6172	6338	7061	3680
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-037	EP1108946-038	EP1108946-039	EP1108946-040	EP1108946-041
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.1	5.8	5.5	5.0	4.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	115	89	96	276	457
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.5	6.6	7.5	5.6	3.0
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	2.0
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	0.6	<0.1	1.6	6.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.7	<0.5	<0.5	<0.5	1.2
ANC as CaCO3	----	0.1	% CaCO3	0.3	<0.1	<0.1	<0.1	0.1
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	220	<100	1100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	0.01	0.02	0.31
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.4	7.6	7.5	7.2	5.8



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				3661	3672	4165	4172	4573
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-042	EP1108946-043	EP1108946-044	EP1108946-045	EP1108946-046
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.6	6.2	4.7	4.6	3.7
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	62	64	66	72	574
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.7	6.7	5.5	4.9	3.3
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	1.2
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.5	0.7	5.5	5.9	6.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	3.2	<0.5	<0.5	3.0
ANC as CaCO3	----	0.1	% CaCO3	<0.1	0.3	<0.1	<0.1	0.3
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	<100	100	990
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	<0.01	0.14



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				5963	6061	6081	6163	6332
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]
Compound	CAS Number	LOR	Unit	EP1108946-047	EP1108946-048	EP1108946-049	EP1108946-050	EP1108946-051
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.7	6.4	6.3	5.6	5.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	340	128	67	59	102
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.1	6.2	5.6	5.4	6.3
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	3.5	3.1	7.5	7.2	0.3
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	53.8	1.8	<0.5	1.2	0.9
ANC as CaCO3	----	0.1	% CaCO3	5.5	0.2	<0.1	0.1	<0.1
Fizz Rating	----	0	Fizz Unit	2	1	1	1	1
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	250	<100	<100	260
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.06	0.02	0.01	<0.01	0.03



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				6340	6673	6395	4554	----
				[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	[16-DEC-2011]	----
Compound	CAS Number	LOR	Unit	EP1108946-052	EP1108946-053	EP1108946-054	EP1108946-055	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.6	5.4	6.3	6.3	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	60	57	647	84	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.0	5.5	4.6	6.4	----
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	0.2	4.6	2.1	1.4	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	0.9	8.2	<0.5	----
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	0.8	<0.1	----
Fizz Rating	----	0	Fizz Unit	1	1	1	1	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	----	----	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	160	890	<100	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.02	0.35	<0.01	----
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	6.8	6.8	7.2	----



Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EP1201090	Page	: 1 of 16
Client	: VDM ENVIRONMENTAL	Laboratory	: Environmental Division Perth
Contact	: EDGARDO ALARCONLEON	Contact	: Scott James
Address	: 310 SELBY STREET NORTH OSBORNE PARK WA, AUSTRALIA 6017	Address	: 10 Hod Way Malaga WA Australia 6090
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Telephone	: +61 08 9241 1800	Telephone	: +61-8-9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 14-FEB-2012
Sampler	: ----	Issue Date	: 28-MAR-2012
Site	: ----		
Quote number	: EP-169-10	No. of samples received	: 53
		No. of samples analysed	: 53

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics
Chas Tucker	Inorganic Chemist	Perth Inorganics
Cicelia Bartels	Metals Instrument Chemist	Perth Inorganics
Daniel Fisher	Inorganics Analyst	Perth Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Leanne Cooper	Acid Sulfate Soils Supervisor	Perth ASS

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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

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



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				WR144400	WR144503	WR144509	WR144415	WR144421
				28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00
Compound	CAS Number	LOR	Unit	EP1201090-001	EP1201090-004	EP1201090-008	EP1201090-011	EP1201090-015
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.01	6.99	7.48	6.69	6.84
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	59	211	112	312	198
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	60	160	106	234	190
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	2	5	2	2
Total Alkalinity as CaCO3	----	1	mg/L	3	2	5	2	2
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	5	2	24	18
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	9	42	21	54	38
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	<1
Magnesium	7439-95-4	1	mg/L	<1	6	<1	2	<1
Sodium	7440-23-5	1	mg/L	13	24	16	44	32
Potassium	7440-09-7	1	mg/L	2	10	12	16	10
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.31	0.18	0.46	0.72	0.46
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	0.002	<0.001	0.003	0.002	0.001
Copper	7440-50-8	0.001	mg/L	0.001	<0.001	<0.001	0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.002	0.006	0.005	0.005	<0.001
Nickel	7440-02-0	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
Zinc	7440-66-6	0.005	mg/L	0.079	0.118	0.054	0.110	0.079
Iron	7439-89-6	0.05	mg/L	0.12	0.09	0.26	0.18	0.14
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.38	1.33	0.73	2.06	1.49
Total Cations	----	0.01	meq/L	0.62	1.79	1.00	2.49	1.65



