APPENDIX

N

Geochemical Impact Assessment

RGS

Maules Creek Project
Geochemical Assessment of Overburden and Potential Coal Reject Materials

Final report prepared for:

Hansen Bailey Pty Ltd
PO Box 473
Singleton NSW 2330

Date: 10 January 2011
Project Number: 091022
Report Number: R001_A

Prepared by: Dr. Alan M. Robertson
RGS Environmental Pty Ltd
18 Inglis Street
Grange QLD 4051
Australia

Tel/Fax: +61 7 3856 5591
Mob: +61 431 620 623
Email: alan@rgsenv.com
Webpage: http://www.rgsenv.com

EXECUTIVE SUMMARY

ES1 Background

RGS Environmental Pty Ltd (RGS) was commissioned by Hansen Bailey on behalf of Aston Resources Limited (Aston Resources) to undertake a geochemical impact assessment for the Maules Creek Coal Project (the Project). The purpose of the assessment is to form part of an Environmental Assessment (EA) being prepared by Hansen Bailey to support an application for a contemporary Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to facilitate the development of a 21 year open cut coal mining operation and associated infrastructure.

The Project is located in the Gunnedah Basin, approximately 20 km north-east of the town of Boggabri, within the Narrabri Local Government Area (LGA). The Project is situated approximately 18 km from the existing rail infrastructure, the Werris Creek to Mungindi Railway, which services the existing local mines for transport of coal to the Newcastle coal terminals. The Project is an undeveloped metallurgical and thermal coal project on Coal Lease (CL) 375 with a resource of some 610 Million tonnes (Mt), capable of supporting a large open cut operation for at least 21 years. The Project has a low strip ratio and high energy content in the raw coal.

The Maules Creek Formation is the principal coal bearing sequence in the Project Boundary containing 15 identifiable coal seams. Seam splitting has resulted in the recognition of up to 39 individual seam plys resulting in complex geological modelling (JB Mining Services, 2009). Overburden (and interburden) consists predominantly of sandy conglomerate with minor amounts of interbedded sandstone, siltstone and mudstone separating the coal seams. These materials are of continental origin and were deposited in a periglacial environment by fluvial means under atmospheric conditions. Thus most sediment was oxidised *insitu* and is devoid of acid-forming pyrite (Dames & Moore, 1983a).

ES2 Scope of Work

The overall objective of the RGS scope of work was to complete an EA Geochemical Impact Assessment for the Project in accordance with the Environmental Assessment Requirements (EARs), which were provided by NSW Department of Planning on 6 December 2010.

RGS has conducted a geochemical characterisation and assessment of overburden and potential coal reject materials associated with the proposed mining of approximately 15 coal seams by open cut pit at the Project. The results of the characterisation have been used to confirm and update the results of previous investigations and develop/recommend any necessary environmental management measures related to overburden and potential coal reject emplacement and rehabilitation.

The RGS scope of work completed for the Project has included:

- A review of existing geological data and prior geochemical assessments within the Project Boundary;
- A site visit;
- Coordination of a geochemical sampling and laboratory testing program;
- A geochemical assessment of representative overburden and potential reject materials; and
- Preparation of a Geochemical Assessment Report (this report) detailing any acid generating potential or other salinity/dispersivity issues related to overburden and potential coal reject material characteristics within the Project Boundary.

ES3 Methodology

RGS has completed a review of available geochemical and geological data associated with the Project, supplied by Hansen Bailey and Aston Resources personnel. Supplied information was used in the development of an overburden and potential coal reject sampling and testing program.

A site visit by RGS personnel was completed in July 2010 and available drill core material was selected from four drill holes at locations with sufficient spread to enhance the lateral coverage of areas of the Project site not specifically covered by three drill holes sampled during previous geochemical assessment programs (Dames & Moore, 1983a and b). There are no specific regulatory requirements regarding the number of samples required to be obtained and tested for overburden and potential coal reject materials at mines in NSW. As such, existing technical guidelines for geochemical assessment of mine waste in Australia (AMIRA, 2002; DITR, 2007) and worldwide (INAP, 2009) were used as a framework for developing the sampling (and geochemical testing) program at the Project.

The sampling strategy was based on the expected geological variability and complexity in rock types; potential for significant environmental or health impacts; size of operation; sample representation requirements; material volumes; level of confidence in predictive ability; and cost.

A total of 138 samples were collected by Aston Resources personnel from four drill holes at various depth intervals, which supplemented existing geochemical information available for 47 samples from three drill holes. The samples represented the range of overburden (and interburden) lithologies (40 samples) found within the Project Boundary and also potential coal rejects materials taken from the coal seam, roof and floor materials at the target coal seams (98 samples). Samples were subjected to a series of static and kinetic geochemical tests at ALS Brisbane. The geochemical test program was designed to assess the degree of risk from oxidation of pyrite, acid generation, and leaching of soluble metals and salts. The static geochemical assessment test program also included characterisation of standard soil parameters including salinity, cation exchange capacity, sodicity, potential nutrients and major metal compositions.

ES4 Conclusions

The results of the geochemical assessment of representative overburden and potential coal reject materials from the Project indicate that:

Overburden

- Overburden materials at the Project are likely to be Non-Acid Forming (NAF) and have a high factor of safety with respect to potential acid generation. Most overburden samples have negligible total sulphur content and a moderate Acid Neutralising Capacity (ANC);
- The concentration of total metals in overburden solids is well below applied guideline criteria for soils and is unlikely to present any environmental issues associated with revegetation and rehabilitation;
- Most overburden materials will generate slightly alkaline and relatively low-salinity run-off and seepage following surface exposure. The major ion chemistry of initial surface run-off and seepage from overburden materials is likely to be dominated by sodium, bicarbonate, chloride and sulphate;
- The concentration of dissolved metals in initial and ongoing run-off and seepage from overburden materials is unlikely to present any significant environmental issues associated with surface water and groundwater quality as a result of the Project; and
- Overburden materials are likely to be non-sodic and may be suitable for revegetation and rehabilitation activities (in final surfaces or as a growth medium). Conglomerate and sandstone overburden materials may have a marginally more favourable nutrient balance than siltstone and therefore may be more amenable to revegetation and rehabilitation activities.

Potential Coal Reject

- Most potential coal reject materials are likely to be NAF and have a high factor of safety with respect to potential acid generation;
- A few of the potential coal reject materials are PAF, although these PAF materials appear to be limited to the Braymont, Herndale and Onavale seams and are likely to be blended with NAF coal reject materials at the CHPP;
- The concentration of total metals in potential coal reject solids is well below the applied guideline criteria for soils and is unlikely to present any environmental issues associated with revegetation and rehabilitation;
- Most NAF potential coal reject materials will generate slightly alkaline and relatively low-salinity run-off and seepage following surface exposure. However, PAF potential coal reject materials may generate acidic and more saline run-off and seepage if exposed to oxidising conditions;
- The major ion chemistry of initial surface run-off and seepage from NAF potential coal reject materials is likely to be dominated by sodium, bicarbonate, chloride and sulphate. For PAF materials, calcium, magnesium and sulphate may become more dominant;
- For PAF materials, the initial concentration of soluble sulphate in surface run-off and seepage is expected to be relatively low, although further exposure to oxidising conditions may lead to increased sulphate concentrations; and
- The concentration of dissolved metals in initial surface run-off and seepage from NAF potential coal reject materials is unlikely to present any significant environmental issues associated with surface water and groundwater quality as a result of the Project. For PAF materials, there is some potential for the concentration of dissolved metals in surface run-off and seepage to increase over time.

ES5 Recommendations

Overburden

The ongoing management of overburden should consider the geochemistry of these materials with respect to their potential risk to cause harm to the environment and their suitability for use in rehabilitation and revegetation activities. It is therefore recommended that the Proponent undertakes:

- Pre-stripping topsoil from areas to be mined for use in final rehabilitation activities (surface cover or vegetation growth medium);
- Placement of overburden within the emplacement areas in a manner that limits the risk of surface erosion; and
- Field trials to identify the most appropriate topsoil and overburden materials for revegetation and rehabilitation of final landforms.

Surface water and seepage from overburden material should be monitored to ensure that key water quality parameters remain within appropriate criteria. It is therefore recommended that the Proponent:

- Monitors standard parameters for run-off/seepage from the overburden emplacement areas (pH, electrical conductivity (EC) and total suspended solids (TSS)), as required.

Potential Coal Reject

The ongoing management of coal rejects material should consider the geochemistry of materials with respect to their potential risk to cause harm to the environment and their suitability for use in rehabilitation construction and revegetation. It is therefore recommended that the Proponent considers:

- Placement of NAF coal reject materials in the open pit and/or out-of-pit co-disposal with overburden;
- Deep (in-pit) burial of any blended coal reject materials identified as PAF. Out-of-pit co-disposal of PAF rejects in overburden encapsulated cells may need to be considered until sufficient capacity in the open pit becomes available;
- Deep (in-pit) burial of any PAF roof and floor materials that do not report as dilution to the CHPP. Out-of-pit co-disposal of PAF roof and floor materials in overburden encapsulated cells may need to be considered until sufficient capacity in the open pit becomes available;
- Covering of PAF coal reject and PAF roof and floor materials as soon as practical (within a few weeks) with at least 5 metres of overburden material to minimise the length of exposure time to oxidising conditions (and minimise the potential for AMD)[1];
- For the co-disposal option, placement of NAF coal reject material in a manner that limits the risk of erosion; and
- Verifying the geochemical characteristics of blended coal reject materials using the same static geochemical tests as those completed in this report, in future, (post approval) when bulk samples become available from the CHPP.

Surface water and seepage from coal reject material, should be monitored to ensure that key water quality parameters remain within appropriate criteria. It is therefore recommended that the Proponent:

- Monitors standard parameters in run-off/seepage from coal reject emplacement areas (pH, EC and TSS) on a monthly basis and dissolved metals, as required.

[1] The recommended minimum thickness of 5m of overburden cover material could potentially be reduced if an appropriate cover design study was completed in future by the Proponent.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

GLOSSARY OF TERMS

ABCC	Acid buffering characteristic curve measures the readily available portion of the inherent acid neutralising capacity (ANC) of a sample by slow acid titration to a set end-point and then calculation of the amount of acid consumed and evaluation of the resultant titration curve.
Acid	A measure of hydrogen ion (H+) concentration; generally expressed as pH.
Acid Base Account	Evaluation of the balance between acid generation and acid neutralisation processes. Generally determines the maximum potential acidity (MPA) and the inherent acid neutralising capacity (ANC), as defined below.
AMD	Acid and metalliferous drainage caused by exposure of sulphide minerals in mine waste materials to oxygen and water. Typically characterised by low pH and elevated concentrations of salts, sulphate and metals.
ANC	Acid neutralising capacity of a sample as kg H_2SO_4 per tonne of sample.
ANC/MPA Ratio	Ratio of the acid neutralising capacity and maximum potential acidity of a sample. Used to assess the risk of a sample generating acid conditions.
CHPP	Coal Handling and Preparation Plant.
EC	Electrical Conductivity, expressed as µS/cm.
eCEC	Effective cation exchange capacity provides a measure of the amount of exchangeable cations (Ca, Mg, Na and K) in a sample.
ESP	Exchangeable sodium percentage provides a measure of the sodicity of a materials and propensity to erode.
KLC test	Kinetic leach column tests are procedures used to measure the geochemical/ weathering behaviour of a sample of mine material over time.
MPA	Maximum Potential Acidity calculated by multiplying the total sulphur content of a sample by 30.6 (stoichiometric factor) and expressed as kg H_2SO_4 per tonne.
NAF	Non-acid forming. Geochemical classification criterion for a sample that will not generate acid conditions.
NAG test	Net acid generation test. Hydrogen peroxide solution is used to oxidise sulfides in a sample, then any acid generated through oxidation may be consumed by neutralising components in the sample. Any remaining acidity is expressed as kg H_2SO_4 per tonne.
NAPP	Net acid producing potential expressed as kg H_2SO_4 per tonne. Calculated by subtracting the ANC from the MPA.
Overburden	Material that overlies a coal resource and must be removed to mine the coal.
PAF	Potentially acid forming. Geochemical classification criterion for a sample that has the potential to generate acid conditions.
(Coal) Reject	Mixture of coarse and finely ground materials from which the desired mineral (coal) values have been largely extracted.
Static test	Procedure for characterising the geochemical nature of a sample at one point in time. Static tests may include measurements of mineral and chemical composition of a sample and the Acid Base Account.
(Coal) Tailing	Finely ground materials from which the desired mineral (coal) values have been largely extracted.
TSF	Tailing storage facility designed for the storage of tailing (fine reject) materials produced during coal processing at the CHPP. Supernatant water may be recycled back to the CHPP from a decant pond.
Total Sulphur	Total sulphur content of a sample generally measured using a 'Leco' analyser expressed as % S.
Uncertain	Geochemical classification criterion for a sample where the potential to generate acid conditions remains uncertain and may require further analysis.

1.0 INTRODUCTION

1.1 Background

RGS Environmental Pty Ltd (RGS) was commissioned by Hansen Bailey on behalf of Aston Resources Limited (Aston Resources) to undertake a geochemical impact assessment for the Maules Creek Coal Project (the Project). The purpose of the assessment is to form part of an Environmental Assessment (EA) being prepared by Hansen Bailey to support an application for a contemporary Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to facilitate the development of a 21 year open cut coal mining operation and associated infrastructure.

The Project is located in the Gunnedah Basin, approximately 20 km north-east of the town of Boggabri, within the Narrabri Local Government Area (LGA) as shown at **Figures 1** and **2**. The Project is situated approximately 18 km from the existing rail infrastructure, the Werris Creek to Mungindi Railway, which services the existing local mines for transport of coal to the Newcastle coal terminals. The Project is an undeveloped metallurgical and thermal coal project on Coal Lease (CL) 375 with a resource of some 610 Million tonnes (Mt), capable of supporting a large open cut operation for at least 21 years. The Project has a low strip ratio and high energy content in the raw coal.

1.2 Geology

The Project is located within a major regional geological feature known as the Gunnedah Basin, one of the main coal basins in NSW. Two sub-basins separated by the Bobbabri Volcanics (Maules Creek Ridge) have been identified. The Maules Creek sub basin is located to the east and Mulalley to the west of Maules Creek Ridge. There are two coal-bearing sequences within Gunnedah Basin, the Early Permian Bellata Group and Late Permian Black Jack Group. The majority of the Bellata Group coal seams are found within the Maules Creek Formation where the coal bearing strata can reach thicknesses of greater than 800 m.

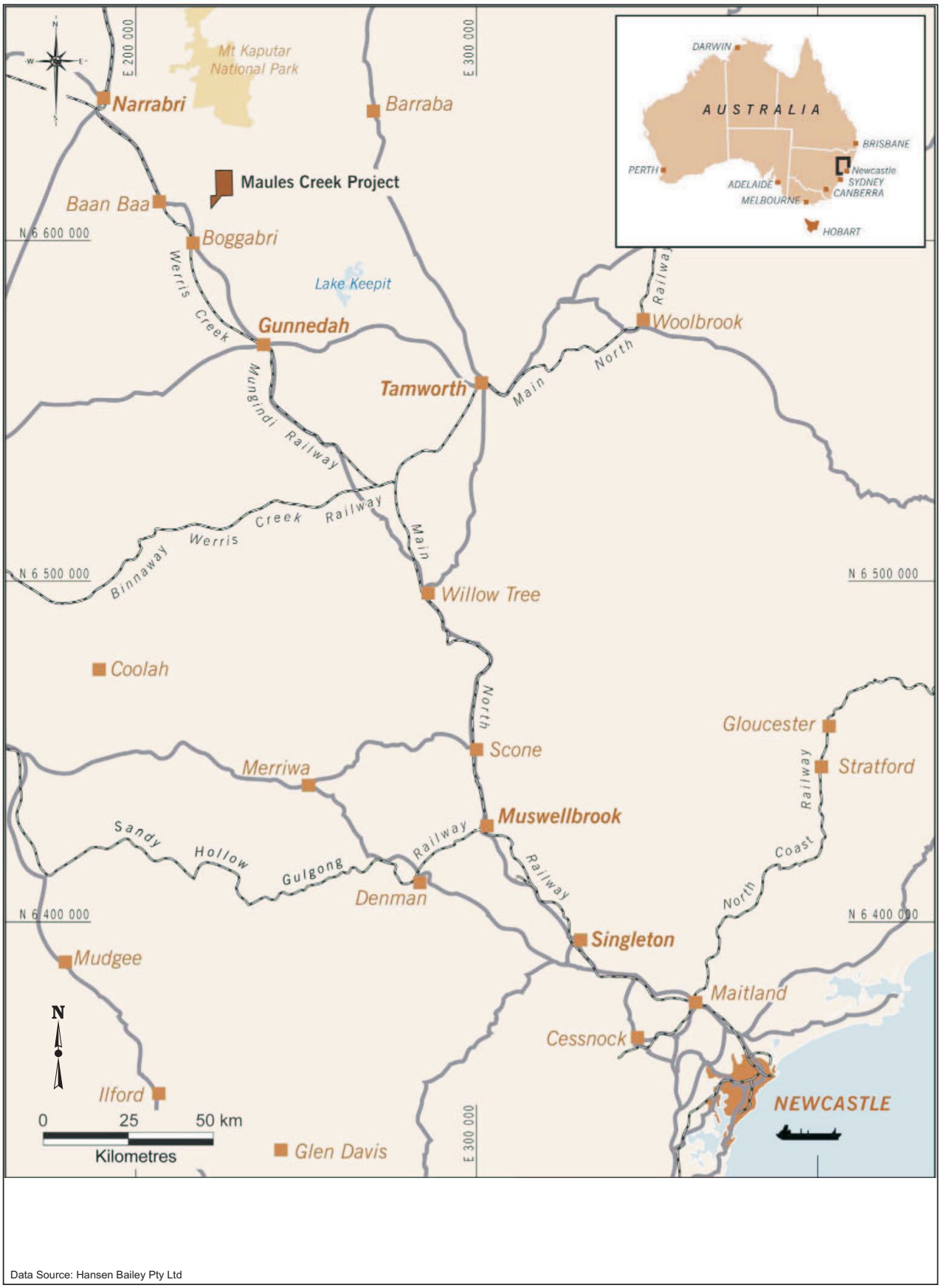
The Maules Creek Formation is the principal coal bearing sequence in the Project Boundary containing 15 identifiable coal seams. Seam splitting has resulted in the recognition of up to 39 individual seam plys resulting in complex geological modelling (JB Mining Services, 2009). Overburden (and interburden) consists predominantly of sandy conglomerate with minor amounts of interbedded sandstone, siltstone and mudstone separating the coal seams. **Figure 3** provides a schematic of the typical Maules Creek site stratigraphy, showing the main coal seams and overburden (and interburden) rock types.

Overburden and interburden material is of continental origin and was deposited in a periglacial environment by fluvial means under atmospheric conditions. Thus most sediment was oxidised *insitu* and is devoid of acid-forming pyrite (Dames & Moore, 1983a).

1.3 Scope of Work

The RGS scope of work was to complete an EA Geochemical Impact Assessment for the Project suitable to support a Project Approval Application under Part 3A of the EP&A Act. The study was to specifically address the Environmental Assessment Requirements (EARs) provided by NSW Department of Planning on 6 December 2010.

RGS has conducted a geochemical characterisation and assessment of overburden and potential coal reject materials associated with the proposed mining of approximately 15 coal seams by open cut pit at the Project. The results of the characterisation have been used to confirm and update the results of previous investigations and develop/recommend any necessary environmental management measures related to overburden and potential coal reject emplacement and rehabilitation.