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				WR144430	WR144539	WR144445	WR144451	WR144460
				28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00
Compound	CAS Number	LOR	Unit	EP1201090-021	EP1201090-028	EP1201090-031	EP1201090-035	EP1201090-041
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.98	8.05	6.48	6.66	6.86
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	180	49	327	197	190
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	104	54	300	160	134
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	6	3	2	2
Total Alkalinity as CaCO3	----	1	mg/L	3	6	3	2	2
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	18	4	117	59	122
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	29	3	8	8	6
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	4	<1	<1
Magnesium	7439-95-4	1	mg/L	<1	<1	12	4	2
Sodium	7440-23-5	1	mg/L	28	7	21	17	16
Potassium	7440-09-7	1	mg/L	12	8	29	22	27
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	1.28	0.62	0.05	0.14	0.15
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.005	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	0.002	0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.002	<0.001	0.039	0.018	0.002
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.014	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.107	0.035	0.268	0.185	0.169
Iron	7439-89-6	0.05	mg/L	0.54	0.20	<0.05	<0.05	<0.05
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	1.25	0.29	2.72	1.49	2.75
Total Cations	----	0.01	meq/L	1.52	0.51	2.84	1.63	1.55



Analytical Results

Sub-Matrix: DI WATER LEACHATE

Client sample ID

Client sampling date / time

				WR144563	WR144472	WR144478	----	----
				28-MAR-2012 12:00	28-MAR-2012 12:00	28-MAR-2012 12:00	----	----
Compound	CAS Number	LOR	Unit	EP1201090-044	EP1201090-049	EP1201090-053	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.21	7.39	7.44	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	31	74	67	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	36	50	62	----	----
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	5	4	5	----	----
Total Alkalinity as CaCO3	----	1	mg/L	5	4	5	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	18	15	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	2	4	3	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	----	----
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	----	----
Sodium	7440-23-5	1	mg/L	5	13	12	----	----
Potassium	7440-09-7	1	mg/L	4	9	7	----	----
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	3.45	2.40	0.57	----	----
Arsenic	7440-38-2	0.001	mg/L	0.006	0.003	0.002	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	0.005	0.003	0.002	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L	0.008	0.002	0.001	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	0.067	0.048	0.036	----	----
Iron	7439-89-6	0.05	mg/L	1.86	0.80	0.19	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.22	0.57	0.50	----	----
Total Cations	----	0.01	meq/L	0.32	0.80	0.70	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144400	WR144500	WR144403	WR144503	WR144406
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-001	EP1201090-002	EP1201090-003	EP1201090-004	EP1201090-005
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.6	7.4	8.9	7.9	8.3
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	3.0	<0.1	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.6	4.2	6.3	5.5	2.1
ANC as CaCO3	----	0.1	% CaCO3	0.4	0.4	0.6	0.6	0.2
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.0	7.0	7.9	7.4	7.0
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	390	370	1190	1260	2240
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	130	<100	220	140	630
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	<0.01	0.02
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.7	----	----	7.1	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144506	WR144409	WR144509	WR144412	WR144512
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-006	EP1201090-007	EP1201090-008	EP1201090-009	EP1201090-010
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.7	5.8	7.2	6.1	6.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	11.2	<0.1	5.1	1.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	5.3	2.6	5.4	2.7	11.1
ANC as CaCO3	----	0.1	% CaCO3	0.5	0.3	0.6	0.3	1.1
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.2	6.6	7.6	6.5	7.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	1270	2750	751	2200	491
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	720	<100	830	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.02	<0.01	0.04	<0.01
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	----	7.8	----	----



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				WR144415	WR144515	WR144418	WR144518	WR144421
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-011	EP1201090-012	EP1201090-013	EP1201090-014	EP1201090-015
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	5.8	6.6	5.8	3.0	5.9
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	8.6	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	9.6	2.2	9.6	17.9	12.0
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.1	6.5	2.4	12.9	3.2
ANC as CaCO3	----	0.1	% CaCO3	0.3	0.7	0.2	1.3	0.3
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.4	7.6	6.3	7.0	6.5
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	1100	425	1480	724	741
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	850	200	940	910	800
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.24	0.01	0.26	0.67	0.21
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.2	----	----	----	7.2