Data Source: Hansen Bailey Pty Ltd

RGS Environmental Pty Ltd
18 Inglis Street, Grange, QLD 4051
Tel/Fax +61 7 3856 5591
Mobile 0431 620623
Email alan@rgsenv.com

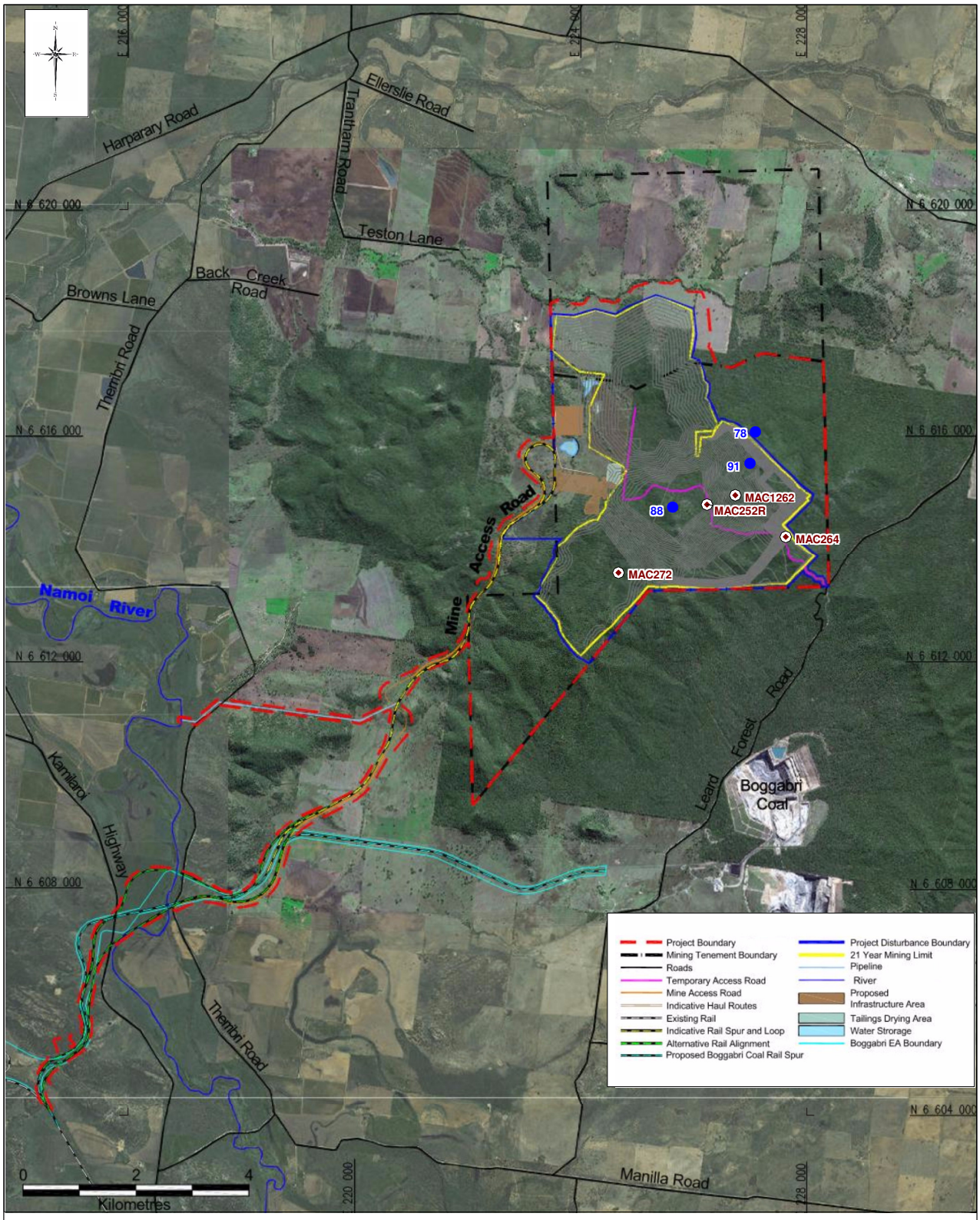
File: 091022-001 A4.cdr
Date: 21/12/2010

HANSEN BAILEY PTY LTD

MAULES CREEK PROJECT

Figure: **1**

LOCATION PLAN



Data Source: Hansen Bailey Pty Ltd

RGS Environmental Pty Ltd
18 Inglis Street, Grange. QLD 4051
Tel/Fax +61 7 3856 5591
Mobile 0431 620623
Email alan@rgsenv.com

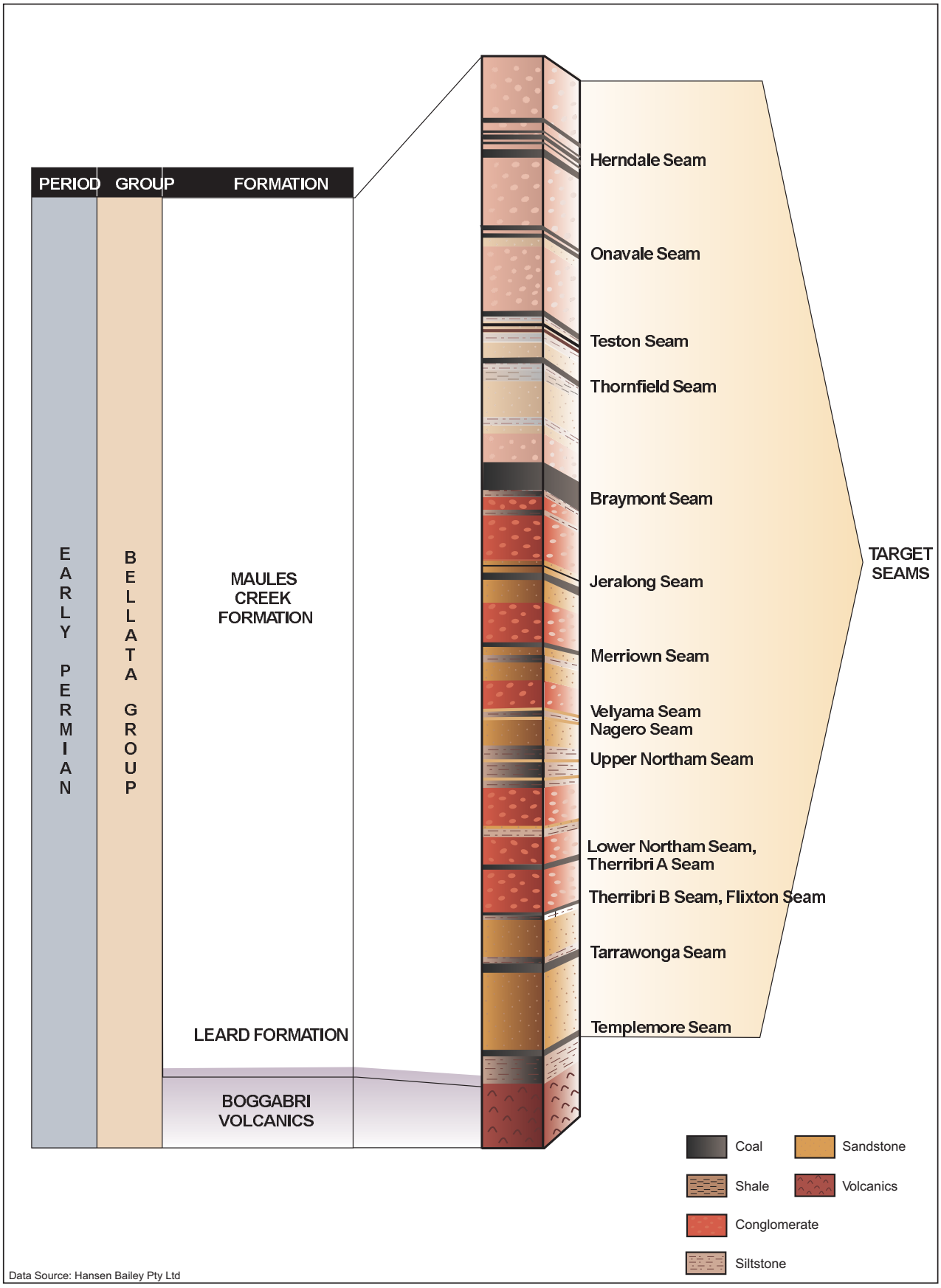
File:091022 003b A4.wor
Date: 21/12/2010

HANSEN BAILEY PTY LTD

MAULES CREEK PROJECT

Figure: **2**

PROJECT LAYOUT SHOWING LOCATION OF DRILL HOLES USED FOR GEOCHEMICAL SAMPLING



Data Source: Hansen Bailey Pty Ltd

RGS Environmental Pty Ltd
18 Inglis Street, Grange, QLD 4051
Tel/Fax +61 7 3856 5591
Mobile 0431 620623
Email alan@rgsenv.com

File:091022-004b A4.cdr
Date: 21/12/2010

HANSEN BAILEY PTY LTD

MAULES CREEK PROJECT

Figure: 3

INDICATIVE STRATIGRAPHIC COLUMN

The RGS scope of work completed for the Project has included:

- A review of existing geological data and prior geochemical assessments within the Project Boundary;
- A site visit;
- Coordination of a geochemical sampling and laboratory testing program;
- A geochemical assessment of representative overburden and potential reject materials; and
- Preparation of a Geochemical Assessment Report (this report) detailing any acid generating potential or other salinity/dispersivity issues related to overburden and potential coal reject material characteristics within the Project Boundary.

2.0 METHODOLOGY

2.1 Desktop Review

RGS has completed a review of available geochemical and geological data, groundwater quality data, and existing drill hole database (including plans, drill hole logs and drill core photographs) associated with the Project. Relevant Project information was supplied to RGS by Hansen Bailey and Aston Resources personnel. Supplied information was used in the development of the overburden and potential coal reject sampling and testing program.

2.2 Site Visit

RGS personnel completed a site visit on 19 July 2010 and met with key Project site exploration personnel. Available drill core material from four selected drill holes was identified for sampling and the majority of the sampling was completed at that time. Site exploration personnel were briefed by RGS personnel on completion of the sampling program and dispatch of the samples to the geochemical laboratory. The site visit enabled efficient use of existing data and exploration drilling programs to develop an effective sampling and testing program for overburden and potential coal reject materials for the Project.

2.3 Sampling and Geochemical Testing Program

2.3.1 Sampling Program

There are no specific regulatory requirements regarding the number of samples required to be obtained and tested for overburden and potential coal reject materials at mines in NSW. As such, existing technical guidelines for geochemical assessment of mine waste in Australia (AMIRA, 2002; DITR, 2007) and worldwide (INAP, 2009) have been used by RGS as a framework for developing the sampling (and testing) program at the Project.

Samples were selected from four drill holes at locations with sufficient spread to enhance the lateral coverage of areas of the Project Boundary. The sampling program was designed to complement existing information from a previous geochemical assessment program on 47 samples collected from three drill holes at the Maules Creek site (Dames & Moore, 1983a and b). The location of all of the drill holes that have been used for geochemical sampling in the two campaigns (seven drill holes in total) is shown in **Figure 2**. The sampling strategy was based on the expected geological variability and complexity in rock types; potential for significant environmental or health impacts; size of operation; sample representation requirements; material volumes; level of confidence in predictive ability; and cost.

As part of the site visit, Aston Resources provided site personnel to assist/supervise the collection of representative samples of the required range of overburden and potential coal reject materials. The site Exploration Geologist was provided with instructions to allow collection and dispatch of the relevant drill core (and some drill chip) samples to ALS Brisbane laboratory for geochemical testing. Relevant ALS chain of custody documentation was provided to the site Exploration Geologist. Two separate batches of samples were sent to ALS Brisbane and received on 30 July and 19 August 2010, respectively.

A total of 138 samples were collected by the Exploration Geologist from four drill holes at various depth intervals. The samples represented the range of overburden (and interburden) lithologies (40 samples) found at the mine and also potential coal reject materials taken from the roof and floor material at the target coal seams (98 samples).

Table 1: Number of Samples Selected for Geochemical Testing

Sample Type	Sample Number
Overburden (and Interburden) Materials	40 samples
Roof and Floor Potential Coal Reject Materials	98 samples

Approximately 2kg of each sample was sent to ALS Brisbane laboratory and prepared for geochemical testing by crushing to nominal 5-10 mm and then sub-sampling 300g for pulverising. All static geochemical tests were completed on pulverised sub-samples. Kinetic leach column tests were completed on selected composite crushed samples. For this study, full core was obtained from specific drill core depth intervals ranging from approximately 0.07 m to 8 m, depending on lithology and stratigraphy. Individual samples comprised single lithologies, where possible, to facilitate interpretation of geochemical results. Relevant drill hole logs for these samples were utilised for sample selection and summaries of these are provided as **Attachment A**.

2.3.1 Geochemical Testing Program

The crushed and pulverised samples received by ALS Brisbane were subjected to a series of static and kinetic geochemical tests as described below. A description of laboratory tests typically used in geochemical assessment programs for mine waste materials is provided as **Attachment B**. The geochemical test program was designed to assess the degree of risk from oxidation of pyrite, acid generation, and leaching of soluble metals and salts. The static geochemical assessment test program also included characterisation of standard soil parameters including salinity, cation exchange capacity, sodicity, potential nutrients and major metal compositions. The kinetic leach column test program is described at the end of this section.

Static Geochemical Test Program

All of the 138 samples collected were subjected to Acid Base Account (ABA) geochemical testing as part of an initial screening process. Specifically, each sample was tested for:

- pH and Electrical Conductivity (EC) (1:5);
- Total sulfur;
- Acid neutralising capacity (ANC); and
- Net acid producing potential (NAPP).

After the results of the ABA tests were received and reviewed, a further 15 composite samples were prepared from 115 of the 138 original samples collected with sample selection based on lithology, drill hole, depth interval and geochemical characteristics. Multi-element testing was then completed on solid and soluble fractions of these composite samples. Composite samples were tested for:

- pH and EC (1:5 solid:water);
- Alkalinity or acidity (pH dependent) (1:5);
- Total metals (Al, As, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Mo, N, Ni, Sb, Se, Zn) in solids;
- Total cations (Ca, Mg, Na, K);
- Soluble metals (Al, As, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Mo, Ni, Sb, Se, Zn) in 1:5 (solid:water) extracts;
- Soluble cations (Ca, Mg, Na, K) and soluble anions (Cl, SO_4);
- Exchangeable cations (Ca, Mg, Na, K) and Cation Exchange Capacity (CEC); and
- Exchangeable Sodium Percentage (ESP).

Kinetic Geochemical Test Program

Six Kinetic Leach Column (KLC) tests were set up at the RGS in-house laboratory for three composite samples of the main overburden/interburden types (conglomerate, sandstone and siltstone) present at the Project and three composite samples of roof, coal and floor materials from the Herndale, Onavale and Braymont coal seams. The KLC tests commenced on 17 September 2010 and were operated under a fortnightly watering and leaching cycle for 12 weeks until 10 December, 2010. Approximately 2 kg of each composite sample was used in the KLC tests. Heat lamps were used on a daily basis to simulate sunshine and ensure that the KLC test materials were unsaturated and subject to oxidising conditions, between leaching events. A schematic of the KLC test arrangement is provided in **Attachment B**. All leachates collected were sent to ALS Brisbane for analysis of parameters including:

- pH and EC;
- Acidity and alkalinity;
- Soluble metals (Al, As, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Mo, Ni, Sb, Se, and Zn);
- Soluble cations (Ca, Mg, Na and K); and
- Soluble Anions (Cl, SO_4).

KLC test results are presented in **Attachment C** and a copy of all the geochemical results received from ALS Brisbane for both the static and KLC geochemical tests is provided in **Attachment D.**

3.0 SUMMARY OF PREVIOUS GEOCHEMICAL STUDIES

Historical geochemical assessment work on overburden and potential coal reject materials from the Maules Creek Project was completed in 1983 which was incorporated into the 1989 Environmental Impact Statement (EIS) (Dames and Moore, 1983a and b). The studies provided information on the geochemical characteristics of samples obtained from drill holes within the Project Boundary (see **Figure 2**). Surface and groundwater quality data from the 1989 EIS and more recent surface and groundwater investigations completed for the Project as part of the current EA (Hansen Bailey, 2011), provide useful information regarding background water quality at the site.

3.1 Overburden & Interburden Characterisation Programs (1983)

Geochemical assessment studies completed on 47 drill samples from three drill holes within the Maules Creek Coal Project Boundary were completed in 1983 (Dames and Moore, 1983a and b), which found that:

- Most overburden and interburden is Non-Acid Forming (NAF);
- Interburden from the Herndale and Onavale coal seams and overburden from above the Onavale coal seam is PAF;
- Sodic materials are present in carbonaceous shales associated with the Velyama seam plys and in lithic sandstones associated with the Herndale seam plys.

The reports advocated no selective handling of NAF overburden/interburden materials but recommended deep burial of PAF materials within overburden to a depth of at least four metres with lime application. Placement of sodic materials on final surfaces of rehabilitated landforms was also to be avoided.

3.2 Surface Water and Groundwater Quality Investigations

Surface water and groundwater quality investigations were reported for Maules Creek as part of the EIS study (EIS, 1989). Five surface water monitoring stations were set up within the Project Boundary and median water quality values reported indicate that surface run-off at the Project has a neutral pH (6.8-7.3) and a low conductivity (80 – 110 µS/cm) and a low concentration of trace metals and sulphate.

High level groundwater assessments to date suggest that three aquifer systems exist in the region including, the alluvial aquifer system associated with the Namoi River floodplain and tributaries; weathered bedrock near the ground surface; and the coal seams of the Permian Maules Creek Formation. Depth to groundwater in the Permian Maules Creek Formation ranges from approximately 18 to 60 m below ground surface (Hansen Bailey, 2010). Previous groundwater quality monitoring results presented in the Maules Creek EIS and recent studies indicate that the local groundwater is generally fresh in the alluvial aquifer system. Groundwater quality is typically brackish in the Permian Maules Creek Formation aquifer and is suitable for livestock use.

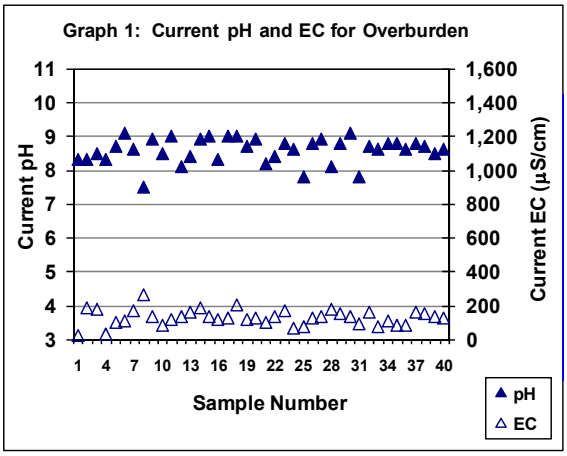
4.0 GEOCHEMICAL TEST RESULTS

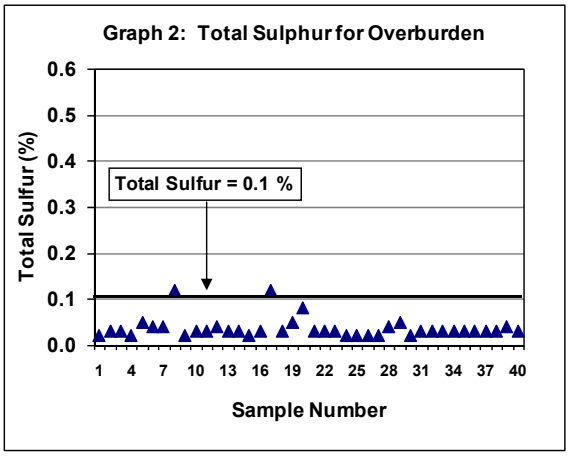
4.1 Acid Base Account Results

4.1.1 Overburden

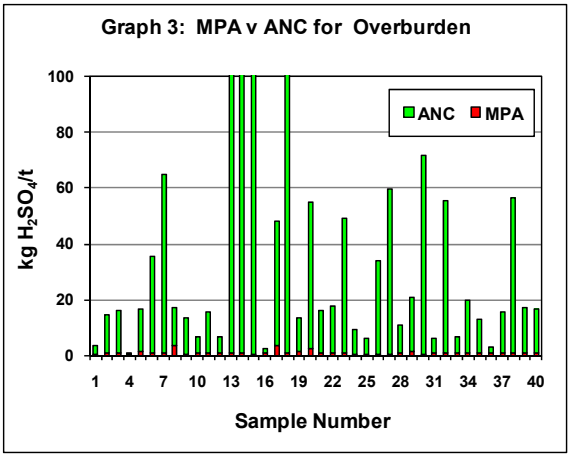
ABA test results for the 40 overburden samples are summarised below and presented in **Table 2** and **Graphs 1, 2, 3** and **4**.

- **pH:** The current $pH_{(1:5)}$ of the overburden samples ranges from 7.5 to 9.1 and is typically alkaline (median pH 8.7), as illustrated at **Graph 1**.
- **EC:** The current $EC_{(1:5)}$ of the overburden samples ranges from 20 to 259 µS/cm and is typically low (median 129 µS/cm), as illustrated at **Graph 1**.
- **Total sulphur:** The total sulphur content of the overburden samples is typically low and ranges from 0.02 to 0.12 % (median 0.03 %). Thirty-eight (38) of the 40 overburden samples tested have total sulphur values less than 0.1 % and are essentially barren of sulphur, as illustrated at **Graph 2**.





- **Maximum Potential Acidity (MPA):** Based on the total sulphur content, the MPA that could be generated by the overburden samples is very low and ranges from 0.6 to 3.7 kg H_2SO_4/t (median 0.9 kg H_2SO_4/t), as illustrated at **Graph 3**.
- **ANC:** The ANC value for the samples ranges from 0.3 to 321 kg H_2SO_4/t and is typically moderate (median 16 kg H_2SO_4/t), as illustrated at **Graph 3**.



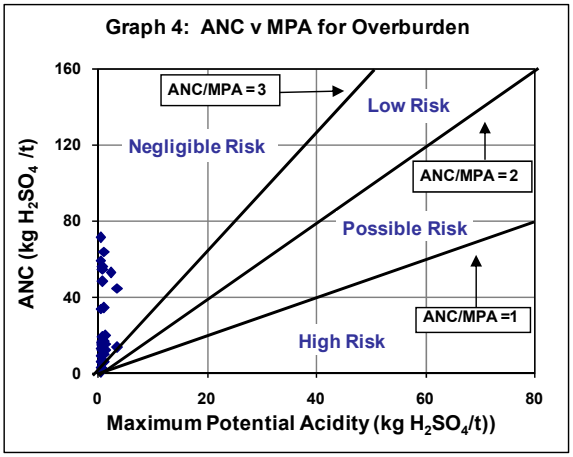


Table 2: Acid-base Results for Overburden and Potential Coal Reject Materials - Maules Creek Project

ALS Laboratory Sample ID	Date	Drill Hole ID	Sample Interval (m)			Lithology	Sample Type	pH[1]	EC[1]	Total Sulfur	MPA[2]	ANC[2]	NAPP[2]	ANC/MPA ratio	Sample Classification[3]
			From	To	Depth				(mS/cm)	(%)	(kg H_2SO_4/t)				
Overburden and Interburden															
EB1013377-001	30/07/10	MAC264	13.56	13.82	0.26	CG	Overburden	8.3	20	0.02	0.6	3.0	-2.4	4.9	Non-Acid Forming (Barren)
EB1013377-075	30/07/10	MAC272	102.49	102.62	0.13	CG	Interburden	8.3	182	0.03	0.9	13.9	-13.0	15.1	Non-Acid Forming (Barren)
EB1013377-084	30/07/10	MAC1261	6.00	12.00	6.00	CG	Overburden	8.5	176	0.03	0.9	15.5	-14.6	16.9	Non-Acid Forming (Barren)
EB1013377-086	30/07/10	MAC1261	30.00	36.00	6.00	CG	Overburden	8.3	34	0.02	0.6	0.3	0.4	0.4	Non-Acid Forming (Barren)
EB1014622-067	19/08/10	MAC1261	54.00	60.00	6.00	CG	Interburden	8.7	96	0.05	1.5	15.2	-13.7	9.9	Non-Acid Forming (Barren)
EB1014622-073	19/08/10	MAC1261	126.00	132.00	6.00	CG	Interburden	9.1	106	0.04	1.2	34.2	-33.0	27.9	Non-Acid Forming (Barren)
EB1014622-026	19/08/10	MAC252R	129.44	129.67	0.23	CG	Interburden	8.6	164	0.04	1.2	63.7	-62.5	52.0	Non-Acid Forming (Barren)
EB1013377-007	30/07/10	MAC264	47.08	47.40	0.32	PC	Interburden	7.5	259	0.12	3.7	13.7	-10.0	3.7	Non Acid Forming
EB1013377-031	30/07/10	MAC264	146.21	146.36	0.15	PC (CG)	Interburden	8.9	135	0.02	0.6	13.0	-12.4	21.2	Non-Acid Forming (Barren)
EB1013377-035	30/07/10	MAC264	177.42	177.72	0.30	PC (CG)	Interburden	8.5	85	0.03	0.9	6.0	-5.1	6.5	Non-Acid Forming (Barren)
EB1013377-045	30/07/10	MAC264	236.59	236.79	0.20	PC (CG)	Interburden	9.0	120	0.03	0.9	14.7	-13.8	16.0	Non-Acid Forming (Barren)
EB1013377-066	30/07/10	MAC272	123.51	123.76	0.25	PC (CG)	Interburden	8.1	137	0.04	1.2	5.6	-4.4	4.6	Non-Acid Forming (Barren)
EB1014622-033	19/08/10	MAC252R	53.47	53.66	0.19	SC	Interburden	8.4	159	0.03	0.9	198.0	-197.1	215.5	Non-Acid Forming (Barren)
EB1013377-078	30/07/10	MAC272	69.52	69.68	0.16	SC	Interburden	8.9	189	0.03	0.9	172.0	-171.1	187.2	Non-Acid Forming (Barren)
EB1013377-061	30/07/10	MAC272	196.49	196.64	0.15	SC/CG	Interburden	9.0	130	0.02	0.6	257.0	-256.4	419.6	Non-Acid Forming (Barren)
EB1013377-062	30/07/10	MAC272	134.39	134.51	0.12	SC/CG	Interburden	8.3	115	0.03	0.9	1.9	-1.0	2.1	Non-Acid Forming (Barren)
EB1014622-069	19/08/10	MAC1261	84.00	86.00	2.00	SC/CG	Interburden	9.0	127	0.12	3.7	44.6	-40.9	12.1	Non Acid Forming
EB1013377-002	30/07/10	MAC264	34.71	34.87	0.16	SF	Overburden	9.0	203	0.03	0.9	321.0	-320.1	349.4	Non-Acid Forming (Barren)
EB1013377-030	30/07/10	MAC264	143.50	143.73	0.23	SF	Interburden	8.7	115	0.05	1.5	11.9	-10.4	7.8	Non-Acid Forming (Barren)
EB1014622-070	19/08/10	MAC1261	90.00	96.00	6.00	SF	Interburden	8.9	124	0.08	2.5	52.7	-50.3	21.5	Non-Acid Forming (Barren)
EB1014622-036	19/08/10	MAC252R	35.88	36.00	0.12	SF	Interburden	8.2	98	0.03	0.9	15.5	-14.6	16.9	Non-Acid Forming (Barren)
EB1014622-013	19/08/10	MAC252R	157.57	157.79	0.22	SF	Interburden	8.4	132	0.03	0.9	16.7	-15.8	18.2	Non-Acid Forming (Barren)
EB1013377-025	30/07/10	MAC264	120.38	120.59	0.21	SF/ST	Interburden	8.8	168	0.03	0.9	48.1	-47.2	52.4	Non-Acid Forming (Barren)
EB1013377-034	30/07/10	MAC264	175.49	175.70	0.21	SF/ST	Interburden	8.6	64	0.02	0.6	8.9	-8.3	14.5	Non-Acid Forming (Barren)
EB1013377-083	30/07/10	MAC272	30.96	31.11	0.15	SF/ST	Interburden	7.8	72	0.02	0.6	5.5	-4.9	9.0	Non-Acid Forming (Barren)
EB1013377-015	30/07/10	MAC264	95.15	95.41	0.26	SM	Interburden	8.8	128	0.02	0.6	33.6	-33.0	54.9	Non-Acid Forming (Barren)
EB1013377-018	30/07/10	MAC264	102.15	102.33	0.18	SM	Interburden	8.9	133	0.02	0.6	59.1	-58.5	96.5	Non-Acid Forming (Barren)
EB1013377-022	30/07/10	MAC264	109.35	109.55	0.20	SM	Interburden	8.1	175	0.04	1.2	10.0	-8.8	8.2	Non-Acid Forming (Barren)
EB1014622-021	19/08/10	MAC252R	148.40	148.58	0.18	SM	Interburden	8.8	152	0.05	1.5	19.5	-18.0	12.7	Non-Acid Forming (Barren)
EB1014622-074	19/08/10	MAC1261	138.00	150.00	12.00	SS	Interburden	9.1	135	0.02	0.6	71.2	-70.6	116.2	Non-Acid Forming (Barren)
EB1013377-011	30/07/10	MAC264	66.21	66.56	0.35	SS/CG	Interburden	7.8	88	0.03	0.9	5.6	-4.7	6.1	Non-Acid Forming (Barren)
EB1013377-012	30/07/10	MAC264	88.45	88.76	0.31	SS/CG	Interburden	8.7	159	0.03	0.9	54.4	-53.5	59.2	Non-Acid Forming (Barren)
EB1013377-003	30/07/10	MAC264	36.75	36.90	0.15	ST	Overburden	8.6	74	0.03	0.9	5.9	-5.0	6.4	Non-Acid Forming (Barren)
EB1013377-027	30/07/10	MAC264	127.92	128.01	0.09	ST	Interburden	8.8	108	0.03	0.9	18.8	-17.9	20.5	Non-Acid Forming (Barren)
EB1013377-040	30/07/10	MAC264	227.00	227.24	0.24	ST	Interburden	8.8	84	0.03	0.9	12.2	-11.3	13.3	Non-Acid Forming (Barren)
EB1013377-085	30/07/10	MAC1261	18.00	19.00	1.00	ST	Overburden	8.6	78	0.03	0.9	2.2	-1.3	2.4	Non-Acid Forming (Barren)
EB1014622-006	19/08/10	MAC252R	212.59	212.76	0.17	ST	Interburden	8.8	156	0.03	0.9	14.7	-13.8	16.0	Non-Acid Forming (Barren)
EB1013377-068	30/07/10	MAC272	116.81	116.94	0.13	YS	Interburden	8.7	151	0.03	0.9	55.6	-54.7	60.5	Non-Acid Forming (Barren)

Table 2: Acid-base Results for Overburden and Potential Coal Reject Materials - Maules Creek Project

ALS Laboratory Sample ID	Date	Drill Hole ID	Sample Interval (m)			Lithology	Sample Type	pH[1]	EC[1]	Total Sulfur	MPA[2]	ANC[2]	NAPP[2]	ANC/MPA ratio	Sample Classification[3]
			From	To	Depth				(mS/cm)	(%)	(kg H_2SO_4/t)				
EB1014622-018	19/08/10	MAC252R	153.14	153.35	0.21	YS	Interburden	8.5	134	0.04	1.2	16.2	-15.0	13.2	Non-Acid Forming (Barren)
EB1014622-041	19/08/10	MAC252R	27.51	27.68	0.17	YS	Overburden	8.6	126	0.03	0.9	15.9	-15.0	17.3	Non-Acid Forming (Barren)
Coal and Potential Coal Reject															
EB1013377-026	30/07/10	MAC264	125.64	125.78	0.14	YC/CO	Coal (Band)	8.8	108	0.19	5.8	14.7	-8.9	2.5	Uncertain (NAF)
EB1013377-005	30/07/10	MAC264	38.46	38.64	0.18	ST	Parting	8.6	64	0.03	0.9	5.8	-4.9	6.3	Non-Acid Forming (Barren)
EB1013377-028	30/07/10	MAC264	131.77	131.92	0.15	YS/ST	Roof (BRA)	8.8	95	0.04	1.2	4.3	-3.1	3.5	Non-Acid Forming (Barren)
EB1013377-029	30/07/10	MAC264	133.57	133.75	0.18	SF	Floor (BRA)	8.7	113	0.03	0.9	4.7	-3.8	5.1	Non-Acid Forming (Barren)
EB1013377-032	30/07/10	MAC264	162.89	163.03	0.14	YS/ CO	Roof (BRM)	4.2	136	0.58	17.8	0.3	17.5	0.0	Potentially Acid Forming
EB1014622-028	19/08/10	MAC252R	103.60	103.73	0.13	CG	Roof (BRL)	8.7	126	0.06	1.8	10.1	-8.3	5.5	Non-Acid Forming (Barren)
EB1013377-033	30/07/10	MAC264	170.02	170.23	0.21	YS/ CO	Floor (BRL)	7.5	487	0.06	1.8	4.4	-2.6	2.4	Non-Acid Forming (Barren)
EB1014622-027	19/08/10	MAC252R	105.09	105.36	0.27	SF	Floor (BRL)	8.4	158	0.03	0.9	10.2	-9.3	11.1	Non-Acid Forming (Barren)
EB1014622-030	19/08/10	MAC252R	92.29	92.44	0.15	YC	Roof (BRT)	8.2	105	0.07	2.1	10.0	-7.9	4.7	Non-Acid Forming (Barren)
EB1014622-029	19/08/10	MAC252R	98.58	98.76	0.18	YS/ CO	Floor (BRT)	8.0	86	0.04	1.2	9.9	-8.7	8.1	Non-Acid Forming (Barren)
EB1013377-077	30/07/10	MAC272	73.54	73.72	0.18	ST/YC	Roof (BRY)	8.0	61	0.04	1.2	3.0	-1.8	2.4	Non-Acid Forming (Barren)
EB1014622-075	19/08/10	MAC1261	155.00	163.00	8.00	CO	Coal (BRY)	8.7	88	0.54	16.5	12.2	4.3	0.7	Uncertain (PAF)
EB1013377-076	30/07/10	MAC272	81.28	81.51	0.23	SF/ST	Floor (BRY)	7.8	35	0.03	0.9	1.1	-0.2	1.2	Non-Acid Forming (Barren)
EB1014622-002	19/08/10	MAC252R	217.04	217.22	0.18	ST	Roof (FLX)	7.8	72	0.05	1.5	12.0	-10.5	7.8	Non-Acid Forming (Barren)
EB1014622-001	19/08/10	MAC252R	217.82	218.04	0.22	YS	Floor (FLX)	7.3	222	1.60	49.0	12.0	37.0	0.2	Potentially Acid Forming
EB1014622-066	19/08/10	MAC1261	45.00	47.00	2.00	CO	Coal (HRN)	7.6	500	0.82	25.1	17.2	7.9	0.7	Uncertain (PAF)
EB1013377-004	30/07/10	MAC264	37.77	37.97	0.20	YS/YC	Roof (HRA)	8.8	163	0.05	1.5	73.0	-71.5	47.7	Non-Acid Forming (Barren)
EB1013377-006	30/07/10	MAC264	42.59	42.64	0.05	YS	Floor (HRA)	3.4	1,130	13.00	398.1	0.3	397.9	0.001	Potentially Acid Forming
EB1013377-036	30/07/10	MAC264	211.48	211.66	0.18	PC (CG)	Roof (JEA)	8.0	125	0.03	0.9	8.4	-7.5	9.1	Non-Acid Forming (Barren)
EB1013377-074	30/07/10	MAC272	104.68	104.86	0.18	CG	Roof (JEA)	7.9	234	0.05	1.5	20.8	-19.3	13.6	Non-Acid Forming (Barren)
EB1014622-025	19/08/10	MAC252R	129.93	130.11	0.18	CG	Roof (JEA)	8.5	214	0.05	1.5	228.0	-226.5	148.9	Non-Acid Forming (Barren)
EB1013377-037	30/07/10	MAC264	212.13	212.30	0.17	SF	Floor (JEA)	8.6	46	0.03	0.9	8.4	-7.5	9.1	Non-Acid Forming (Barren)
EB1013377-073	30/07/10	MAC272	105.33	105.47	0.14	YS	Floor (JEA)	8.3	61	0.03	0.9	2.6	-1.7	2.8	Non-Acid Forming (Barren)
EB1014622-024	19/08/10	MAC252R	130.69	130.86	0.17	SM	Floor (JEA)	8.8	132	0.03	0.9	15.3	-14.4	16.7	Non-Acid Forming (Barren)
EB1013377-038	30/07/10	MAC264	212.99	213.22	0.23	ST	Roof (JEB)	8.7	79	0.03	0.9	8.0	-7.1	8.7	Non-Acid Forming (Barren)
EB1013377-072	30/07/10	MAC272	105.81	106.04	0.23	ST	Roof (JEB)	8.4	64	0.03	0.9	6.2	-5.3	6.7	Non-Acid Forming (Barren)
EB1014622-023	19/08/10	MAC252R	135.44	135.73	0.29	SC/SM	Roof (JEB)	8.7	155	0.03	0.9	50.4	-49.5	54.9	Non-Acid Forming (Barren)
EB1013377-039	30/07/10	MAC264	215.75	215.90	0.15	ST/ YS	Floor (JEB)	8.7	63	0.02	0.6	5.7	-5.1	9.3	Non-Acid Forming (Barren)
EB1013377-071	30/07/10	MAC272	106.31	106.47	0.16	ST	Floor (JEB)	8.3	71	0.03	0.9	6.7	-5.8	7.3	Non-Acid Forming (Barren)
EB1014622-022	19/08/10	MAC252R	137.36	137.51	0.15	YC	Floor (JEB)	8.5	159	0.05	1.5	10.9	-9.4	7.1	Non-Acid Forming (Barren)
EB1013377-070	30/07/10	MAC272	107.40	107.53	0.13	YS/ST	Roof (JEC)	8.4	95	0.03	0.9	6.5	-5.6	7.1	Non-Acid Forming (Barren)
EB1013377-069	30/07/10	MAC272	108.32	108.44	0.12	YC/YS	Floor (JEC)	8.3	74	0.05	1.5	2.5	-1.0	1.6	Non-Acid Forming (Barren)
EB1013377-051	30/07/10	MAC264	289.47	289.60	0.13	ST	Roof (LRA)	9.2	159	0.03	0.9	9.1	-8.2	9.9	Non-Acid Forming (Barren)
EB1013377-052	30/07/10	MAC264	290.36	290.61	0.25	ST/SF	Floor (LRA)	9.6	169	0.02	0.6	36.5	-35.9	59.6	Non-Acid Forming (Barren)
EB1013377-053	30/07/10	MAC264	297.31	297.48	0.17	YS/YC	Roof (LRB)	9.4	129	0.04	1.2	4.1	-2.9	3.3	Non-Acid Forming (Barren)
EB1013377-054	30/07/10	MAC264	297.87	297.99	0.12	CO	Coal (LRB)	8.6	89	0.24	7.4	13.1	-5.8	1.8	Uncertain (NAF)

Table 2: Acid-base Results for Overburden and Potential Coal Reject Materials - Maules Creek Project