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144521	WR144424	WR144524	WR144427	WR144527
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-016	EP1201090-017	EP1201090-018	EP1201090-019	EP1201090-020
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.4	5.9	3.1	6.0	4.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	3.1	<0.1	7.9	<0.1	0.9
NAG (pH 7.0)	----	0.1	kg H2SO4/t	10.1	10.8	17.4	13.3	8.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	9.4	2.5	19.1	1.9	30.8
ANC as CaCO3	----	0.1	% CaCO3	1.0	0.2	2.0	0.2	3.1
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.8	6.5	7.6	7.3	7.5
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	396	1090	762	1060	1100
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	310	840	1060	2540	2140
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.42	0.24	1.02	0.76	1.29



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144430	WR144530	WR144433	WR144533	WR144436
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-021	EP1201090-022	EP1201090-023	EP1201090-024	EP1201090-025
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.0	3.0	5.5	3.9	2.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	9.5	<0.1	1.8	13.3
NAG (pH 7.0)	----	0.1	kg H2SO4/t	10.5	18.4	9.4	7.7	19.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	0.8	31.7	1.7	20.3	8.6
ANC as CaCO3	----	0.1	% CaCO3	<0.1	3.2	0.2	2.1	0.9
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.5	7.1	6.7	7.2	5.9
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	934	1620	903	641	1200
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	1050	3110	780	740	2240
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.21	1.59	0.08	0.52	0.79
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	7.2	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144536	WR144439	WR144539	WR144442	WR144542
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-026	EP1201090-027	EP1201090-028	EP1201090-029	EP1201090-030
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.5	2.8	7.0	2.8	7.3
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	13.2	<0.1	24.9	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.4	19.9	0.2	31.4	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	12.2	6.2	14.5	5.9	14.6
ANC as CaCO3	----	0.1	% CaCO3	1.2	0.6	1.5	0.6	1.5
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.5	7.3	7.8	6.6	7.8
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	283	831	242	1580	299
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	160	940	110	3110	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.13	0.79	0.11	1.29	0.08
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	----	8.2	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144445	WR144545	WR144448	WR144548	WR144451
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-031	EP1201090-032	EP1201090-033	EP1201090-034	EP1201090-035
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.4	7.2	2.7	5.0	2.7
NAG (pH 4.5)	----	0.1	kg H2SO4/t	53.9	<0.1	26.1	<0.1	16.8
NAG (pH 7.0)	----	0.1	kg H2SO4/t	63.1	<0.1	33.9	3.8	22.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	4.8	19.2	5.9	10.0	14.4
ANC as CaCO3	----	0.1	% CaCO3	0.5	2.0	0.6	1.0	1.5
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	5.8	7.6	6.1	7.9	6.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	1700	104	1200	275	1000
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	5350	140	2340	120	1880
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	2.39	0.10	1.29	0.14	0.92
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.8	----	----	----	6.9



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144551	WR144454	WR144554	WR144457	WR144557
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-036	EP1201090-037	EP1201090-038	EP1201090-039	EP1201090-040
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.7	3.1	6.8	2.8	6.5
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	13.6	<0.1	13.5	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	23.2	0.2	20.6	0.3
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	21.7	8.8	11.7	6.4	7.5
ANC as CaCO3	----	0.1	% CaCO3	2.2	0.9	1.2	0.6	0.8
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.6	6.6	7.6	6.5	7.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	353	890	321	820	359
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	320	2170	250	1460	290
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.11	0.93	0.08	0.82	0.14



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				WR144460	WR144560	WR144463	WR144563	WR144466
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-041	EP1201090-042	EP1201090-043	EP1201090-044	EP1201090-045
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.5	6.0	2.8	5.2	2.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	47.1	<0.1	19.6	<0.1	14.3
NAG (pH 7.0)	----	0.1	kg H2SO4/t	57.2	0.8	26.7	2.7	19.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.8	8.3	4.8	8.8	7.2
ANC as CaCO3	----	0.1	% CaCO3	0.3	0.8	0.5	0.9	0.7
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	6.4	7.8	7.2	7.7	7.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	1110	237	1050	337	680
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	2140	140	970	<100	960
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	2.16	0.08	1.10	0.10	0.85
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	6.9	----	----	8.4	----



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				WR144566	WR144469	WR144569	WR144472	WR144572
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00
Compound	CAS Number	LOR	Unit	EP1201090-046	EP1201090-047	EP1201090-048	EP1201090-049	EP1201090-050
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.6	3.4	7.0	3.3	7.1
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	4.0	<0.1	4.0	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.2	9.2	<0.1	8.4	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	14.3	1.4	11.2	8.3	17.0
ANC as CaCO3	----	0.1	% CaCO3	1.4	0.1	1.1	0.8	1.7
Fizz Rating	----	0	Fizz Unit	1	1	1	1	1
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	8.0	7.4	8.1	7.5	7.4
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	206	578	174	488	447
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	580	<100	560	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.12	0.39	0.10	0.42	0.09
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	----	----	7.9	----