ALS Laboratory Sample ID	Date	Drill Hole ID	Sample Interval (m)			Lithology	Sample Type	pH[1]	EC[1]	Total Sulfur	MPA[2]	ANC[2]	NAPP[2]	ANC/MPA ratio	Sample Classification[3]
			From	To	Depth				(mS/cm)	(%)	(kg H_2SO_4/t)				
EB1013377-041	30/07/10	MAC264	229.82	229.99	0.17	SF	Roof (MEA)	7.1	90	0.03	0.9	288.0	-287.1	313.5	Non-Acid Forming (Barren)
EB1014622-020	19/08/10	MAC252R	151.73	151.98	0.25	YS/YC	Roof (MEA)	8.2	183	0.05	1.5	11.4	-9.9	7.4	Non-Acid Forming (Barren)
EB1014622-019	19/08/10	MAC252R	152.89	153.11	0.22	SD/YS	Floor (MEA)	8.2	172	0.06	1.8	2.6	-0.8	1.4	Non-Acid Forming (Barren)
EB1014622-017	19/08/10	MAC252R	154.42	154.59	0.17	YS	Roof (MEB)	8.7	145	0.04	1.2	11.3	-10.1	9.2	Non-Acid Forming (Barren)
EB1013377-043	30/07/10	MAC264	231.97	232.14	0.17	CO	Coal (MEB)	7.4	18	0.18	5.5	4.2	1.3	0.8	Uncertain (PAF)
EB1013377-043	30/07/10	MAC264	231.97	232.14	0.17	CO	Coal (MEB)	7.4	18	0.18	5.5	4.2	1.3	0.8	Uncertain (PAF)
EB1013377-042	30/07/10	MAC264	230.92	231.18	0.26	SF/ST	Parting (MEB)	8.0	108	0.04	1.2	8.1	-6.9	6.6	Non-Acid Forming (Barren)
EB1013377-044	30/07/10	MAC264	233.19	233.30	0.11	ST/SF	Floor (MEB)	8.6	67	0.04	1.2	4.8	-3.6	3.9	Non-Acid Forming (Barren)
EB1014622-016	19/08/10	MAC252R	156.39	156.58	0.19	YS	Floor (MEB)	8.6	139	0.05	1.5	11.8	-10.3	7.7	Non-Acid Forming (Barren)
EB1014622-015	19/08/10	MAC252R	156.58	156.75	0.17	ST	Roof (MEC)	8.6	131	0.04	1.2	10.6	-9.4	8.7	Non-Acid Forming (Barren)
EB1014622-014	19/08/10	MAC252R	156.97	157.12	0.15	ST	Floor (MEC)	8.7	126	0.05	1.5	11.7	-10.2	7.6	Non-Acid Forming (Barren)
EB1013377-067	30/07/10	MAC272	117.82	117.97	0.15	ST/SS	Roof (MER)	8.3	114	0.05	1.5	4.6	-3.1	3.0	Non-Acid Forming (Barren)
EB1013377-065	30/07/10	MAC272	120.49	120.65	0.16	SF/ST	Floor (MER)	8.0	89	0.03	0.9	7.5	-6.6	8.2	Non-Acid Forming (Barren)
EB1013377-060	30/07/10	MAC272	197.85	197.99	0.14	YS	Roof (NAG)	9.0	163	0.03	0.9	20.3	-19.4	22.1	Non-Acid Forming (Barren)
EB1014622-009	19/08/10	MAC252R	185.20	185.44	0.24	ST	Roof (NAG)	8.7	132	0.04	1.2	11.4	-10.2	9.3	Non-Acid Forming (Barren)
EB1013377-048	30/07/10	MAC264	279.23	279.38	0.15	SF	Floor (NAG)	9.1	85	0.02	0.6	8.8	-8.2	14.4	Non-Acid Forming (Barren)
EB1013377-059	30/07/10	MAC272	198.94	199.09	0.15	YS	Floor (NAG)	8.9	126	0.02	0.6	5.7	-5.1	9.3	Non-Acid Forming (Barren)
EB1013377-008	30/07/10	MAC264	61.98	62.09	0.11	YS/YC	Roof (ONV)	5.2	598	0.38	11.6	2.3	9.3	0.2	Uncertain (PAF)
EB1013377-010	30/07/10	MAC264	63.75	63.88	0.13	CO	Coal (ONV)	4.0	143	0.47	14.4	0.3	14.1	0.02	Potentially Acid Forming
EB1014622-068	19/08/10	MAC1261	67.00	69.00	2.00	CO	Coal (ONV)	2.7	1,770	1.27	38.9	5.5	33.4	0.1	Potentially Acid Forming
EB1013377-009	30/07/10	MAC264	64.17	64.32	0.15	YS	Floor (ONV)	8.0	107	0.35	10.7	3.1	7.6	0.3	Uncertain (PAF)
EB1014622-005	19/08/10	MAC252R	213.29	213.46	0.17	ST	Roof (TER)	8.5	141	0.19	5.8	11.1	-5.3	1.9	Uncertain (NAF)
EB1014622-004	19/08/10	MAC252R	215.74	215.81	0.07	ST	Roof/Floor (TER/LRN)	8.3	175	0.09	2.8	21.2	-18.4	7.7	Non-Acid Forming (Barren)
EB1014622-003	19/08/10	MAC252R	216.79	216.94	0.15	ST	Floor (TER)	7.8	73	0.05	1.5	11.7	-10.2	7.6	Non-Acid Forming (Barren)
EB1013377-055	30/07/10	MAC264	298.82	299.00	0.18	YC	Roof (TEA)	9.0	129	0.12	3.7	4.7	-1.0	1.3	Uncertain (NAF)
EB1013377-056	30/07/10	MAC264	299.11	299.27	0.16	CO	Coal (TEA)	8.6	67	0.31	9.5	5.5	4.0	0.6	Uncertain (PAF)
EB1013377-023	30/07/10	MAC264	116.42	116.54	0.12	ST	Roof (TNN)	9.0	89	0.03	0.9	8.6	-7.7	9.4	Non-Acid Forming (Barren)
EB1014622-032	19/08/10	MAC252R	54.40	54.68	0.28	ST	Roof (TNN)	8.9	113	0.02	0.6	12.6	-12.0	20.6	Non-Acid Forming (Barren)
EB1013377-080	30/07/10	MAC272	56.96	57.09	0.13	ST	Roof (TNN)	8.5	90	0.03	0.9	4.8	-3.9	5.2	Non-Acid Forming (Barren)
EB1014622-072	19/08/10	MAC1261	112.00	113.00	1.00	CO	Coal (TNN)	9.0	108	0.31	9.5	27.2	-17.7	2.9	Non Acid Forming
EB1013377-024	30/07/10	MAC264	117.04	117.21	0.17	ST	Floor (TNN)	9.1	104	0.03	0.9	7.2	-6.3	7.8	Non-Acid Forming (Barren)
EB1013377-079	30/07/10	MAC272	58.07	58.23	0.16	ST	Floor (TNN)	8.5	58	0.03	0.9	3.4	-2.5	3.7	Non-Acid Forming (Barren)
EB1014622-031	19/08/10	MAC252R	55.86	56.06	0.20	SC	Floor (TNN)	8.6	176	0.03	0.9	13.8	-12.9	15.0	Non-Acid Forming (Barren)
EB1013377-019	30/07/10	MAC264	105.74	105.81	0.07	ST/ YS	Roof (TSL)	8.8	78	0.06	1.8	4.3	-2.5	2.3	Non-Acid Forming (Barren)
EB1014622-035	19/08/10	MAC252R	38.85	39.02	0.17	ST	Roof (TSL)	8.4	135	0.04	1.2	11.1	-9.9	9.1	Non-Acid Forming (Barren)
EB1013377-020	30/07/10	MAC264	106.09	106.26	0.17	CO	Coal (TSL)	7.9	27	0.29	8.9	1.7	7.2	0.2	Uncertain (PAF)
EB1013377-021	30/07/10	MAC264	106.84	107.01	0.17	SF/ ST	Floor (TSL)	8.6	80	0.04	1.2	2.7	-1.5	2.2	Non-Acid Forming (Barren)
EB1014622-034	19/08/10	MAC252R	39.75	39.95	0.20	YC	Floor (TSL)	8.6	129	0.07	2.1	10.1	-8.0	4.7	Non-Acid Forming (Barren)
EB1013377-016	30/07/10	MAC264	98.99	99.11	0.12	SS (VF)	Roof (TSM)	9.0	115	0.04	1.2	66.0	-64.8	53.9	Non-Acid Forming (Barren)
EB1014622-038	19/08/10	MAC252R	31.62	31.74	0.12	ST	Roof (TSM)	7.9	172	0.04	1.2	250.0	-248.8	204.1	Non-Acid Forming (Barren)

Table 2: Acid-base Results for Overburden and Potential Coal Reject Materials - Maules Creek Project

ALS Laboratory Sample ID	Date	Drill Hole ID	Sample Interval (m)			Lithology	Sample Type	pH[1]	EC[1]	Total Sulfur	MPA[2]	ANC[2]	NAPP[2]	ANC/MPA ratio	Sample Classification[3]
			From	To	Depth				(mS/cm)	(%)	(kg H_2SO_4/t)				
EB1014622-071	19/08/10	MAC1261	97.00	100.00	3.00	CO	Coal (TSM)	8.7	103	0.30	9.2	15.5	-6.3	1.7	Uncertain (NAF)
EB1013377-017	30/07/10	MAC264	99.63	99.73	0.10	ST	Floor (TSM)	8.8	84	0.03	0.9	38.2	-37.3	41.6	Non-Acid Forming (Barren)
EB1014622-037	19/08/10	MAC252R	32.00	32.21	0.21	YS	Floor (TSM)	8.6	104	0.04	1.2	14.3	-13.1	11.7	Non-Acid Forming (Barren)
EB1013377-082	30/07/10	MAC272	32.76	32.92	0.16	ST	Roof (TST)	7.7	68	0.05	1.5	2.5	-1.0	1.6	Non-Acid Forming (Barren)
EB1013377-081	30/07/10	MAC272	36.73	36.90	0.17	SF/ST	Floor (TST)	7.5	39	0.03	0.9	2.0	-1.1	2.2	Non-Acid Forming (Barren)
EB1013377-013	30/07/10	MAC264	90.17	90.32	0.15	ST/YC	Roof (TSU)	8.9	61	0.04	1.2	14.5	-13.3	11.8	Non-Acid Forming (Barren)
EB1014622-040	19/08/10	MAC252R	28.58	28.84	0.26	YS	Roof (TSU)	8.6	124	0.05	1.5	11.1	-9.6	7.2	Non-Acid Forming (Barren)
EB1013377-014	30/07/10	MAC264	92.10	92.27	0.17	ST/YC	Floor (TSU)	8.9	72	0.03	0.9	8.7	-7.8	9.5	Non-Acid Forming (Barren)
EB1014622-039	19/08/10	MAC252R	30.35	30.52	0.17	YS	Floor (TSU)	7.3	113	0.06	1.8	9.7	-7.9	5.3	Non-Acid Forming (Barren)
EB1013377-049	30/07/10	MAC264	280.05	280.16	0.11	ST	Roof (UPN)	9.3	95	0.03	0.9	8.1	-7.2	8.8	Non-Acid Forming (Barren)
EB1013377-058	30/07/10	MAC272	200.98	201.13	0.15	YS	Roof (UPN)	8.7	91	0.05	1.5	3.5	-2.0	2.3	Non-Acid Forming (Barren)
EB1014622-008	19/08/10	MAC252R	186.81	187.03	0.22	YS	Roof/Floor (UPN/NAG)	8.5	90	0.03	0.9	11.5	-10.6	12.5	Non-Acid Forming (Barren)
EB1013377-050	30/07/10	MAC264	281.90	282.06	0.16	YC/ YS	Floor (UPN)	9.3	162	0.04	1.2	243.0	-241.8	198.4	Non-Acid Forming (Barren)
EB1013377-057	30/07/10	MAC272	201.44	201.62	0.18	YS	Floor (UPN)	9.1	257	0.03	0.9	7.9	-7.0	8.6	Non-Acid Forming (Barren)
EB1014622-007	19/08/10	MAC252R	188.30	188.52	0.22	YS	Floor (UPN)	8.4	106	0.06	1.8	10.1	-8.3	5.5	Non-Acid Forming (Barren)
EB1014622-011	19/08/10	MAC252R	184.02	184.32	0.30	YS	Roof/Floor (VEC/VEB)	8.7	121	0.03	0.9	11.1	-10.2	12.1	Non-Acid Forming (Barren)
EB1014622-012	19/08/10	MAC252R	182.67	182.83	0.16	ST	Roof (VEB)	9.0	170	0.04	1.2	10.3	-9.1	8.4	Non-Acid Forming (Barren)
EB1014622-010	19/08/10	MAC252R	184.81	185.04	0.23	YS	Floor (VEC)	8.5	119	0.04	1.2	10.7	-9.5	8.7	Non-Acid Forming (Barren)
EB1013377-046	30/07/10	MAC264	276.30	276.53	0.23	YC	Roof (VEL)	9.5	76	0.05	1.5	6.8	-5.3	4.4	Non-Acid Forming (Barren)
EB1013377-064	30/07/10	MAC272	131.82	132.00	0.18	ST/SS	Roof (VEL)	8.4	72	0.39	11.9	26.2	-14.3	2.2	Non Acid Forming
EB1013377-047	30/07/10	MAC264	276.69	276.82	0.13	CO	Coal (VEL)	8.0	16	0.22	6.7	4.2	2.5	0.6	Uncertain (PAF)
EB1013377-063	30/07/10	MAC272	133.38	133.54	0.16	ST/SS	Floor (VEL)	8.4	109	0.06	1.8	1.8	0.0	1.0	Non-Acid Forming (Barren)

Notes
1. Current pH, EC, Alkalinity and Acidity provided for 1:5 sample:water extracts
2. MPA = Maximum potential acidity; ANC = Acid neutralising capacity; and NAPP = Net acid producing potential.
3. Sample classification detail provided in report text.

- **NAPP:** The calculated NAPP value for the samples ranges from -320 to +0.4 kg H_2SO_4/t and is typically negative (median -15 kg H_2SO_4/t).

Graph 3 illustrates that the ANC value exceeds the MPA value in most overburden samples and, consequently, all but one of the overburden samples (39 out of 40 samples) have negative NAPP values. The results for some overburden samples (4 samples) are not shown on the graph as the ANC value is very high.

Graph 4 shows a plot of ANC versus MPA for the overburden samples. The ANC/MPA ratio of the samples ranges from 0.4 to 420 and is typically high (median 16). ANC/MPA ratio lines have been plotted on the graph to illustrate the factor of safety associated with the samples. Generally those samples with an ANC/MPA ratio of greater than 2 are considered to have a negligible risk of acid generation and a high factor of safety in terms of potential for ARD (DITR, 2007; INAP, 2009[2]). The results indicate that all of the overburden samples have negligible risk of acid generation and a high factor of safety. The single sample with an ANC/MPA ratio less than 2, has a very low sulphur content (0.02 %) and consequently has negligible capacity to generate acid (≤ 0.6 kg H_2SO_4/t).

The ABA results presented in this section have been used to classify the acid forming nature of the 40 overburden samples as shown in **Table 2**. The geochemical criteria used to classify the acid forming nature of the overburden samples are provided in **Table 3**.

Table 3

Geochemical Classification Criteria for Overburden Materials

Geochemical Classification	Total Sulfur (%)	NAPP (kg H_2SO_4/t)	ANC/MPA Ratio	Number of samples	% of total samples
NAF - Barren	≤ 0.1	-	-	38	95
NAF	> 0.1	≤ - 10	> 2	2	5
Uncertain (NAF)	> 0.1	> - 10 and ≤ 0	-	0	0
Uncertain (PAF)	> 0.1	> 0 and ≤ 10	< 2	0	0
PAF	> 0.1	> 10	< 2	0	0

Notes: NAF = Non-Acid Forming, PAF = Potentially Acid Forming

The results in **Table 3** indicate that most of the overburden samples (38 out of 40) tested fall in the NAF-Barren[3] category. Only two samples were classified as NAF.

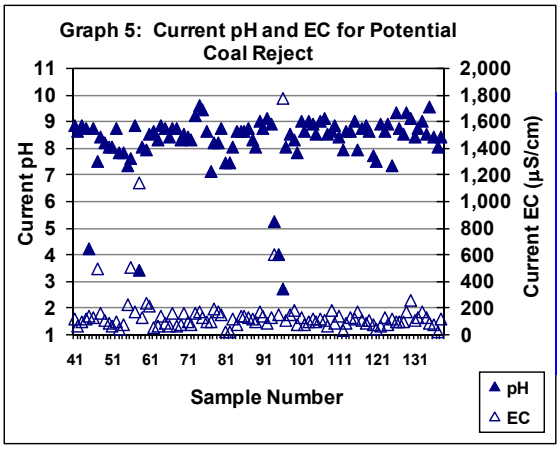
Overall, from an acid-base perspective, the overburden material can be generally be regarded as a NAF unit, that appears to contain significant excess acid neutralising capacity.

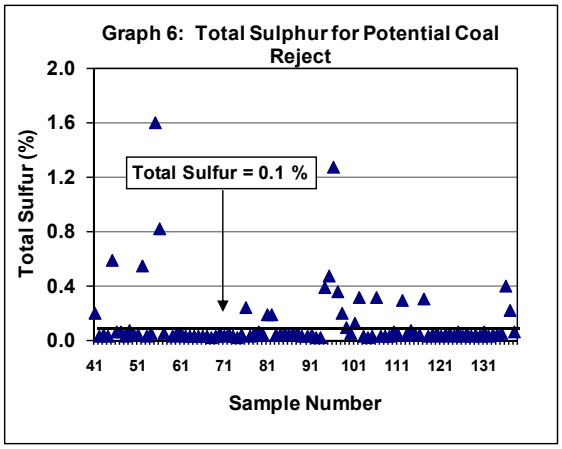
[2] INAP considers that mine materials with an ANC/MPA ratio greater than 2 are likely to be NAF unless significant preferential exposure of sulphides along fracture planes occurs in combination with insufficiently reactive ANC.
[3] Samples with a total sulphur content of ≤ 0.1 % are essentially barren of sulphur and have negligible capacity to generate acidity, even in the absence of significant ANC.

4.1.2 Potential Coal Reject

ABA test results for the 98 potential coal reject samples are presented in **Table 2**, summarised below, and presented in **Graphs 5**, **6**, **7** and **8**.

- **pH**: The current $pH_{1:5}$ of the potential coal reject samples ranges from 2.7 to 9.6 and is typically slightly alkaline (median pH 8.6), as illustrated at **Graph 5**.
- **EC**: The current $EC_{1:5}$ of the potential coal reject samples ranges from 16 to 1,770 µS/cm and is typically low (median 108 µS/cm), as illustrated at **Graph 5**.
- **Total sulphur**: The total sulphur content of the potential coal reject samples ranges from low to high 0.01 to 13 % and is typically low (median 0.04 %). Seventy-seven (77) of the 98 potential coal reject samples tested have total sulphur values less 0.1 %, as illustrated at **Graph 6**.



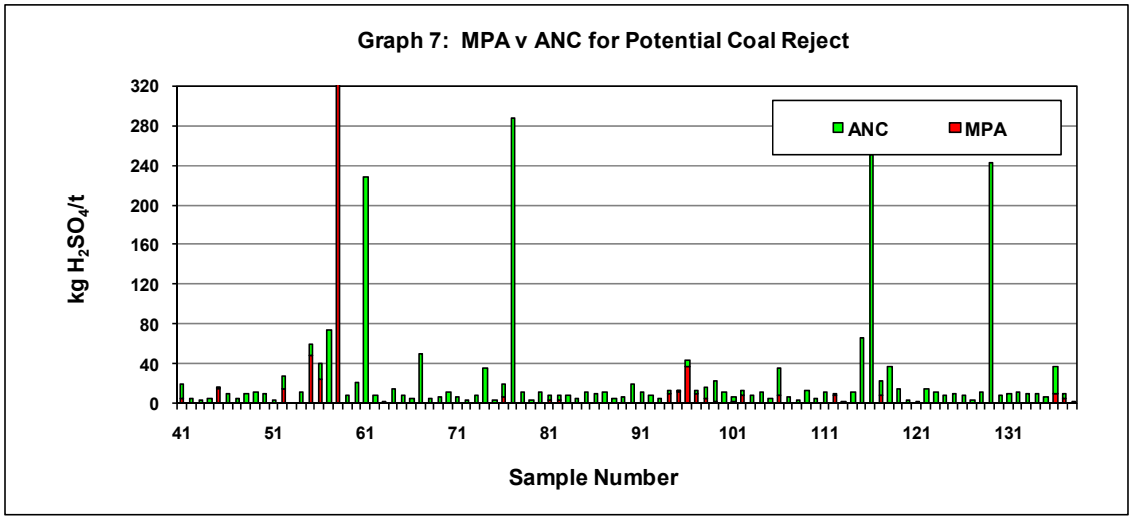


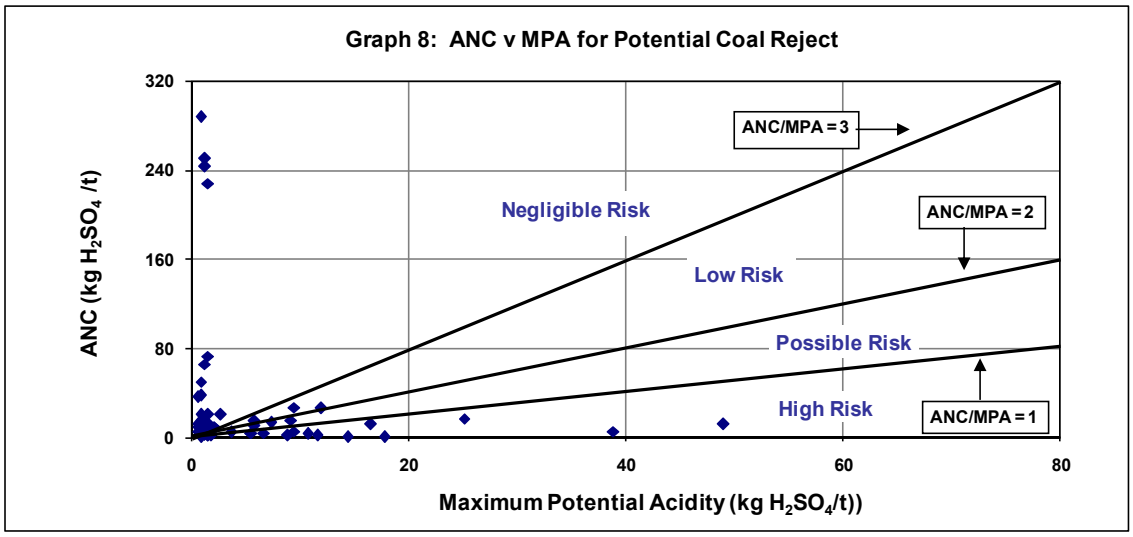
- **MPA**: Based on the total sulphur content, the MPA that could be generated by the potential coal reject samples ranges from low to high (0.6 to 398 kg H_2SO_4/t), with a low median value of 1.2 kg H_2SO_4/t), as illustrated at **Graph 7**.
- **ANC**: The ANC value for the samples ranges from low to high (0.3 to 288 kg H_2SO_4/t), with a low median value of 9 kg H_2SO_4/t), as illustrated at **Graph 7**.
- **NAPP**: The calculated NAPP value for the samples ranges from -287 to +398 kg H_2SO_4/t and is typically negative (median -7 kg H_2SO_4/t).
- **ANC/MPA ratio**: The ANC/MPA ratio of the samples ranges from 0.001 to 314 and is typically greater than 2 (median 6.9).

Graph 7 illustrates that the ANC value exceeds the MPA value in most potential coal reject samples and, consequently, most of these samples (84 out of 98 samples) have negative or zero NAPP. Nine (9) of the 14 samples with a positive NAPP values have an acid generating capacity less than 10 kg H_2SO_4/t and five of the 14 samples have an acid generating capacity greater than 10 kg H_2SO_4/t.

Graph 8 shows a plot of ANC versus MPA for the potential coal reject samples. ANC/MPA ratio lines have been plotted on the graph to illustrate the factor of safety associated with the samples. Generally those samples with an ANC/MPA ratio of greater than 2 (or with a total sulphur content of less than 0.1 %) are considered to have a low risk of acid generation and a high factor of safety in terms of potential for AMD (DITR, 2007; INAP, 2009)[4].

[4] One of the results for the potential coal reject samples (Herndale Floor sample) is not shown on **Graph 8** as it has a much larger MPA value (398 kg H_2SO_4/t) than the rest of the samples.





The results shown in **Graph 8** indicate that 75 of the 98 potential coal reject samples have an ANC:MPA ration greater than 2 and a negligible/low risk of acid generation and a high factor of safety. Of the remaining 23 samples, 9 have an ANC:MPA ratio greater than 1 and 14 have an ANC:MPA ratio less than 1, indicating a possible and high risk of acid generation, respectively.

The ABA results presented in this section have been used to classify the acid forming nature of the 98 potential coal reject samples as shown in **Table 2**. The geochemical criteria used to classify the acid forming nature of the potential coal reject samples are shown at **Table 4**.

Table 4

Geochemical Classification Criteria for Potential Coal Reject Materials

Geochemical Classification	Total Sulfur (%)	NAPP (kg H_2SO_4/t)	ANC/MPA Ratio	Number of samples	% of total samples
NAF - Barren	≤ 0.1	-	-	77	78.6
NAF	> 0.1	≤ - 10	> 2	2	2.0
Uncertain (NAF)	> 0.1	> - 10 and ≤ 0	-	5	5.1
Uncertain (PAF)	> 0.1	> 0 and ≤ 10	< 2	9	9.2
PAF	> 0.1	> 10	< 2	5	5.1

Notes: NAF = Non-Acid Forming, PAF = Potentially Acid Forming

The results in **Table 4** indicate that most of the potential coal reject samples tested (84 out of 98) fall in the NAF-Barren[5], NAF, or Uncertain (NAF) categories. Fourteen (14) samples are classified as Uncertain (PAF) or PAF, and the geochemical characteristic of these samples are shown in **Table 5**.

Table 5

Geochemical Characteristics of Uncertain (PAF) and PAF Materials

Drill Hole ID	Sample Interval (m)			Lithology	Sample Type	pH	EC	Total Sulfur	MPA	ANC	NAPP	ANC/MPA ratio	Sample Classification
	From	To	Depth				(mS/cm)	(%)	(kg H_2SO_4/t)				
MAC264	162.89	163.03	0.14	YS/ CO	Roof (BRM)	4.2	136	0.58	17.8	0.3	17.5	0.01	Potentially Acid Forming
MAC1261	155.00	163.00	8.00	CO	Coal (BRY)	8.7	88	0.54	16.5	12.2	4.3	0.7	Uncertain (PAF)
MAC252R	217.82	218.04	0.22	YS	Floor (FLX)	7.3	222	1.60	49.0	12.0	37.0	0.2	Potentially Acid Forming
MAC1261	45.00	47.00	2.00	CO	Coal (HRN)	7.6	500	0.82	25.1	17.2	7.9	0.7	Uncertain (PAF)
MAC264	42.59	42.64	0.05	YS	Floor (HRA)	3.4	1,130	13.00	398.1	0.3	397.9	0.001	Potentially Acid Forming
MAC264	231.97	232.14	0.17	CO	Coal (MEB)	7.4	18	0.18	5.5	4.2	1.3	0.8	Uncertain (PAF)
MAC264	231.97	232.14	0.17	CO	Coal (MEB)	7.4	18	0.18	5.5	4.2	1.3	0.8	Uncertain (PAF)
MAC264	61.98	62.09	0.11	YS/YC	Roof (ONV)	5.2	598	0.38	11.6	2.3	9.3	0.2	Uncertain (PAF)
MAC264	63.75	63.88	0.13	CO	Coal (ONV)	4.0	143	0.47	14.4	0.3	14.1	0.02	Potentially Acid Forming
MAC1261	67.00	69.00	2.00	CO	Coal (ONV)	2.7	1,770	1.27	38.9	5.5	33.4	0.1	Potentially Acid Forming
MAC264	64.17	64.32	0.15	YS	Floor (ONV)	8.0	107	0.35	10.7	3.1	7.6	0.3	Uncertain (PAF)
MAC264	299.11	299.27	0.16	CO	Coal (TEA)	8.6	67	0.31	9.5	5.5	4.0	0.6	Uncertain (PAF)
MAC264	106.09	106.26	0.17	CO	Coal (TSL)	7.9	27	0.29	8.9	1.7	7.2	0.2	Uncertain (PAF)
MAC264	276.69	276.82	0.13	CO	Coal (VEL)	8.0	16	0.22	6.7	4.2	2.5	0.6	Uncertain (PAF)

The results in **Table 5** indicate that whilst the majority of potential coal reject materials from the Project are likely to be NAF and have a high factor of safety with respect to acid generation, some coal reject materials are present that have uncertain geochemical characteristics or are PAF. The PAF materials appear to be limited to parts of the Braymont, Flixton, Herndale and Onavale coal seams. PAF samples have some capacity to generate acid and materials represented by these samples will need to be well managed at the Project to avoid any issues associated with AMD.

The results of the ABA tests on overburden and potential coal reject samples and any potential implications for mine waste management at the Project are discussed further in **Section 5**.

4.2 Multi-Element Concentration in Solids

Multi-element scans are completed to identify any elements (particularly metals) present in a mine waste material at concentrations that may be of environmental concern with respect to revegetation. The results are then compared to potentially relevant guideline criteria to determine any concerns related to mine operation and final rehabilitation.

For this study, four composite overburden samples were made up from 21 of the 40 individual overburden samples and 11 composite samples of potential coal reject materials were made up from 94 of the 98 individual coal, roof and floor samples. These 15 composite samples were then subjected to multi-element (total metal) test work. The makeup of the composite samples is provided in **Table 6**.

The results from multi-element testing (metals) of the composite overburden and potential coal reject samples are presented in **Table 7**. The acquired data indicates that the total metal concentrations in overburden and potential coal reject materials are relatively low.

4.3 Multi-Element Concentration in Water Extracts

The results from multi-element testing of soluble metals concentrations in water extracts (1:5 solid:water) from the composite overburden and potential coal reject samples are presented in **Table 8**. The extracts are pH neutral to slightly alkaline except for potential coal reject sample ME011 derived from the Onavale coal seam, which has an acidic pH of 4.3 and negligible alkalinity. The extracts typically have low EC values (10 of the 11 composite samples tested have EC values ranging from 106 to 538 µS/cm). The highest EC value was recorded for extract Sample ME006 (1,060 µS/cm) derived from the Herndale coal seam.

The dominant major soluble cation is typically sodium, although the calcium and magnesium concentrations can occasionally be dominant in a few potential coal reject composite samples. The dominant major soluble anions are typically bicarbonate, chloride, and sulphate. The concentrations of calcium, magnesium and sulphate in the water extracts are particularly elevated, compared to most other water extract samples, in samples ME006 and ME011.

The concentrations of trace metals tested in the water extracts is typically very low, and predominantly below the analytical detection limit.

The multi-element (metal) and soluble metal results for composite overburden and potential coal reject samples and any potential implications for waste management and water quality at the Project are discussed further in **Section 5**.

Table 6: Composite Overburden and Potential Coal Reject Materials - Maules Creek Project

ALS Laboratory Sample ID	Date	Drill Hole ID	Sample Interval (m)			Lithology	Sample Type	RGS Composite Number	Sample Classification
			From	To	Depth				
Overburden and Interburden									
EB1013377-001	30/07/10	MAC264	13.56	13.82	0.26	CG	Overburden	Comp_001	Non-Acid Forming (Barren)
EB1013377-075	30/07/10	MAC272	102.49	102.62	0.13	CG	Interburden		Non-Acid Forming (Barren)
EB1013377-084	30/07/10	MAC1261	6.00	12.00	6.00	CG	Overburden		Non-Acid Forming (Barren)
EB1013377-086	30/07/10	MAC1261	30.00	36.00	6.00	CG	Overburden		Non-Acid Forming (Barren)
EB1014622-067	19/08/10	MAC1261	54.00	60.00	6.00	CG	Interburden		Non-Acid Forming (Barren)
EB1014622-073	19/08/10	MAC1261	126.00	132.00	6.00	CG	Interburden		Non-Acid Forming (Barren)
EB1014622-026	19/08/10	MAC252R	129.44	129.67	0.23	CG	Interburden		Non-Acid Forming (Barren)
EB1013377-002	30/07/10	MAC264	34.71	34.87	0.16	SF	Overburden	Comp_002	Non-Acid Forming (Barren)
EB1013377-030	30/07/10	MAC264	143.50	143.73	0.23	SF	Interburden		Non-Acid Forming (Barren)
EB1014622-070	19/08/10	MAC1261	90.00	96.00	6.00	SF	Interburden		Non-Acid Forming (Barren)
EB1014622-036	19/08/10	MAC252R	35.88	36.00	0.12	SF	Interburden		Non-Acid Forming (Barren)
EB1014622-013	19/08/10	MAC252R	157.57	157.79	0.22	SF	Interburden		Non-Acid Forming (Barren)
EB1013377-015	30/07/10	MAC264	95.15	95.41	0.26	SM	Interburden	Comp_003	Non-Acid Forming (Barren)
EB1013377-018	30/07/10	MAC264	102.15	102.33	0.18	SM	Interburden		Non-Acid Forming (Barren)
EB1013377-022	30/07/10	MAC264	109.35	109.55	0.20	SM	Interburden		Non-Acid Forming (Barren)
EB1014622-021	19/08/10	MAC252R	148.40	148.58	0.18	SM	Interburden		Non-Acid Forming (Barren)
EB1013377-003	30/07/10	MAC264	36.75	36.90	0.15	ST	Overburden	Comp_004	Non-Acid Forming (Barren)
EB1013377-027	30/07/10	MAC264	127.92	128.01	0.09	ST	Interburden		Non-Acid Forming (Barren)
EB1013377-040	30/07/10	MAC264	227.00	227.24	0.24	ST	Interburden		Non-Acid Forming (Barren)
EB1013377-085	30/07/10	MAC1261	18.00	19.00	1.00	ST	Overburden		Non-Acid Forming (Barren)
EB1014622-006	19/08/10	MAC252R	212.59	212.76	0.17	ST	Interburden		Non-Acid Forming (Barren)
Potential Coal Reject									
EB1013377-028	30/07/10	MAC264	131.77	131.92	0.15	YS/ST	Roof (BRA)	Comp_005	Non-Acid Forming (Barren)
EB1013377-029	30/07/10	MAC264	133.57	133.75	0.18	SF	Floor (BRA)		Non-Acid Forming (Barren)
EB1013377-032	30/07/10	MAC264	162.89	163.03	0.14	YS/ CO	Roof (BRM)		Potentially Acid Forming
EB1014622-028	19/08/10	MAC252R	103.60	103.73	0.13	CG	Roof (BRL)		Non-Acid Forming (Barren)
EB1013377-033	30/07/10	MAC264	170.02	170.23	0.21	YS/ CO	Floor (BRL)		Non-Acid Forming (Barren)
EB1014622-027	19/08/10	MAC252R	105.09	105.36	0.27	SF	Floor (BRL)		Non-Acid Forming (Barren)
EB1014622-030	19/08/10	MAC252R	92.29	92.44	0.15	YC	Roof (BRT)		Non-Acid Forming (Barren)
EB1014622-029	19/08/10	MAC252R	98.58	98.76	0.18	YS/ CO	Floor (BRT)		Non-Acid Forming (Barren)
EB1013377-077	30/07/10	MAC272	73.54	73.72	0.18	ST/YC	Roof (BRY)		Non-Acid Forming (Barren)
EB1014622-075	19/08/10	MAC1261	155.00	163.00	8.00	CO	Coal (BRY)		Uncertain (PAF)
EB1013377-076	30/07/10	MAC272	81.28	81.51	0.23	SF/ST	Floor (BRY)		Non-Acid Forming (Barren)
EB1014622-066	19/08/10	MAC1261	45.00	47.00	2.00	CO	Coal (HRN)	Comp_006	Uncertain (PAF)
EB1013377-004	30/07/10	MAC264	37.77	37.97	0.20	YS/YC	Roof (HRA)		Non-Acid Forming (Barren)
EB1013377-006	30/07/10	MAC264	42.59	42.64	0.05	YS	Floor (HRA)		Potentially Acid Forming
EB1013377-036	30/07/10	MAC264	211.48	211.66	0.18	PC (CG)	Roof (JEA)	Comp_007	Non-Acid Forming (Barren)
EB1013377-074	30/07/10	MAC272	104.68	104.86	0.18	CG	Roof (JEA)		Non-Acid Forming (Barren)
EB1014622-025	19/08/10	MAC252R	129.93	130.11	0.18	CG	Roof (JEA)		Non-Acid Forming (Barren)
EB1013377-037	30/07/10	MAC264	212.13	212.30	0.17	SF	Floor (JEA)		Non-Acid Forming (Barren)
EB1013377-073	30/07/10	MAC272	105.33	105.47	0.14	YS	Floor (JEA)		Non-Acid Forming (Barren)
EB1014622-024	19/08/10	MAC252R	130.69	130.86	0.17	SM	Floor (JEA)		Non-Acid Forming (Barren)
EB1013377-038	30/07/10	MAC264	212.99	213.22	0.23	ST	Roof (JEB)		Non-Acid Forming (Barren)
EB1013377-072	30/07/10	MAC272	105.81	106.04	0.23	ST	Roof (JEB)		Non-Acid Forming (Barren)
EB1014622-023	19/08/10	MAC252R	135.44	135.73	0.29	SC/SM	Roof (JEB)		Non-Acid Forming (Barren)
EB1013377-039	30/07/10	MAC264	215.75	215.90	0.15	ST/ YS	Floor (JEB)		Non-Acid Forming (Barren)
EB1013377-071	30/07/10	MAC272	106.31	106.47	0.16	ST	Floor (JEB)		Non-Acid Forming (Barren)
EB1014622-022	19/08/10	MAC252R	137.36	137.51	0.15	YC	Floor (JEB)		Non-Acid Forming (Barren)
EB1013377-070	30/07/10	MAC272	107.40	107.53	0.13	YS/ST	Roof (JEC)		Non-Acid Forming (Barren)
EB1013377-069	30/07/10	MAC272	108.32	108.44	0.12	YC/YS	Floor (JEC)		Non-Acid Forming (Barren)
EB1013377-051	30/07/10	MAC264	289.47	289.60	0.13	ST	Roof (LRA)	Comp_008	Non-Acid Forming (Barren)
EB1013377-052	30/07/10	MAC264	290.36	290.61	0.25	ST/SF	Floor (LRA)		Non-Acid Forming (Barren)
EB1013377-053	30/07/10	MAC264	297.31	297.48	0.17	YS/YC	Roof (LRB)		Non-Acid Forming (Barren)
EB1013377-054	30/07/10	MAC264	297.87	297.99	0.12	CO	Coal (LRB)		Uncertain (NAF)
EB1013377-041	30/07/10	MAC264	229.82	229.99	0.17	SF	Roof (MEA)		Non-Acid Forming (Barren)
EB1014622-020	19/08/10	MAC252R	151.73	151.98	0.25	YS/YC	Roof (MEA)		Non-Acid Forming (Barren)
EB1014622-019	19/08/10	MAC252R	152.89	153.11	0.22	SD/YS	Floor (MEA)		Non-Acid Forming (Barren)
EB1014622-017	19/08/10	MAC252R	154.42	154.59	0.17	YS	Roof (MEB)		Non-Acid Forming (Barren)

Table 6: Composite Overburden and Potential Coal Reject Materials - Maules Creek Project

ALS Laboratory Sample ID	Date	Drill Hole ID	Sample Interval (m)			Lithology	Sample Type	RGS Composite Number	Sample Classification
			From	To	Depth				
EB1013377-043	30/07/10	MAC264	231.97	232.14	0.17	CO	Coal (MEB)	Comp_009	Uncertain (PAF)
EB1013377-043	30/07/10	MAC264	231.97	232.14	0.17	CO	Coal (MEB)		Uncertain (PAF)
EB1013377-042	30/07/10	MAC264	230.92	231.18	0.26	SF/ST	Parting (MEB)		Non-Acid Forming (Barren)
EB1013377-044	30/07/10	MAC264	233.19	233.30	0.11	ST/SF	Floor (MEB)		Non-Acid Forming (Barren)
EB1014622-016	19/08/10	MAC252R	156.39	156.58	0.19	YS	Floor (MEB)		Non-Acid Forming (Barren)
EB1014622-015	19/08/10	MAC252R	156.58	156.75	0.17	ST	Roof (MEC)		Non-Acid Forming (Barren)
EB1014622-014	19/08/10	MAC252R	156.97	157.12	0.15	ST	Floor (MEC)		Non-Acid Forming (Barren)
EB1013377-067	30/07/10	MAC272	117.82	117.97	0.15	ST/SS	Roof (MER)		Non-Acid Forming (Barren)
EB1013377-065	30/07/10	MAC272	120.49	120.65	0.16	SF/ST	Floor (MER)		Non-Acid Forming (Barren)
EB1013377-060	30/07/10	MAC272	197.85	197.99	0.14	YS	Roof (NAG)	Comp_010	Non-Acid Forming (Barren)
EB1014622-009	19/08/10	MAC252R	185.20	185.44	0.24	ST	Roof (NAG)		Non-Acid Forming (Barren)
EB1013377-048	30/07/10	MAC264	279.23	279.38	0.15	SF	Floor (NAG)		Non-Acid Forming (Barren)
EB1013377-059	30/07/10	MAC272	198.94	199.09	0.15	YS	Floor (NAG)		Non-Acid Forming (Barren)
EB1013377-008	30/07/10	MAC264	61.98	62.09	0.11	YS/YC	Roof (ONV)	Comp_011	Uncertain (PAF)
EB1013377-010	30/07/10	MAC264	63.75	63.88	0.13	CO	Coal (ONV)		Potentially Acid Forming
EB1014622-068	19/08/10	MAC1261	67.00	69.00	2.00	CO	Coal (ONV)		Potentially Acid Forming
EB1013377-009	30/07/10	MAC264	64.17	64.32	0.15	YS	Floor (ONV)		Uncertain (PAF)
EB1014622-005	19/08/10	MAC252R	213.29	213.46	0.17	ST	Roof (TER)	Comp_012	Uncertain (NAF)
EB1014622-004	19/08/10	MAC252R	215.74	215.81	0.07	ST	Roof/Floor (TER/LRN)		Non-Acid Forming (Barren)
EB1014622-003	19/08/10	MAC252R	216.79	216.94	0.15	ST	Floor (TER)		Non-Acid Forming (Barren)
EB1013377-055	30/07/10	MAC264	298.82	299.00	0.18	YC	Roof (TEA)		Uncertain (NAF)
EB1013377-056	30/07/10	MAC264	299.11	299.27	0.16	CO	Coal (TEA)		Uncertain (PAF)
EB1013377-023	30/07/10	MAC264	116.42	116.54	0.12	ST	Roof (TNN)		Non-Acid Forming (Barren)
EB1014622-032	19/08/10	MAC252R	54.40	54.68	0.28	ST	Roof (TNN)		Non-Acid Forming (Barren)
EB1013377-080	30/07/10	MAC272	56.96	57.09	0.13	ST	Roof (TNN)		Non-Acid Forming (Barren)
EB1014622-072	19/08/10	MAC1261	112.00	113.00	1.00	CO	Coal (TNN)		Non-Acid Forming
EB1013377-024	30/07/10	MAC264	117.04	117.21	0.17	ST	Floor (TNN)		Non-Acid Forming (Barren)
EB1013377-079	30/07/10	MAC272	58.07	58.23	0.16	ST	Floor (TNN)		Non-Acid Forming (Barren)
EB1014622-031	19/08/10	MAC252R	55.86	56.06	0.20	SC	Floor (TNN)		Non-Acid Forming (Barren)
EB1013377-019	30/07/10	MAC264	105.74	105.81	0.07	ST/ YS	Roof (TSL)	Comp_013	Non-Acid Forming (Barren)
EB1014622-035	19/08/10	MAC252R	38.85	39.02	0.17	ST	Roof (TSL)		Non-Acid Forming (Barren)
EB1013377-020	30/07/10	MAC264	106.09	106.26	0.17	CO	Coal (TSL)		Uncertain (PAF)
EB1013377-021	30/07/10	MAC264	106.84	107.01	0.17	SF/ ST	Floor (TSL)		Non-Acid Forming (Barren)
EB1014622-034	19/08/10	MAC252R	39.75	39.95	0.20	YC	Floor (TSL)		Non-Acid Forming (Barren)
EB1013377-016	30/07/10	MAC264	98.99	99.11	0.12	SS (VF)	Roof (TSM)		Non-Acid Forming (Barren)
EB1014622-038	19/08/10	MAC252R	31.62	31.74	0.12	ST	Roof (TSM)		Non-Acid Forming (Barren)
EB1014622-071	19/08/10	MAC1261	97.00	100.00	3.00	CO	Coal (TSM)		Uncertain (NAF)
EB1013377-017	30/07/10	MAC264	99.63	99.73	0.10	ST	Floor (TSM)		Non-Acid Forming (Barren)
EB1014622-037	19/08/10	MAC252R	32.00	32.21	0.21	YS	Floor (TSM)		Non-Acid Forming (Barren)
EB1013377-082	30/07/10	MAC272	32.76	32.92	0.16	ST	Roof (TST)		Non-Acid Forming (Barren)
EB1013377-081	30/07/10	MAC272	36.73	36.90	0.17	SF/ST	Floor (TST)		Non-Acid Forming (Barren)
EB1013377-013	30/07/10	MAC264	90.17	90.32	0.15	ST/YC	Roof (TSU)		Non-Acid Forming (Barren)
EB1014622-040	19/08/10	MAC252R	28.58	28.84	0.26	YS	Roof (TSU)		Non-Acid Forming (Barren)
EB1013377-014	30/07/10	MAC264	92.10	92.27	0.17	ST/YC	Floor (TSU)		Non-Acid Forming (Barren)
EB1014622-039	19/08/10	MAC252R	30.35	30.52	0.17	YS	Floor (TSU)		Non-Acid Forming (Barren)
EB1013377-049	30/07/10	MAC264	280.05	280.16	0.11	ST	Roof (UPN)	Comp_014	Non-Acid Forming (Barren)
EB1013377-058	30/07/10	MAC272	200.98	201.13	0.15	YS	Roof (UPN)		Non-Acid Forming (Barren)
EB1014622-008	19/08/10	MAC252R	186.81	187.03	0.22	YS	Roof/Floor (UPN/NAG)		Non-Acid Forming (Barren)
EB1013377-050	30/07/10	MAC264	281.90	282.06	0.16	YC/ YS	Floor (UPN)		Non-Acid Forming (Barren)
EB1013377-057	30/07/10	MAC272	201.44	201.62	0.18	YS	Floor (UPN)		Non-Acid Forming (Barren)
EB1014622-007	19/08/10	MAC252R	188.30	188.52	0.22	YS	Floor (UPN)		Non-Acid Forming (Barren)
EB1014622-011	19/08/10	MAC252R	184.02	184.32	0.30	YS	Roof/Floor (VEC/VEB)	Comp_015	Non-Acid Forming (Barren)
EB1014622-012	19/08/10	MAC252R	182.67	182.83	0.16	ST	Roof (VEB)		Non-Acid Forming (Barren)
EB1014622-010	19/08/10	MAC252R	184.81	185.04	0.23	YS	Floor (VEC)		Non-Acid Forming (Barren)
EB1013377-046	30/07/10	MAC264	276.30	276.53	0.23	YC	Roof (VEL)		Non-Acid Forming (Barren)
EB1013377-064	30/07/10	MAC272	131.82	132.00	0.18	ST/SS	Roof (VEL)		Non-Acid Forming
EB1013377-047	30/07/10	MAC264	276.69	276.82	0.13	CO	Coal (VEL)		Uncertain (PAF)
EB1013377-063	30/07/10	MAC272	133.38	133.54	0.16	ST/SS	Floor (VEL)		Non-Acid Forming (Barren)