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				WR144475	WR144575	WR144478	----	----
				06-FEB-2012 15:00	06-FEB-2012 15:00	06-FEB-2012 15:00	----	----
Compound	CAS Number	LOR	Unit	EP1201090-051	EP1201090-052	EP1201090-053	----	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.1	6.9	4.2	----	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t	6.4	<0.1	0.5	----	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t	11.8	<0.1	3.7	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.0	13.5	10.1	----	----
ANC as CaCO3	----	0.1	% CaCO3	0.7	1.4	1.0	----	----
Fizz Rating	----	0	Fizz Unit	1	1	1	----	----
EA031: pH (saturated paste)								
pH (Saturated Paste)	----	0.1	pH Unit	7.4	7.7	7.6	----	----
EA032: Electrical Conductivity (saturated paste)								
Electrical Conductivity (Saturated Paste)	----	1	µS/cm	496	209	380	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	620	120	380	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.54	0.10	0.22	----	----
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	----	7.8	----	----

Appendix I

ABA Classification

VDM Sample ID	Depth (m)	Lithotype	ABA Classification
Area E East			
WR001	12 - 13	Sandstone	NAF
WR002	19 - 20	Oolite	PAF
WR003	19 - 20	Sandstone	PAF
WR004	19 - 20	Oolite	NAF
WR005	20 - 21	Oolite	PAF
WR006	20 - 21	Oolitic sandstone	PAF
WR007	20 - 21	Sandstone	PAF
WR008	20 - 21	Oolite	NAF
WR009	21 - 22	Clay	NAF
WR010	21 - 22	Oolite	PAF
WR011	21 - 22	Sandy oolite	NAF
WR012	22 - 23	Sandstone	PAF
WR013	22 - 23	Sandstone	NAF
WR014	23 - 24	Sandstone	NAF
WR015	24 - 25	Oolite	NAF
WR016	25 - 26	Sandy oolite	NAF
WR017	25 - 26	Sandstone	PAF
WR018	26 - 27	Sandy oolite	PAF
WR019	28 - 29	Oolite	NAF
WR020	29 - 30	Sandstone	PAF
WR021	30 - 31	Oolite	NAF
WR022	31 - 32	Sandstone	PAF
WR023	32 - 33	Sandy oolite	NAF
WR024	32 - 33	Sandy oolite	NAF
WR025	32 - 33	Sandstone	PAF
WR026	33 - 34	Sandy oolite	NAF
WR027	33 - 34	Sandstone	PAF
WR028	33 - 34	Sandstone	PAF
WR029	34 - 35	Sandy oolite	PAF
WR030	34 - 35	Sandstone	PAF
WR031	35 - 36	Sandstone	PAF
WR032	36 - 37	Siltstone	PAF
WR033	36 - 37	Sandstone	PAF
WR034	37 - 38	Oolite	PAF
WR035	38 - 39	Oolite	PAF
WR036	38 - 39	Oolite	PAF
WR037	38 - 39	Sandstone	PAF
WR038	39 - 40	Siltstone	PAF
WR039	40 - 41	Siltstone	PAF
WR040	41 - 42	Siderite oolite	NAF
WR041	41 - 42	Oolite	PAF
WR042	43 - 44	Oolite	NAF
WR043	45 - 46	Siltstone	PAF
WR044	48 - 49	Siltstone	PAF
WR045	48 - 49	Oolite	PAF
WR046	55 - 56	Sandy oolite	PAF
WR047	63 - 64	Sandstone	PAF

VDM Sample ID	Depth (m)	Lithotype	ABA Classification
WR048	67 - 68	Sandstone	PAF
WR049	76 - 77	Oolite	PAF
WR050	84 - 85	Siderite oolite	NAF
WR051	88 - 89	Siltstone	NAF
WR052	92 - 93	Sandstone	PAF
WR053	97 - 98	Sandy oolite	NAF
WR054	98 - 99	Oolite	NAF
WR055	99 - 100	Oolite	NAF
WR056	105 - 106	Siltstone	NAF
WR057	108 - 109	Siltstone	NAF
WR058	115 - 116	Oolite	NAF
WR059	121 - 122	Sandstone	NAF
WR060	128 - 129	Sandstone	NAF
Area E South			
WR061	0 - 1	Sandy oolite	PAF
WR062	1 - 2	Sandstone	NAF
WR063	6 - 7	Oolite	NAF
WR064	9 - 10	Sandy oolite	NAF
WR065	9 - 10	Sandstone	NAF
WR066	11 - 12	Sandy oolite	NAF
WR067	14 - 15	Oolite	NAF
WR068	15 - 16	Oolite	NAF
WR069	15 - 16	Oolitic sandstone	NAF
WR070	18 - 19	Oolite	PAF
WR071	19 - 20	Sandstone	NAF
WR072	19 - 20	Sandstone	NAF
WR073	20 - 21	Oolitic sandstone	PAF
WR074	21 - 22	Sandstone	NAF
WR075	22 - 23	Sandstone	NAF
WR076	23 - 24	Sandstone	PAF
WR077	23 - 24	Oolite	NAF
WR078	24 - 25	Strongly sideritic sandy oolite	NAF
WR079	24 - 25	Oolitic sandstone	PAF
WR080	25 - 26	Sandstone	PAF
WR081	26 - 27	Siltstone	NAF
WR082	27 - 28	Oolite	NAF
WR083	29 - 30	Oolite	NAF
WR084	29 - 30	Sandy oolite	NAF
WR085	31 - 32	Oolitic sandstone	NAF
WR086	34 - 35	Siltstone	NAF
WR087	34 - 35	Strongly sideritic sandy oolite	NAF
WR088	36 - 37	Sandstone	NAF
WR089	36 - 37	Siderite oolite	NAF
WR090	39 - 40	Sandstone	NAF
WR091	40 - 41	Siltstone	NAF
WR092	46 - 47	Sandstone	NAF
WR093	49 - 50	Oolite	NAF
WR094	57 - 58	Siltstone	NAF

VDM Sample ID	Depth (m)	Lithotype	ABA Classification
WR095	67 - 68	Siltstone	NAF
Area F East Pit 1			
WR096	8 - 9	Oolitic sandstone	NAF
WR097	10 - 11	Oolite	NAF
WR098	11 - 12	Sandstone	NAF
WR099	20 - 21	Oolite	PAF
WR100	21 - 22	Oolite	NAF
WR101	24 - 25	Oolite	PAF
WR102	26 - 27	Sandstone	PAF
WR103	28 - 29	Sandstone	PAF
WR104	29 - 30	Oolite	PAF
WR105	29 - 30	Sandstone	PAF
WR106	30 - 31	Sandstone	PAF
WR107	40 - 41	Sandstone	NAF
WR108	43 - 44	Sandstone	NAF
WR109	48 - 49	Oolite	PAF
WR110	56 - 57	Oolite	NAF
WR111	69 - 70	Sandstone	NAF
Area F East Pit 2			
WR112	0 - 1	Sandy oolite	NAF
WR113	0 - 3	Clay	NAF
WR114	3 - 6	Clay	NAF
WR115	4 - 5	Sandstone	NAF
WR116	4 - 5	Sandstone	NAF
WR117	6 - 9	Clay	NAF
WR118	9 - 12	Sandstone	NAF
WR119	11 - 12	Oolitic sandstone	NAF
WR120	11 - 12	Oolitic sandstone	NAF
WR121	12 - 15	Sandstone	NAF
WR122	15 - 16	Oolite	NAF
WR123	15 - 18	Sandstone	NAF
WR124	17 - 18	Oolite	PAF
WR125	18 - 21	Sandstone	PAF
WR126	21 - 24	Sandstone	PAF
WR127	24 - 27	Sandstone	PAF
WR128	27 - 30	Sandstone	PAF
WR129	30 - 33	Sandstone	PAF
WR130	33 - 36	Sandstone	NAF
WR131	36 - 39	Sandstone	NAF
WR132	39 - 42	Sandstone	NAF
WR133	42 - 45	Sandstone	NAF
WR134	45 - 48	Sandstone	NAF
WR135	48 - 51	Sandstone	NAF
WR136	51 - 54	Sandstone	NAF
WR137	54 - 57	Sandstone	NAF
WR138	57 - 60	Sandstone	NAF
WR139	60 - 63	Sandstone	NAF
WR140	63 - 66	Sandstone	NAF