Table 7: Multi-Element Results for Overburden and Potential Coal Reject Materials - Maules Creek Project

			Overburden				Potential Coal Reject										
	RGS composite number -->		ME001	ME002	ME003	ME004	ME005	ME006	ME007	ME008	ME009	ME010	ME011	ME012	ME013	ME014	ME015
	Material description -->		Conglomerate	Sandstone (fine)	Sandstone (medium)	Siltstone	Braymont Roof, Floor, Coal	Herndale Roof, Floor, Coal	Jeralong Roof, Floor, Coal	Lower Northam Roof, Floor, Coal	Merriown Roof, Floor, Coal	Nagero Roof, Floor, Coal	Onivale Roof, Floor, Coal	Thornfield Roof, Floor, Coal	Teston Roof, Floor, Coal	Opper Northam Roof, Floor, Coal	Velyama Roof, Floor, Coal
Parameters	Detection Limit	NEPC[1] Health-Based Investigation Level															
Elements	All units mg/kg																
Aluminium (Al)	50	-	2,350	3,260	2,340	3,880	3,420	2,300	2,730	3,440	2,960	4,040	2,610	3,970	3,060	3,860	3,340
Antimony (Sb)	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Arsenic (As)	5	200	<5	<5	<5	<5	6	8	<5	5	<5	<5	8	<5	6	23	<5
Boron (B)	50	6,000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium (Cd)	1	40	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Calcium (Ca)	10	-	6,580	28,700	7,910	2,550	1,290	8,560	11,400	4,850	2,660	3,510	970	2,710	2,630	2,130	1,380
Chromium (Cr) total	2	-*	44	12	10	5	5	5	14	4	3	5	3	6	3	6	6
Cobalt (Co)	2	200	4	4	12	13	5	5	2	6	3	4	3	5	4	5	3
Copper (Cu)	5	2,000	5	13	9	24	20	16	19	26	25	35	14	31	22	48	23
Iron (Fe)	50	-	8,410	28,200	8,920	14,100	1,470	47,800	27,800	3,920	71,300	6,200	3,920	5,320	18,200	7,960	4,330
Lead (Pb)	5	600	9	11	13	18	19	18	13	14	12	15	9	16	14	16	15
Magnesium (Mg)	10	-	1,560	10,400	3,050	2,680	570	3,820	2,790	2,520	1,690	700	610	1,200	1,870	8,980	920
Manganese (Mn)	5	3,000	117	585	66	106	8	48	524	53	1,770	57	<5	32	152	59	35
Molybdenum (Mo)	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	2	<2
Nickel (Ni)	2	600	12	11	23	21	12	21	11	15	12	9	16	11	13	29	6
Phosphorus (P)	50	-	100	130	90	180	70	<50	80	90	100	60	<50	70	60	<50	70
Potassium (K)	10	-	810	880	660	1,120	860	820	800	1,160	980	680	910	950	940	710	1,170
Selenium (Se)	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Sodium (Na)	10	-	230	210	190	190	120	110	120	370	150	360	140	180	120	390	200
Zinc (Zn)	5	14,000	26	66	47	132	59	30	52	30	52	119	36	50	45	49	75
Exchangeable Cations	All units meq/100g (except Exchangeable Sodium Percentage (%))																
Exch. Calcium	0.1	-	12.3	14.7	8.8	6.2	-	-	-	-	-	-	-	-	-	-	-
Exch. Magnesium	0.1	-	1.8	4.4	2.8	5.3	-	-	-	-	-	-	-	-	-	-	-
Exch. Potassium	0.1	-	0.7	0.6	0.4	0.7	-	-	-	-	-	-	-	-	-	-	-
Exch. Sodium	0.1	-	0.3	0.4	0.4	0.5	-	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	0.1	-	15.1	20.1	12.5	12.8	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percentage	0.1 %	-	2.2	2.0	3.0	4.0	-	-	-	-	-	-	-	-	-	-	-
Calcium/Magnesium Ratio	0.1 %	-	6.8	3.3	3.1	1.2	-	-	-	-	-	-	-	-	-	-	-

Notes < indicates less than the analytical detection limit.

1. NEPC (1999)a. National Environmental Protection Council (NEPC). National Environmental Protection (Assessment of Site Contamination) Measure (NEPM). Guideline on investigation levels for soil and groundwater. HIL(E); parks, recreation open space and playing fields.

* Guideline level for Cr(VI) = 200 mg/kg. Guideine level for Cr(III) = 24% of total Cr.

Table 8: Multi-Element Results for Water Extracts from Overburden and Potential Coal Reject Materials - Maules Creek Project

			Overburden				Potential Coal Reject										
	RGS composite number -->		ME001	ME002	ME003	ME004	ME005	ME006	ME007	ME008	ME009	ME010	ME011	ME012	ME013	ME014	ME015
	Material description -->		Conglomerate	Sandstone (fine)	Sandstone (medium)	Siltstone	Braymont Roof, Floor, Coal	Herndale Roof, Floor, Coal	Jeralong Roof, Floor, Coal	Lower Northam Roof, Floor, Coal	Merriown Roof, Floor, Coal	Nagero Roof, Floor, Coal	Onivale Roof, Floor, Coal	Thornfield Roof, Floor, Coal	Teston Roof, Floor, Coal	Opper Northam Roof, Floor, Coal	Velyama Roof, Floor, Coal
Parameters	Detection Limit	Guideline Levels[1]															
pH	0.1 pH unit	-	8.9	8.8	8.8	8.7	7.3	7.1	8.8	9.2	8.5	8.9	4.3	8.5	8.0	8.8	8.5
Electrical Conductivity	1 µS/cm	-	153	174	150	122	187	1,060	141	155	140	194	538	167	114	216	106
Total Alkalinity ($mgCaCO_3/L$)	1 mg/L	-	982	5,280	668	298	149	298	1,498	396	198	298	<1	298	224	916	224
Bicarbonate Alkalinity ($mgCaCO_3/L$)	1 mg/L	-	952	5,260	594	272	149	298	1,450	346	173	248	<1	272	224	868	198
Carbonate Alkalinity ($mgCaCO_3/L$)	1 mg/L	-	29	20	74	25	<1	<1	50	50	25	50	<1	25	<1	50	25
Major Ions	All element concentrations in mg/L																
Calcium (Ca)	2	1,000	8	10	8	2	12	118	10	<2	6	<2	44	8	6	4	<2
Magnesium (Mg)	2	-	4	4	4	4	<2	78	4	<2	<2	<2	28	2	2	<2	<2
Sodium (Na)	2	-	12	14	14	16	12	4	8	32	16	40	10	18	8	42	18
Potassium (K)	2	-	10	8	6	6	8	4	8	4	8	4	16	8	8	4	6
Chloride (Cl)	2	-	4	8	2	24	4	4	16	84	52	36	4	26	32	40	52
Sulphate (SO_4)	2	1,000	16	10	18	12	36	508	10	2	6	8	252	8	6	10	6
Metals	All element concentrations in mg/L																
Aluminium (Al)	0.2	5	<0.2	<0.2	<0.2	0.4	<0.2	<0.2	<0.2	0.8	0.2	0.2	<0.2	<0.2	0.4	0.2	0.6
Antimony (Sb)	0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (As)	0.02	0.5	<0.02	0.04	0.14	0.04	<0.02	<0.02	0.02	0.18	<0.02	0.04	<0.02	0.06	0.04	0.6	0.02
Boron (B)	0.2	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium (Cd)	0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chromium (Cr)	0.02	1 / -	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cobalt (Co)	0.02	1	<0.02	<0.02	<0.02	<0.02	<0.02	0.1	<0.02	<0.02	<0.02	<0.02	0.1	<0.02	<0.02	<0.02	<0.02
Copper (Cu)	0.02	1 / 0.5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Iron (Fe)	0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	4.6	<0.2	<0.2	<0.2	<0.2
Lead (Pb)	0.02	0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Manganese (Mn)	0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	0.36	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.02	<0.02	<0.02
Molybdenum (Mo)	0.02	0.15 / 0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	0.02	<0.02	<0.02	0.02	0.12	<0.02
Nickel (Ni)	0.02	1	<0.02	<0.02	<0.02	<0.02	<0.02	0.3	<0.02	<0.02	<0.02	<0.02	0.3	<0.02	<0.02	<0.02	<0.02
Phosphorus (P)	0.1	-	<0.02	<0.02	0.04	<0.02	0.1	<0.02	<0.02	0.1	<0.02	0.0	<0.02	0.02	0.04	0.24	<0.02
Selenium (Se)	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Zinc (Zn)	0.02	20	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	0.5	<0.02	<0.02	<0.02	<0.02

Notes: < Indicates concentration less than the detection limit. Shaded cells indicate values which exceed applied ANZECC/NEPC guideline values.

1. The first guideline level shown refers to ANZECC (2000) and the second to NEPC (1999) e.g. 0.15 / 0.01. Where the two guidelines limits for a given element are in agreement, only one value is shown. A 'dash' represents no trigger value provided for this element.

a. ANZECC and ARMCANZ, Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra, ACT (2000). Livestock drinking water (cattle).

4.4 Effective Cation Exchange Capacity and Sodicity

The effective Cation Exchange Capacity (eCEC) results presented in **Table 7** indicate that the eCEC of composite overburden samples is moderate and ranges from 12.5 to 20.1 meq/100g.

The exchangeable sodium percentage (ESP) results presented in **Table 7** indicate that the sodicity of composite overburden and coal reject samples is low, ranging from 2 to 4 %.

The results of the eCEC and ESP tests on composite mine waste samples and any potential implications for waste management at the Project are discussed further in **Section 5**.

4.5 Kinetic Leach Column Tests

Kinetic Leach Column (KLC) tests were completed for six composite samples of overburden and potential coal reject materials using the methodology described in **Section 3**. Three of the six composite samples comprised overburden materials and the remainder comprised potential coal reject materials. The makeup of the composite samples used in the KLC tests is provided at **Table 9**.

Table 9

Overburden and Potential Coal Reject Samples used for KLC Tests

Drill Hole ID	Sample Interval (m)			Lithology	Sample Type	pH	EC	Total Sulfur	MPA	ANC	NAPP	ANC/MPA ratio	KLC Sample Number	Sample Classification
	From	To	Depth				(mS/cm)	(%)	(kg H_2SO_4/t)					
Overburden														
MAC264	13.56	13.82	0.26	CG	Overburden	8.3	20	0.02	0.6	3.0	-2.4	4.9		Non-Acid Forming (Barren)
MAC272	102.49	102.62	0.13	CG	Interburden	8.3	182	0.03	0.9	13.9	-13.0	15.1		Non-Acid Forming (Barren)
MAC1261	6.00	12.00	6.00	CG	Overburden	8.5	176	0.03	0.9	15.5	-14.6	16.9		Non-Acid Forming (Barren)
MAC1261	30.00	36.00	6.00	CG	Overburden	8.3	34	0.02	0.6	0.3	0.4	0.4	1	Non-Acid Forming (Barren)
MAC1261	54.00	60.00	6.00	CG	Interburden	8.7	96	0.05	1.5	15.2	-13.7	9.9		Non-Acid Forming (Barren)
MAC1261	126.00	132.00	6.00	CG	Interburden	9.1	106	0.04	1.2	34.2	-33.0	27.9		Non-Acid Forming (Barren)
MAC252R	129.44	129.67	0.23	CG	Interburden	8.6	164	0.04	1.2	63.7	-62.5	52.0		Non-Acid Forming (Barren)
MAC264	34.71	34.87	0.16	SF	Overburden	9.0	203	0.03	0.9	321.0	-320.1	349.4		Non-Acid Forming (Barren)
MAC264	143.50	143.73	0.23	SF	Interburden	8.7	115	0.05	1.5	11.9	-10.4	7.8		Non-Acid Forming (Barren)
MAC1261	90.00	96.00	6.00	SF	Interburden	8.9	124	0.08	2.5	52.7	-50.3	21.5	2	Non-Acid Forming (Barren)
MAC252R	35.88	36.00	0.12	SF	Interburden	8.2	98	0.03	0.9	15.5	-14.6	16.9		Non-Acid Forming (Barren)
MAC252R	157.57	157.79	0.22	SF	Interburden	8.4	132	0.03	0.9	16.7	-15.8	18.2		Non-Acid Forming (Barren)
MAC264	36.75	36.90	0.15	ST	Overburden	8.6	74	0.03	0.9	5.9	-5.0	6.4		Non-Acid Forming (Barren)
MAC264	127.92	128.01	0.09	ST	Interburden	8.8	108	0.03	0.9	18.8	-17.9	20.5		Non-Acid Forming (Barren)
MAC264	227.00	227.24	0.24	ST	Interburden	8.8	84	0.03	0.9	12.2	-11.3	13.3	3	Non-Acid Forming (Barren)
MAC1261	18.00	19.00	1.00	ST	Overburden	8.6	78	0.03	0.9	2.2	-1.3	2.4		Non-Acid Forming (Barren)
MAC252R	212.59	212.76	0.17	ST	Interburden	8.8	156	0.03	0.9	14.7	-13.8	16.0		Non-Acid Forming (Barren)
Potential Coal Reject														
MAC264	131.77	131.92	0.15	YS/ST	Roof (BRA)	8.8	95	0.04	1.2	4.3	-3.1	3.5		Non-Acid Forming (Barren)
MAC264	133.57	133.75	0.18	SF	Floor (BRA)	8.7	113	0.03	0.9	4.7	-3.8	5.1		Non-Acid Forming (Barren)
MAC264	162.89	163.03	0.14	YS/ CO	Roof (BRM)	4.2	136	0.58	17.8	0.3	17.5	0.0		Potentially Acid Forming
MAC252R	103.60	103.73	0.13	CG	Roof (BRL)	8.7	126	0.06	1.8	10.1	-8.3	5.5		Non-Acid Forming (Barren)
MAC264	170.02	170.23	0.21	YS/ CO	Floor (BRL)	7.5	487	0.06	1.8	4.4	-2.6	2.4		Non-Acid Forming (Barren)
MAC252R	105.09	105.36	0.27	SF	Floor (BRL)	8.4	158	0.03	0.9	10.2	-9.3	11.1	4	Non-Acid Forming (Barren)
MAC252R	92.29	92.44	0.15	YC	Roof (BRT)	8.2	105	0.07	2.1	10.0	-7.9	4.7		Non-Acid Forming (Barren)
MAC252R	98.58	98.76	0.18	YS/ CO	Floor (BRT)	8.0	86	0.04	1.2	9.9	-8.7	8.1		Non-Acid Forming (Barren)
MAC272	73.54	73.72	0.18	ST/YC	Roof (BRY)	8.0	61	0.04	1.2	3.0	-1.8	2.4		Non-Acid Forming (Barren)
MAC1261	155.00	163.00	8.00	CO	Coal (BRY)	8.7	88	0.54	16.5	12.2	4.3	0.7		Uncertain (PAF)
MAC272	81.28	81.51	0.23	SF/ST	Floor (BRY)	7.8	35	0.03	0.9	1.1	-0.2	1.2		Non-Acid Forming (Barren)
MAC1261	45.00	47.00	2.00	CO	Coal (HRN)	7.6	500	0.82	25.1	17.2	7.9	0.7		Uncertain (PAF)
MAC264	37.77	37.97	0.20	YS/YC	Roof (HRA)	8.8	163	0.05	1.5	73.0	-71.5	47.7	5	Non-Acid Forming (Barren)
MAC264	42.59	42.64	0.05	YS	Floor (HRA)	3.4	1,130	13.00	398.1	0.3	397.9	0.001		Potentially Acid Forming
MAC264	61.98	62.09	0.11	YS/YC	Roof (ONV)	5.2	598	0.38	11.6	2.3	9.3	0.2		Uncertain (PAF)
MAC264	63.75	63.88	0.13	CO	Coal (ONV)	4.0	143	0.47	14.4	0.3	14.1	0.02	6	Potentially Acid Forming
MAC1261	67.00	69.00	2.00	CO	Coal (ONV)	2.7	1,770	1.27	38.9	5.5	33.4	0.1		Potentially Acid Forming
MAC264	64.17	64.32	0.15	YS	Floor (ONV)	8.0	107	0.35	10.7	3.1	7.6	0.3		Uncertain (PAF)

The geochemical results and trends obtained for the six KLC tests are presented at **Attachment C**. Tables **KLC1** to **KLC6** provide KLC test data, selected components of which are shown graphically at **Figures KLC1** to **KLC6.** The KLC test results obtained over the 12 week test period indicate that:

- Leachate from overburden materials is likely to remain pH neutral to slightly alkaline.
- Leachate from unblended PAF potential coal reject materials may become acidic within a matter of weeks of exposure to oxidising conditions.
- Leachate from overburden materials is likely to have a low salinity value (EC typically less than 250 µS/cm). In contrast leachate from unblended PAF potential coal reject materials is likely to be saline than overburden (EC can exceed 2,000 µS/cm).
- The acidity of leachate from all of the KLC tests on overburden is low and these materials are typically net alkaline. In contrast, leachate from the potential coal reject has very little alkalinity and can have an excess of acidity. For example, the acidity value for leachate from the unblended Onavale seam materials can exceed 500 mg/L (as $CaCO_3$);
- The concentrations of soluble calcium and magnesium in leachate from the KLC tests have been used to calculate the residual ANC in these materials. For overburden materials, the residual ANC remains above 98.8%. In contrast the residual ANC in unblended PAF potential coal reject materials can be significantly reduced after several weeks of exposure to oxidising conditions. The results indicate that most of the originally measured ANC remains in the overburden samples whereas in the potential coal reject samples, some of the ANC is being consumed due to partial neutralisation of acid generated through sulfide oxidation;
- The concentration of soluble sulfate in leachate from the KLC tests has been used to calculate the residual sulfur content of the sample materials. The results indicate that the residual sulfur content of the samples remains high after twelve weeks of leaching;
- The concentration of soluble sulfate in leachate from the KLC tests is strongly linked to EC values. The soluble sulfate concentrations in leachate from the PAF potential coal reject materials (unblended Herndale and Onavale seam materials) can exceed 1,000 mg/L);
- The ratio of soluble sulfate to calcium (SO_4:Ca) in leachate from the KLC tests is generally lower for overburden than unblended PAF potential coal reject materials. In particular, the (SO_4:Ca) ratio can exceed 6 for leachate from the Onavale Seam sample, which indicates that sulfide oxidation is currently occurring at a faster rate than that of acid neutralisation; and
- The concentration of soluble trace metals in leachate from the KLC tests is very low for overburden but can be elevated for unblended PAF potential coal reject materials, particularly those generating acid leachate.