VDM Sample ID	Depth (m)	Lithotype	ABA Classification
WR141	66 - 69	Sandstone	NAF
WR142	69 - 72	Sandstone	NAF
WR143	72 - 75	Sandstone	NAF
WR144	75 - 78	Sandstone	NAF
Area F East Pit 3			
WR145	0 - 3	Clay	NAF
WR146	3 - 6	Clay	NAF
WR147	6 - 9	Clay	NAF
WR148	6 - 7	Sandy oolite	NAF
WR149	9 - 12	Siltstone	NAF
WR150	9 - 10	Sandstone	NAF
WR151	12 - 15	Siltstone	NAF
WR152	12 - 13	Sandstone	NAF
WR153	14 - 15	Sandstone	NAF
WR154	15 - 18	Siltstone	PAF
WR155	18 - 21	Siltstone	PAF
WR156	21 - 24	Siltstone	PAF
WR157	23 - 24	Sandstone	NAF
WR158	24 - 27	Siltstone	PAF
WR159	27 - 30	Siltstone	PAF
WR160	30 - 33	Siltstone	PAF
WR161	30 - 31	Oolite	NAF
WR162	33 - 36	Siltstone	PAF
WR163	36 - 37	Oolite	NAF
WR164	36 - 39	Siltstone	PAF
WR165	39 - 42	Siltstone	PAF
WR166	42 - 45	Siltstone	PAF
WR167	44 - 45	Oolite	NAF
WR168	45 - 48	Siltstone	PAF
WR169	48 - 51	Siltstone	PAF
WR170	50 - 51	Siltstone	PAF
WR171	51 - 54	Siltstone	PAF
WR172	53 - 54	Siltstone	NAF
WR173	54 - 57	Siltstone	PAF
WR174	57 - 60	Siltstone	PAF
WR175	60 - 63	Siltstone	PAF
WR176	63 - 66	Siltstone	PAF
WR177	66 - 69	Siltstone	PAF
WR178	69 - 72	Siltstone	PAF
WR179	72 - 75	Siltstone	PAF
WR180	75 - 78	Siltstone	PAF
WR181	78 - 79.97	Siltstone	NAF
Area F West			
WR182	10 - 11	Sandstone	NAF
WR183	16 - 17	Oolite	NAF
WR184	18 - 19	Oolite	NAF
WR185	21 - 22	Sandstone	PAF
WR186	21 - 22	Sandy oolite	NAF

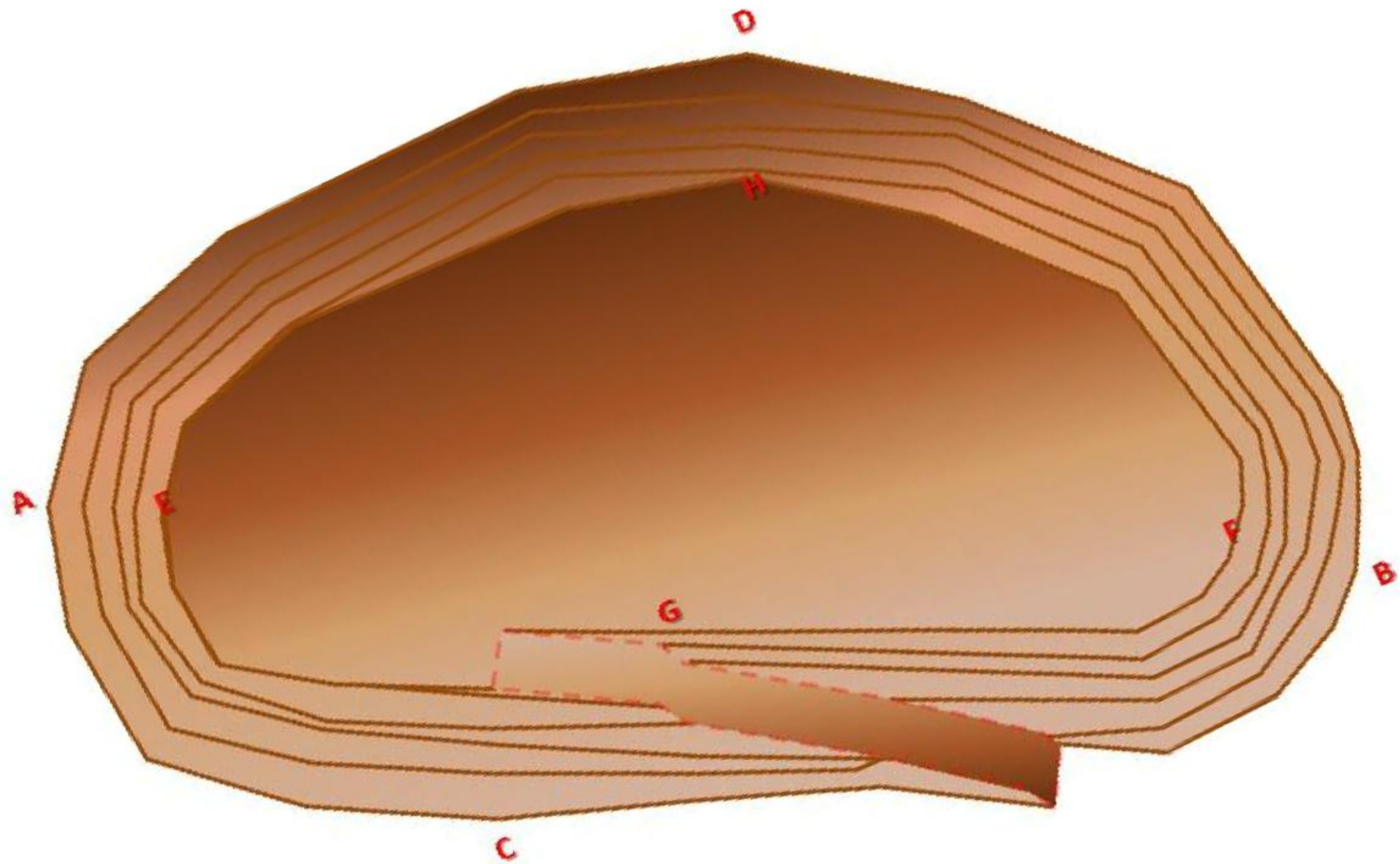
VDM Sample ID	Depth (m)	Lithotype	ABA Classification
WR187	23 - 24	Sandstone	PAF
WR188	28 - 29	Siltstone	NAF
WR189	28 - 29	Sandstone	NAF
WR190	30 - 31	Sandstone	NAF
WR191	32 - 33	Oolite	NAF
WR192	33 - 34	Oolite	NAF
WR193	34 - 35	Oolite	PAF
WR194	34 - 35	Siderite oolite	NAF
WR195	36 - 37	Oolitic sandstone	PAF
WR196	38 - 39	Sandstone	NAF
WR197	39 - 40	Siltstone	NAF
WR198	40 - 41	Sandstone	NAF
WR199	40 - 41	Sandy oolite	NAF
WR200	42 - 43	Oolite	NAF
WR201	54 - 55	Oolite	PAF
WR202	55 - 56	Oolite	NAF
WR203	57 - 58	Oolite	NAF
WR204	57 - 58	Sandstone	NAF

Appendix J

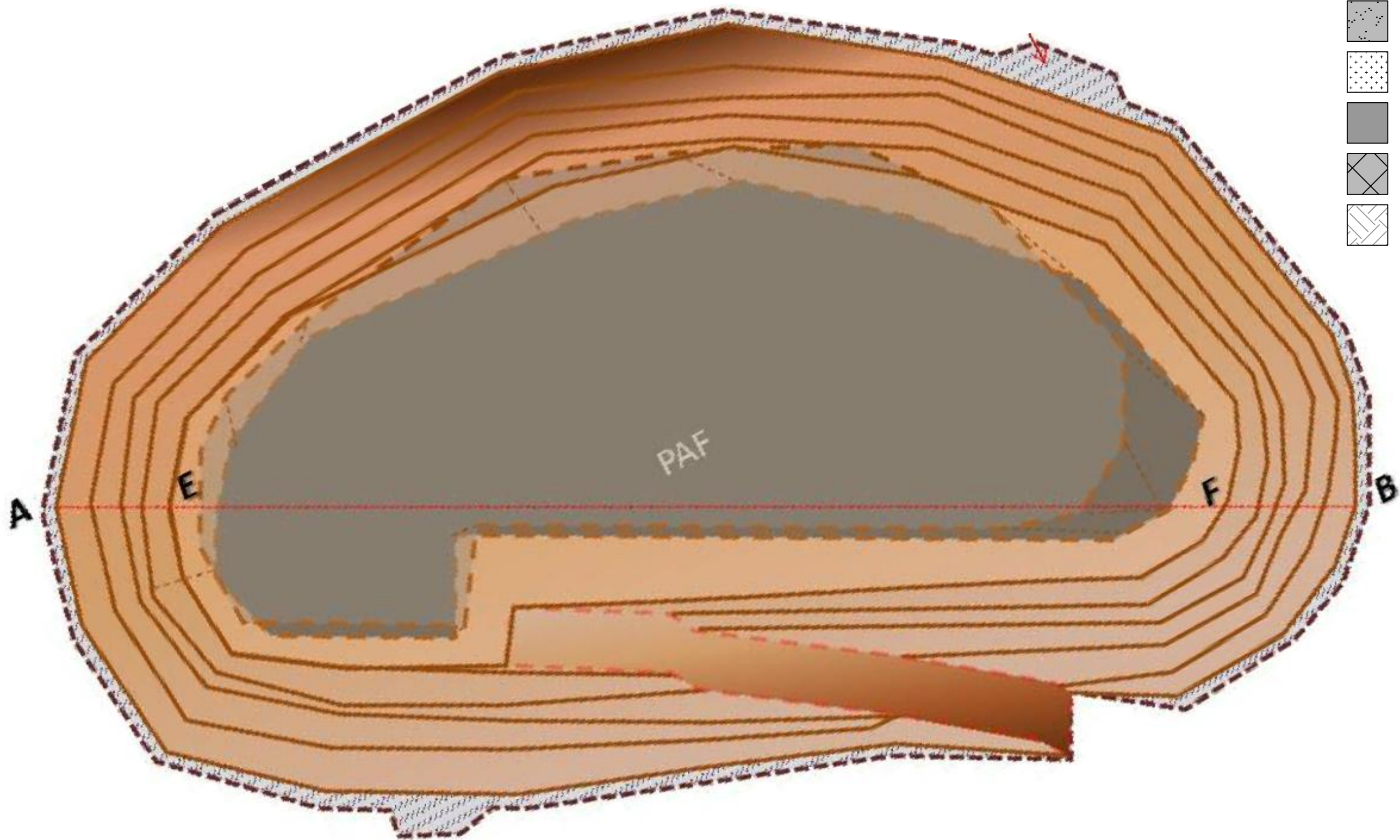
Detailed PAF Encapsulation Methodology (Option B)