Potential implications of these results with respect to management of overburden and coal reject materials at the Project are discussed at **Section 5.0**.

5.0 DISCUSSION

5.1 Acid Base Account and KLC Test Results

The results of the ABA tests presented in **Section 4**, indicate that all overburden (and interburden[5]) materials tested are likely to be NAF and have a high factor of safety with respect to potential acid generation. Most overburden samples have negligible total sulphur content and a moderate ANC. Overall, from an acid-base perspective, the overburden material can be regarded as a NAF unit, that contains significant excess ANC. This finding correlates well with the findings of previous geochemical assessment work completed at the Maules Creek Coal Mine described in **Section 3**.

The results of the ABA tests presented in **Section 4**, indicate that whilst most of the potential coal reject materials tested have a low risk of acid generation and a high factor of safety, some have uncertain geochemical characteristics and a few are PAF. The few PAF potential coal reject materials appear to be limited to the Braymont, Herndale and Onavale seams. The single PAF sample from the Flixton seam may be anomalous based on the geological genesis of this seam, however this should be confirmed at the processing plant when (blended) coal reject samples become available.

It is understood that it is not practical to separate both the coarse and fine coal rejects (on the basis of coal seam source) at the CHPP, hence both coarse and fine coal rejects produced will comprise blends of multiple seams. In addition, coarse and fine coal rejects from the Herndale and Onavale seams will each represent only a small proportion (<5%) of the overall coal reject blends. Hence, any PAF material is likely to be blended out by NAF material during coal processing. In contrast, coarse and fine rejects from the Braymont seam represents 31% of the overall coal reject blend but may, at times, comprise approximately half of the overall coal reject blend. Hence, it is possible that some coal reject blends containing Braymont seam material may have a reduced factor of safety with respect to potential acid generation. It is therefore recommended that any PAF coal reject blends generated at the CHPP be identified and managed avoid any issues associated with AMD. As a conservative management measure, RGS recommends deep (in pit) burial for any coal reject materials identified as PAF, as soon as sufficient capacity becomes available in the open pit. It is acknowledged that some co-disposal of coal rejects at the out-of-pit overburden dump will be required early in mine life. For co-disposal, it is recommended that as an interim measure, any PAF coal rejects are encapsulated in the core of the out-of-pit overburden dump and covered as soon as practical with at least 5 metres of NAF overburden material to minimise the length of exposure time to oxidising conditions (and minimise the potential for AMD)[1].

It is also likely that coal seam roof and floor material that does not report as dilution (along with coal) to the CHPP will end up being spoiled along with the bulk overburden materials. It is therefore also recommended that any overburden containing PAF roof and floor materials be buried deep in the open pit, when sufficient capacity becomes available. If co-disposal of PAF roof and floor materials with NAF bulk overburden materials is required early in mine life as an interim measure at the out-of-pit overburden dump, it should also covered as soon as practical with at least 5 metres of NAF overburden material.

The KLC test results presented in **Section 4** confirm the benign geochemical nature of overburden, and the reactive geochemical nature of unblended PAF potential coal reject material from some coal seams. This finding can be illustrated by calculating the material oxidation rate from the sulphate generation rate in the KLC tests. The sulfate generation rate and calculated oxidation rate for the six composite overburden and potential coal reject samples used in the KLC tests is provided at **Table 10**.

[5] For the purpose of this discussion, overburden (and interburden) materials are collectively termed overburden.

Table 10

Oxidation Rates for Overburden and Potential Coal Reject Materials

KLC Sample Name	Sulfate Generation Rate (mg/kg/week)	Oxidation Rate (kg $O_2/m^3/s$)
KLC1 Overburden (Conglomerate)	5.4	8.1×10^{-9}
KLC2 Overburden (Sandstone)	6.9	1.0×10^{-8}
KLC3 Overburden (Siltstone)	11.8	2.2×10^{-8}
KLC4 Coal Reject (Braymont Seam)	23.8	4.4×10^{-8}
KLC5 Coal Reject (Herndale Seam)	258.0	4.7×10^{-7}
KLC6 Coal Reject (Onavale Seam)	318.0	5.8×10^{-7}

The sulfate generation rate from the three composite overburden samples ranges from 5.4 to 11.8 mg/kg/week, which suggests that the rate of sulfide oxidation is very low in these materials (equivalent to an oxidation rate ranging from 8.1×10^{-9} to 2.2×10^{-8} kg $O_2/m^3/s$). Results of previous KLC test work completed as part of a mining industry sponsored study program (AMIRA, 1995) indicate that mine materials with an oxidation rate of $<1 \times 10^{-8}$ kg $O_2/m^3/s$ and moderate ANC levels have a high factor of safety and are likely to generate pH neutral to alkaline leachate.

In contrast, the sulfate generation rate from the three composite potential coal reject samples ranges from 23.8 to 318.0 mg/kg/week, which suggests that the rate of sulfide oxidation is elevated in these materials (equivalent to an oxidation rate ranging from 4.4×10^{-8} to 5.8×10^{-7} kg $O_2/m^3/s$). Previous AMIRA results indicate that mine materials with an oxidation rate of $>1 \times 10^{-8}$ kg $O_2/m^3/s$, elevated sulphur content, and low ANC levels have a lower factor of safety and could potentially generate acidic leachate. Given the relatively high sulphide oxidation rate of potential coal reject material from the Onavale seam and relatively low ANC value (3 kg H_2SO_4/t), it is likely that this material (if not blended with NAF coal reject material from other seams) could generate acidic leachate within a matter of weeks of exposure to oxidising conditions.

5.2 Multi-Element Composition

For multi-element (metal) concentrations in overburden or potential coal reject materials in NSW, there are no specific guidelines and/or regulatory criteria. In the absence of these and to provide relevant context, RGS has compared the total metal concentration in overburden and potential coal reject materials (solids) to health-based investigation levels (HILs) that apply to soils in parks, recreational open spaces and playing fields (NEPC, 1999a). The applicability of this guideline stems from the potential final land use of the mine following closure (*e.g.* forestry, ecological values and agricultural activities).

The results indicate that metal concentrations in overburden and potential coal reject samples are well within the applied NEPC guideline criteria for soils and are unlikely to present any environmental issues associated with revegetation and rehabilitation.

5.3 Water Quality

There are also no specific regulatory criteria for metal concentrations in leachate derived from overburden and potential coal reject materials on mine sites in NSW. RGS has therefore compared the multi-element concentrations in water extracts from these materials with Australian guidelines to provide some context for discussion of test results (ANZECC, 2000 and NEPC, 1999b).

Water extract results indicate that initial surface run-off and seepage from most overburden and coal reject materials is likely to be pH neutral to slightly alkaline. The exception is coal reject material from the Onavale coal seam, where the presence of unblended PAF materials may initially generate acidic surface run-off and seepage. Over time, run-off and seepage from any unblended PAF coal rejects derived from the Braymont and Herndale coal seams may also become acidic due to the presence of PAF materials, if these materials are exposed to oxidising conditions.

Surface run-off and seepage from most overburden and potential coal reject materials is likely to have low salinity (EC) values, although salinity values are expected to be higher from PAF materials. Given that the salinity values presented in this report are derived from pulverised samples, where the surface area in contact with water is much greater than at a typical overburden or coal rejects emplacement areas, and that further dilution is likely in the field, this laboratory salinity result is likely to represent a potential 'worst case' scenario for NAF materials. Hence, the risk of saline run-off and seepage from most overburden and potential coal reject materials significantly impacting the quality of surface and groundwater from the Project is expected to be low. In contrast, the risk of saline run-off and seepage from any exposed PAF materials potentially impacting surface and groundwater quality, if not appropriately managed, is expected to be moderate.

Based on the water extract results and existing groundwater data (EIS, 1989), the major ion chemistry of initial surface run-off and seepage from overburden and potential coal reject materials will be dominated by sodium, bicarbonate, chloride and sulphate, although for PAF materials, calcium, magnesium and sulphate may become more dominant with time. .

There are no guidelines and regulatory criteria specifically related to seepage from overburden and potential coal reject materials in Australia since guidelines (and regulatory criteria) will depend upon the end-use and receiving environment of the seepage. In addition, the results from KLC tests on overburden and potential coal reject materials in this study are indicative only and cannot be directly compared against water quality guidelines such as ANZECC (2000) and NEPC (1999b) surface water and groundwater guidelines. Relevant comparisons with water quality guidelines for leachate from a waste material are typically based on a 1:5 (solid:water) extract. For the KLC tests, the experimental methodology produced leachate reflecting a solid:water ratio of at least 2:1. Hence, the results obtained for the KLC tests presented at **Attachment C** require dilution by a factor of 10 to provide any sort of arbitrary comparison with water quality guidelines. In addition scale-up and other factors in the field provide additional complexity, which means that simplistic interpretation of KLC test results and direct comparison against water quality guidelines should be treated with caution.

Leachate from most overburden and NAF potential coal reject materials is likely to contain low concentrations of dissolved metals indicating that these metals are sparingly soluble at the neutral to slightly alkaline pH. Given that water extract data presented in this report represents pore water chemistry for pulverised samples and that further dilution effects from rainfall and natural attenuation are likely to occur in the field, it is concluded that the concentration of dissolved metals in any run-off and seepage from overburden and NAF potential coal reject materials is unlikely to present any significant environmental issues associated with on-site or downstream water quality from the Project. For unblended PAF potential coal reject materials, there is some potential for the concentration of dissolved metals in surface run-off and seepage to increase over time. Hence, these materials will need to be blended and well managed at the project.

5.4 Material Suitability for use in Revegetation and Rehabilitation

The following discussion provides some context to the soil chemistry of overburden materials, should these materials report to final landform surfaces. From a soil chemistry viewpoint, all of the overburden materials are likely to be pH neutral to slightly alkaline. The materials will generally have low EC/salinity, and display moderate eCEC values.

All of the overburden and samples tested had ESP values less than or equal to 4 %. Where the EC is relatively low, such as in the tested samples, soils are considered sodic if the ESP value is greater than 6% and less than 14% and strongly sodic if the ESP is 15 or more (Isbell, 2002; and Northcote and Skene, 1972). Materials classified as sodic may be prone to dispersion and erosion. Hence, the ESP results for overburden materials at the Project indicate that materials are unlikely to be sodic and may be suitable for revegetation and rehabilitation activities (in final landform surfaces or as a growth medium) for the Project.

The balance of nutrient ratios in overburden also provides an indicator of their likely suitability for revegetation and rehabilitation activities. The table below (**Table 11**) shows the proportions of each exchangeable cation relative to eCEC. The 'desirable' proportions of each major cation are also shown (Abbott, 1989, in Hazelton and Murphy, 2007).

When compared to the desirable ranges for exchangeable cations in soil (**Table 11**), exchangeable Ca and K proportions in most overburden materials are ideal, and exchangeable Mg and Na proportions are slightly high. Of the four types of composite overburden materials tested, the conglomerate and sandstone overburden materials appear to have marginally more favourable exchangeable cation % eCEC proportions than siltstone and may be more amenable to revegetation and rehabilitation activities (in final surfaces or as a growth medium). Notwithstanding, revegetation/rehabilitation field trials are recommended for overburden materials when operations commence and bulk material become available to confirm these preliminary findings.

Table 11

eCEC proportions for major exchangeable cations

Exchangeable Cation	Desirable ranges	Overburden
	% CEC	
Calcium (Ca)	65 – 80	48 - 81 (mean 68)
Magnesium (Mg)	10 – 15	12 – 41 (mean 24)
Potassium (K)	1 – 5	3 – 5 (median 4)
Sodium (Na)	0 – 1	2 - 4 (median 3)

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

RGS has completed a geochemical assessment of representative overburden and potential coal reject materials from the Project. From the results of this work it is concluded that:

6.1.1 Overburden

- Overburden materials at the Project are likely to be NAF and have a high factor of safety with respect to potential acid generation. Most overburden samples have negligible total sulphur content and a moderate ANC;
- The concentration of total metals in overburden solids is well below applied guideline criteria for soils and is unlikely to present any environmental issues associated with revegetation and rehabilitation;
- Most overburden materials will generate slightly alkaline and relatively low-salinity run-off and seepage following surface exposure. The major ion chemistry of initial surface run-off and seepage from overburden materials is likely to be dominated by sodium, bicarbonate, chloride and sulphate;
- The concentration of dissolved metals in initial and ongoing run-off and seepage from overburden materials is unlikely to present any significant environmental issues associated with surface and ground water quality as a result of the Project; and
- Overburden materials are likely to be non-sodic and may be suitable for revegetation and rehabilitation activities (in final surfaces or as a growth medium). Conglomerate and sandstone overburden materials may have a marginally more favourable nutrient balance than siltstone and therefore may be more amenable to revegetation and rehabilitation activities.

6.1.2 Potential Coal Reject

- Most blended potential coal reject materials are likely to be NAF and have a high factor of safety with respect to potential acid generation;
- A few of the potential coal reject materials are PAF, although these PAF materials appear to be limited to the Braymont, Herndale and Onavale seams and are likely to be blended with NAF coal reject materials at the CHPP;
- The concentration of total metals in potential coal reject solids is well below applied guideline criteria for soils and is unlikely to present any environmental issues. ;
- Most NAF potential coal reject materials will generate slightly alkaline and relatively low-salinity run-off and seepage following surface exposure. However, PAF potential coal reject materials may generate acidic and more saline run-off and seepage if exposed to oxidising conditions;
- The major ion chemistry of initial surface run-off and seepage from NAF potential coal reject materials is likely to be dominated by sodium, bicarbonate, chloride and sulphate. For PAF materials, calcium, magnesium and sulphate may become more dominant.
- For PAF materials, the initial concentration of soluble sulphate in surface run-off and seepage is expected to be relatively low, although further exposure to oxidising conditions may lead to increased sulphate concentrations; and
- The concentration of dissolved metals in initial run-off and seepage from NAF potential coal reject materials is unlikely to present any significant environmental issues associated with surface water and groundwater quality as a result of the Project. For PAF materials, there is some potential for the concentration of dissolved metals in surface run-off and seepage to increase over time, if not managed appropriately.

6.2 Recommendations

6.2.1 Overburden

The ongoing management of overburden should consider the geochemistry of these materials with respect to their potential risk to cause harm to the environment and their suitability for use in construction and revegetation. It is therefore recommended that the Proponent undertakes:

- Pre-stripping topsoil from areas to be mined for use in final rehabilitation activities (surface cover or vegetation growth medium);
- Placement of overburden at the emplacement area in a manner that limits the risk of surface erosion; and
- To complement the Soils & Landscape Impact Assessment (GSSE, 2010), field trials to identify the most appropriate topsoil and overburden materials for revegetation and rehabilitation of final landforms.

Surface water and seepage from overburden material, should be monitored to ensure that key water quality parameters remain within appropriate criteria. It is therefore recommended that the Proponent:

- Monitors standard parameters for run-off/seepage from the overburden emplacement areas (pH, EC and total suspended solids (TSS)), as required.

6.2.2 Potential Coal Reject

The ongoing management of potential coal rejects material should consider the geochemistry of materials with respect to their potential risk to cause harm to the environment and their suitability for use in construction and revegetation. It is therefore recommended that the Proponent considers:

- Placement of NAF coal reject materials in the open pit and/or co-disposal with overburden;
- Deep (in-pit) burial of any blended coal reject materials identified as PAF. Out-of-pit co-disposal of PAF rejects in overburden encapsulated cells may need to be considered until sufficient capacity in the open pit becomes available;
- Deep (in-pit) burial of any PAF roof and floor materials that do not report as dilution to the CHPP. Out-of-pit co-disposal of PAF roof and floor materials in overburden encapsulated cells may need to be considered until sufficient capacity in the open pit becomes available;
- Covering of PAF coal reject and PAF roof and floor materials as soon as practical (within a few weeks) with at least 5 metres of overburden material to minimise the length of exposure time to oxidising conditions (and minimise the potential for AMD)[1];
- For the co-disposal method, placement of NAF coal reject material in a manner that limits the risk of erosion; and
- Verifying the geochemical characteristics of blended coal reject materials using the same static geochemical tests as those completed in this report, in future, (post approval) when bulk samples become available from the CHPP or similar process.

Surface water and seepage from coal reject material, should be monitored to ensure that key water quality parameters remain within appropriate criteria. It is therefore recommended that the Proponent:

- Monitors standard run-off/seepage from coal reject emplacement areas (pH, EC and TSS) on a monthly basis and also dissolved metals, as required.

6.0 REFERENCES

ACARP (2008). *Development of ARD Assessment for Coal Process Wastes*. ACARP Project C15034. Report prepared by Environmental Geochemistry International and Levay and Co. Environmental Services, ACeSSS University of South Australia, July 2008.

AMIRA (1995). Mine Waste Management: *Project P387 Prediction and Identification of Acid Forming Mine Waste*. Australian Minerals Industry Research Association, Report prepared by EGi Pty Ltd, August 1995.

AMIRA (2002). *ARD Test Handbook: Project 387A Prediction and Kinetic Control of Acid Mine Drainage*. Australian Minerals Industry Research Association, Ian Wark Research Institute and Environmental Geochemistry International Pty Ltd, May 2002.

EIS (1989). *Maules Creek Coal Project Environmental Impact Statement*. Kembla Coal and Coke Pty Limited, September 1989.

ANZECC (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Environment Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra, ACT (2000). Livestock drinking water (cattle).

DITR (2007). Department of Industry, Tourism and Resources. Leading Practice Sustainable Development Program for the Mining Industry. Managing Acid and Metalliferous Drainage. February 2007, Canberra ACT.

Dames & Moore (1983a). *Maules Creek Project. Preliminary Overburden and Interburden Characterisation Programme*, Report prepared by Dames & Moore Pty Ltd, March 1983

Dames & Moore (1983b). *Maules Creek Project. Supplementary Overburden and Interburden Characterisation Programme*, Report prepared by Dames & Moore Pty Ltd, June 1983.

Hansen Bailey (2010). *Maules Creek Coal Project Preliminary Environmental Assessment*. Report prepared for Aston Resources Limited, 10th August 2010.

Hazelton, P.A. and Murphy, B.W (Eds). (2007). *Interpreting Soil Test Results: What do all the numbers mean?* [2nd edn.] CSIRO Publishing, Collingwood, Victoria.

INAP (2009). *Global Acid Rock Drainage Guide(GARD Guide).* Document prepared by Golder Associates on behalf of the International Network on Acid Prevention (INAP). June 2009 (http://www.inap.com.au/).

Isbell, R.F. (2002). The Australian Soil Classification (revised edition). CSIRO Publishing. Victoria.

JB Mining Services (2009). *Coal Resources at Maules Creek. A Statement of the Insitu JORC Raw Coal Resources Within CL375 at Maules Creek, Near Gunnedah, NSW*. Report prepared by JB Mining Sservices Pty Ltd for Aston Resources Limited, 16th November 2009.

NEPC (1999a). National Environmental Protection Council (NEPC). National Environmental Protection (Assessment of Site Contamination) Measure (NEPM). Guideline on investigation levels for soil and groundwater. HIL(E); parks, recreation open space and playing fields.

NEPC (1999b). National Environment Protection Council (NEPC). National Environmental Protection (Assessment of Site Contamination) Measure (NEPM). Guideline on investigation levels for soil and groundwater. Groundwater Investigations Levels (Agricultural: Livestock).

Northcote, K.H., and Skene, J.K.M. (1972). *Australian Soils with Saline and Sodic properties.* CSIRO Australia, Soil Publication No. 27, Canberra.

7.0 LIMITATIONS

RGS Environmental Pty Ltd (RGS) has prepared this report for the use of Hansen Bailey Pty Ltd (Hansen Bailey) and Aston Resources Limited (Aston). It is based on accepted consulting practices and standards and no other warranty is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in Proposal P001-A (091022) dated 20 March 2010.

This report was prepared from July 2010 to January 2011 and is based on the information provided by Hansen Bailey and Aston at the time of preparation. RGS disclaims responsibility for any changes that may have occurred after this time.

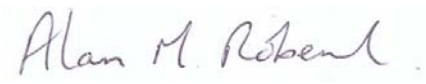
The sources of information and methodology used by RGS are outlined in this report and no independent verification of this information has been made. RGS assumes no responsibility for any inaccuracies or omissions, although no indication was found that any information contained in this report as provided to RGS was incorrect.

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

If you have any questions regarding the information presented in this report, please contact the undersigned on (+617) 3856 5591 or (+61) 431 620 623.