LEGEND:

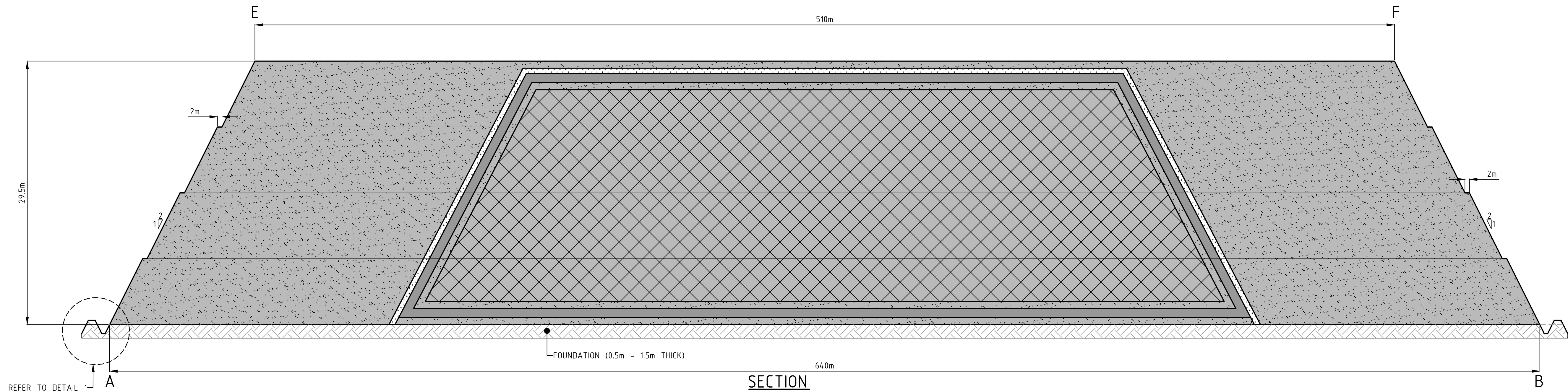
- TOPSOIL / SOIL COVER
WATER SHEDDING NAF MATERIAL
CLAY / CRUSHED NAF WITH BENTONITE
TOP PAF CELL
FOUNDATION



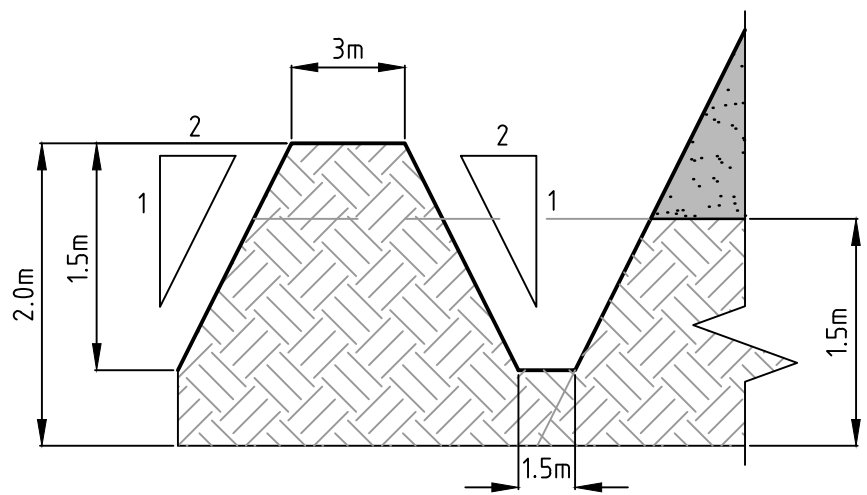
PLAN
SCALE 1:2000



PAF CELL PLAN
SCALE 1:2000



SECTION
SCALE H: 1:1000 V: 1:250



DRAINAGE SYSTEM DETAIL 1
SCALE H 1:200 V: 1:50