Yours sincerely,

RGS ENVIRONMENTAL PTY LTD



Dr. Alan Robertson
Principal Geochemist/Director

ATTACHMENT A

Drill Hole Summary

ASTON RESOURCES - MAULES CREEK

DRILL HOLE SUMMARY SHEET

Page 1

SITE DATA

SITE No.	PURPOSE	DRILL HOLE No.
NEW	COAL QUALITY, STRATIGRAPHY, STRUCTURE	MAC264

SITE EASTING (A.M.G.)	SITE NORTHING (A.M.G.)	R.L.u(masl+2000m	DRILL LINE	AREA
227630	6614206	na	Section 13	MAULES CREEK

HOLE DATA

EASTING (A.M.G.)	NORTHING (A.M.G.)		R.L.u(masl)	SURVEYED BY	
COMMENCED	**COMPLETED**		**T.D. (m)**	**HOLE SIZE (mm)**	**HOLE TYPE**
03-Jun-10	16-Jun-10		300.36	99.00	NON-CORE ☐ CORE X
DRILLED BY	**DRILLER**	**DRILLRIG**		**GEOLOGIST**	
GOS DRILLING	TAL BOYD	ATLAS COPCO - RIG 24		OSCAR CLARK	

DRILLING DETAILS

CASING DETAILS	DRILL BIT	BLADE	SURFACE SET			
TYPE : HWT	BIT SIZE (mm)	146.0	99.0			
SIZE : 124 mm	FROM (m)	0.00	1.00			
TO : 18 m	TO (m)	1.00	300.36			

DRILLING COMMENTS :	Hole encountered several issues. Cemented several times due to loss of water circulation. Rods bogged and cut at 153m. 147m of rods to Rod Barrel including tbe stuck in hole from 153 to 300.36m	DRILL FLUID :	ERAL MUDS, BENTIN

GEOPHYSICAL LOGGING

LOGGING COMPANY	LOGGER	DATE LOGGED	WATER LEVEL (m)	UNIT No.
GROUNDSEARCH	A DAVIS	19-Jun-10		

CCS X	SONIC	NEUTRON	VERTICALITY	COMMENTS :	Density tool run inside HQ rods. Could only log from 295m and up (above barrel)
DIP	SCANNER	TEMP	DEVIATION		

STRATIGRAPHY	DATA SOURCE	DEPTH TO TOP (m)	DEPTH TO BASE (m)	THICK-NESS (m)	INTERSEAM (m)	COMMENTS
BOW		25.56	25.56			
HRA		38.12	38.23	0.11		
BAND1		38.58	38.62	0.04	0.35	
HRB		38.80	39.40	0.60	0.18	
HRC		40.73	41.45	0.72	1.33	
HRD		41.76	42.65	0.89	0.31	
BAND2		43.66	43.84	0.18	1.01	
ONV		62.15	64.38	2.23	18.31	
TSU		90.52	92.27	1.75	26.14	
TSM		99.33	99.74	0.41	7.06	
BAND3		101.23	101.33	0.10	1.49	
BAND4		104.96	105.08	0.12	3.63	
TSL		106.23	107.48	1.25	1.15	
BAND5		111.24	111.32	0.08	3.76	
TNN		117.18	117.69	0.51	5.86	
BAND6		126.28	126.42	0.14	8.59	
BRA		132.44	134.10	1.66	6.02	
BAND7		135.13	135.38	0.25	1.03	
BRM		163.56	163.69	0.13	28.18	
BRA		163.69	164.16	0.47		
BRM		164.16	165.96	1.80		
BRA		165.96	166.02	0.06		
BRM		166.02	167.86	1.84		
BRL		167.93	170.54	2.61	0.07	
JEA		212.06	212.52	0.46	41.52	
JEB		213.61	216.15	2.54	1.09	
BAND8		220.20	220.44	0.24	4.05	
MEA		230.43	231.32	0.89	9.99	
MEB		231.57	232.45	0.88	0.25	
MEC		232.45	233.64	1.19		
VEB		277.07	277.52	0.45	43.43	
VEC		277.52	278.23	0.71		

STRUCTURAL FEATURES	DATA SOURCE	DEPTH (m)	COMMENTS
			Hole was abandoned due to several problems. Rod strings bogged. HQ rods + barrel still in hole from 147m to 300.36m

ADDITIONAL TESTS

CORE PHOTOS X	SLAKE TEST	OTHERS	V.NOTCH WEIR TEST	S.W.L. 1 m	S.W.L. 2	CHECKED BY
COAL ANALYSIS	GEOTECH LOG	GEOTECH SAMPLES	POINT LOAD TESTS	GROUTED: / DATE GROUTED:		DATE PRINTED 13-Jul-10

ASTON RESOURCES - MAULES CREEK

NO PICK FILE

DRILL HOLE SUMMARY SHEET

SITE DATA

SITE No.	*PURPOSE*	*DRILL HOLE No.*
NEW	COAL QUALITY, STRATIGRAPHY, STRUCTURE	MAC264

STRATIGRAPHY	DATA SOURCE	DEPTH TO TOP (m)	DEPTH TO BASE (m)	THICK-NESS (m)	INTERSEAM (m)	COMMENTS
NAG		278.35	280.00	1.65		
UPN		281.11	282.78	1.67	1.11	
LRA		290.65	290.90	0.25	7.87	
LRB		298.01	299.02	1.01	7.11	
TEA		299.49	299.70	0.21	0.47	
TEB		299.87	300.36	0.49	0.17	

ADDITIONAL TESTS

CORE PHOTOS: X	QUALITY ANALYSIS:	OTHERS:	V.NOTCH WEIR TEST:	S.W.L. 1: m	S.W.L. 2:	CHECKED BY:	
COAL ANALYSIS:	GEOTECH LOG:	GEOTECH SAMPLES:	POINT LOAD TESTS:	GROUTED: / DATE GROUTED:		DATE PRINTED: 13-Jul-10	

ASTON RESOURCES - MAULES CREEK

DRILL HOLE SUMMARY SHEET

Page 1

SITE DATA

SITE No.	PURPOSE	DRILL HOLE No.
S09-4	INTRUSION DELINEATION, COAL QUALITY & STRATIGRAPHY	MAC272

SITE EASTING (A.M.G.)	SITE NORTHING (A.M.G.)	R.L.u(masl+2000m	DRILL LINE	AREA
224668.819	6613564.973	365.004	Section 09	MAULES CREEK

HOLE DATA

EASTING (A.M.G.)	NORTHING (A.M.G.)		R.L.u(masl)	SURVEYED BY	
COMMENCED	**COMPLETED**		**T.D. (m)**	**HOLE SIZE (mm)**	**HOLE TYPE**
04-Jul-10	12-Jul-10		224.92	124.00	NON-CORE ☐ CORE ☒
DRILLED BY	**DRILLER**	**DRILLRIG**		**GEOLOGIST**	
GOS DRILLING	HAYDEN BRUNT	ATLAS COPCO - RIG 25		H JENNINGS / W HAN	

DRILLING DETAILS

CASING DETAILS		DRILL BIT	BLADE	SURFACE SET			
TYPE :	HWT	BIT SIZE (mm)	124.0	96.0			
SIZE :	124 mm	FROM (m)	0.00	62.00			
TO :	6.2 m	TO (m)	62.00	224.92			

DRILLING COMMENTS :	Lost circulation within the Braymont Seam. Cemented after drilled through Braymont.	DRILL FLUID :	AIR/WATER

GEOPHYSICAL LOGGING

LOGGING COMPANY	LOGGER	DATE LOGGED	WATER LEVEL (m)	UNIT No.
WEATHERFORD	ALM/KGM	15-Jul-10		

CCS	X	SONIC	X	NEUTRON		VERTICALITY	X	COMMENTS :
DIP		SCANNER		RESISTIV	X	DEVIATION		66m of Conglomerate between VEL & NAG

STRATIGRAPHY	DATA SOURCE	DEPTH TO TOP (m)	DEPTH TO BASE (m)	THICK-NESS (m)	INTERSEAM (m)	COMMENTS
BOW		15.41	15.41			
TST		32.94	36.66	3.72		
TNN		57.10	58.08	0.98	20.44	
BRY1		73.72	75.00	1.28	15.64	
BRY2		75.00	79.95	4.95		
BRY3		79.95	81.28	1.33		
JEA		104.86	105.34	0.48	23.58	
JEB		106.04	106.33	0.29	0.70	
JEC		107.54	108.34	0.80	1.21	
MER		118.06	120.59	2.53	9.72	
VEL		132.09	133.45	1.36	11.50	
NAG		198.05	199.00	0.95	64.60	
UPN		201.24	201.55	0.31	2.24	

STRUCTURAL FEATURES	DATA SOURCE	DEPTH (m)	COMMENTS

ADDITIONAL TESTS

CORE PHOTOS	X	COAL ANALYSIS	X	OTHERS		V.NOTCH WEIR TEST		TD V.NOTCH FLOW RATE litres/sec		S.W.L.	CHECKED BY LKZ
GAS TESTING		GEOTECH LOG		GEOTECH SAMPLES		POINT LOAD TESTS		GROUTED:			DATE PRINTED 18-Jul-10
								DATE GROUTED:			

ASTON RESOURCES - MAULES CREEK

DRILL HOLE SUMMARY SHEET

SITE DATA

SITE No.	PURPOSE	DRILL HOLE No.
S5-3	GEOCHEMISTRY TESTING. STRATIGRAPHY	MAC1261

SITE EASTING (A.M.G.)	SITE NORTHING (A.M.G.)	R.L.u(masl+2000m	DRILL LINE	AREA
226738.36	6614938.515	377.305	Section 5	MAULES CREEK

HOLE DATA

EASTING (A.M.G.)	NORTHING (A.M.G.)		R.L.u(masl)	SURVEYED BY

COMMENCED	COMPLETED		T.D. (m)	HOLE SIZE (mm)	HOLE TYPE
15-Jul-10	16-Jul-10		180.30	150.00	NON-CORE ☐ CORE ☐

DRILLED BY	DRILLER	DRILLRIG	GEOLOGIST
GOS DRILLING	AARON RADBURN	RIG28	HUGH JENNINGS

DRILLING DETAILS

CASING DETAILS
TYPE : PVC
SIZE : 150mm mm
TO : 6 m

DRILL BIT	HAMMER	HAMMER
BIT SIZE (mm)	114.3	114.3
FROM (m)	0.00	6.00
TO (m)	6.00	180.30

DRILLING COMMENTS : WATER INTERSECTED AT 165.00m

DRILL FLUID : AIR

GEOPHYSICAL LOGGING

LOGGING COMPANY	LOGGER	DATE LOGGED	WATER LEVEL (m)	UNIT No.
GROUNDSEARCH	MICHAEL LEE	17-Jul-10		

CCS	X	SONIC	X	NEUTRON		VERTICALITY	X	COMMENTS :
DIP		SCANNER		RESISTIV	X	DEVIATION		

STRATIGRAPHY	DATA SOURCE	DEPTH TO TOP (m)	DEPTH TO BASE (m)	THICK-NESS (m)	INTERSEAM (m)	COMMENTS
HRA		44.38	44.67	0.29		
HRB		44.76	45.24	0.48	0.09	
HRC		45.85	47.19	1.34	0.61	
HRD		47.82	47.92	0.10	0.63	
ONV		66.67	68.45	1.78	18.75	
TSU		87.63	89.35	1.72	19.18	
TSM		96.31	97.64	1.33	6.96	
TSL		100.11	101.27	1.16	2.47	
TNN		112.22	112.90	0.68	10.95	
BRY		155.04	163.62	8.58	42.14	

STRUCTURAL FEATURES	DATA SOURCE	DEPTH (m)	COMMENTS

ADDITIONAL TESTS

CORE PHOTOS		COAL ANALYSIS		OTHERS		V.NOTCH WEIR TEST	X	TD V.NOTCH FLOW RATE		S.W.L.	CHECKED BY	
								7.59 L/min	litres/sec		LKZ	
GAS TESTING		GEOTECH LOG		GEOTECH SAMPLES		POINT LOAD TESTS		GROUTED:			DATE PRINTED	
								DATE GROUTED:			18-Jul-10	

BORE NAME MAC252R

DEPTH	THICKNESS	RECOVERED	GEOLOGICAL DESCRIPTION OF STRATA		SEAM	COMMENTS
0.200	0.200	0.200	SOIL	BROWN, WEATHERED TO SOIL.		
8.000	7.800	7.800	CONGLOMERATE	PURPLE ORANGE, COMPLETELY WEATHERED, COBBLE SIZED.		
8.500	0.500	0.500	CARBONACEOUS CLAYSTONE	DARK, GREY, HIGHLY WEATHERED.		
18.500	10.000	10.000	CONGLOMERATE	YELLOW ORANGE, HIGHLY WEATHERED, COBBLE SIZED.		
18.500	0.000	0.000			BOW	BASE OF WEATHERING
27.270	8.770	9.300	CONGLOMERATE	LIGHT, GREY, UNWEATHERED, COBBLE SIZED.		SAMPLE 41 OVERBURDEN.
28.840	1.570	1.570	CLAYSTONE	GREY, CLAYEY IN PARTS, MEDIUM STRONG.		SAMPLE 40 - ROOF
28.860	0.020	0.020	COAL	1-10% BRIGHT.	TSU	
29.490	0.630	0.630	COAL		TSU	SAMPLE 1 - GM098
29.510	0.020	0.020	COAL	60-90% BRIGHT.	TSU	
29.990	0.480	0.480	COAL	>90% BRIGHT, BROKEN CORE.	TSU	
30.070	0.080	0.080	COAL	60-90% BRIGHT.	TSU	
30.350	0.280	0.280	COAL	>90% BRIGHT, BROKEN CORE.	TSU	
31.420	1.070	1.070	CLAYSTONE	LIGHT, GREY, MINOR CARBONACEOUS BANDS TOWARDS TOP OF UNIT.		SAMPLE 39. FLOOR.
31.620	0.200	0.000	NO RECOVERY/CORE LOSS			
31.740	0.120	0.120	SILTSTONE	LIGHT, GREY CREAM, SANDY PHASES, VERY STRONG.		SAMPLE 38 ROOF
31.760	0.020	0.020	COAL	DULL <1% BRIGHT.	TSM	
31.800	0.040	0.040	CLAYSTONE	DARK, GREY, CARBONACEOUS IN PARTS, STRONG.	TSM	
31.830	0.030	0.030	COAL	40-60% BRIGHT.	TSM	
32.000	0.170	0.170	COAL	>90% BRIGHT, BROKEN CORE.	TSM	
32.520	0.520	0.520	CLAYSTONE	DARK, GREY, CARBONACEOUS TOWARDS BASE OF UNIT, STRONG, BROKEN CORE.		SAMPLE 37. FLOOR.
35.680	3.160	3.160	SANDSTONE FINE GRAINED	LIGHT, GREY, CLAY BANDS, STRONG, COMPACT, FINE TO MEDIUM GRAINED.		SAMPLE 36. INTERBURDEN.
36.380	0.700	0.000	NO RECOVERY/CORE LOSS			
39.020	2.640	2.640	SILTSTONE	GREY, MINOR SANDY BANDS, VERY STRONG, COMPACT.		SAMPLE 35. ROOF
39.740	0.720	0.720	COAL		TSL	SAMPLE 2 - GW062
39.750	0.010	0.010	COAL	1-10% BRIGHT.	TSL	
39.760	0.010	0.010	CLAYSTONE	GREY, CLAYEY PHASES, WEAK.		SAMPLE 34 FLOOR
40.750	0.990	0.990	NO RECOVERY/CORE LOSS			
41.120	0.370	0.100	NO RECOVERY/CORE LOSS			
44.470	3.350	3.350	CLAYSTONE	GREY, CLAYEY PHASES, SILTY BANDS, WEAK.		
45.620	1.150	1.150	SANDSTONE FINE GRAINED	LIGHT, GREY, STRONG, COMPACT.		
47.920	2.300	2.300	CONGLOMERATE	LIGHT, GREY GREEN, LITHIC, VERY STRONG, COMPACT, COBBLE SIZED.		
48.100	0.180	0.180	NO RECOVERY/CORE LOSS			
48.600	0.500	0.500	CONGLOMERATE	LIGHT, GREY GREEN, LITHIC, RARE CARBONACEOUS LENSES, STRONG, COMPACT, COBBLE SIZED.		
50.000	1.400	1.400	SANDSTONE COARSE GRAINED	LIGHT, GREY, LITHIC, LOOSE.		
50.060	0.060	0.600	NO RECOVERY/CORE LOSS			
51.910	1.850	1.850	SANDSTONE COARSE GRAINED	LIGHT, GREY, LITHIC, BROKEN CORE.		
52.060	0.150	0.150	NO RECOVERY/CORE			

BORE NAME MAC252R PAGE 2

DEPTH	THICKNESS	RECOVERED	GEOLOGICAL DESCRIPTION OF STRATA		SEAM	COMMENTS
			LOSS			
53.490	1.430	1.430	SANDSTONE COARSE GRAINED	LIGHT, GREY, LITHIC, BROKEN CORE, MEDIUM STRONG, LOOSE, COBBLE SIZED.		SAMPLE 33. INTERBURDEN
53.560	0.070	0.070	NO RECOVERY/CORE LOSS			
53.700	0.140	0.140	SANDSTONE COARSE GRAINED			
54.680	0.980	0.980	CLAYSTONE	LIGHT, GREY, ABUNDANT CARBONACEOUS WISPS, MEDIUM STRONG, COMPACT, LAMINATED, 0.		SAMPLE 32. ROOF.
55.580	0.900	0.650	NO RECOVERY/CORE LOSS		TNN	
55.780	0.200	0.200	COAL	40-60% BRIGHT.	TNN	
55.820	0.040	0.040	CARBONACEOUS CLAYSTONE	DARK, GREY.	TNN	
55.860	0.040	0.040	COAL	10-40% BRIGHT.	TNN	
56.810	0.950	0.950	CLAYSTONE	DARK, GREY, MINOR COALY WISPS, MEDIUM STRONG, BROKEN CORE, VERY FINE GRAINED.		SAMPLE#31 FLOOR.
57.690	0.880	0.880	SANDSTONE FINE GRAINED	LIGHT, GREY, SILTY IN PARTS.		
59.560	1.870	1.870	SANDSTONE COARSE GRAINED	LIGHT, GREY, LITHIC, STRONG, COMPACT.		
59.810	0.250	0.250	NO RECOVERY/CORE LOSS			
61.880	2.070	2.070	SANDSTONE COARSE GRAINED	LIGHT, GREY, LITHIC, VERY STRONG, COMPACT, COARSE GRAINED, MASSIVE.		
63.260	1.380	1.380	SANDSTONE FINE GRAINED	LIGHT, GREY, LITHIC, ABUNDANT CARBONACEOUS WISPS, VERY STRONG, COMPACT, FINE TO MEDIUM GRAINED, LAMINATED, 20.		
65.840	2.580	2.580	SILTSTONE	GREY, MINOR SANDSTONE BANDS, VERY STRONG, COMPACT, VERY FINE GRAINED, VERY THICKLY BEDDED, 0.		
66.810	0.970	0.970	SILTSTONE	DARK, GREY, ABUNDANT CARBONACEOUS BANDS, STRONG, BROKEN CORE.		
66.890	0.080	0.080	COAL	1-10% BRIGHT, BLACK, BROKEN CORE, STRONG, LOOSE.		
68.560	1.670	1.670	SILTSTONE	DARK, GREY, ABUNDANT CARBONACEOUS BANDS, STRONG, BROKEN CORE, VERY THICKLY BEDDED, 0.		
68.840	0.280	0.280	NO RECOVERY/CORE LOSS			
71.580	2.740	2.740	SILTSTONE	DARK, GREY, MINOR CARBONACEOUS WISPS, VERY STRONG, COMPACT.		
71.880	0.300	0.300	SIDERITE	GREY BROWN, VERY STRONG, COMPACT.		
73.310	1.430	1.430	SILTSTONE	GREY, MINOR CARBONACEOUS BANDS, BROKEN CORE, VERY STRONG.		
73.850	0.540	0.540	SANDSTONE FINE GRAINED	LIGHT, GREY, ABUNDANT CARBONACEOUS WISPS, LITHIC, VERY STRONG, COMPACT, VERY FINE GRAINED, LAMINATED.		
74.610	0.760	0.760	CONGLOMERATE	LIGHT, GREY GREEN, LITHIC, BROKEN CORE, STRONG, PEBBLE SIZED.		
74.800	0.190	0.190	NO RECOVERY/CORE LOSS			
78.050	3.250	3.250	CONGLOMERATE	LIGHT, GREY GREEN, LITHIC, BROKEN CORE, LOOSE, PEBBLE SIZED.		
79.440	1.390	1.390	SANDSTONE COARSE	LIGHT, GREY, LITHIC, VERY STRONG, COMPACT,		

BORE NAME MAC252R PAGE 3

DEPTH	THICKNESS	RECOVERED	GEOLOGICAL DESCRIPTION OF STRATA		SEAM	COMMENTS
			GRAINED	COARSE GRAINED, WELL SORTED, MASSIVE, SHARP BASE.		
80.900	1.460	1.460	SILTSTONE	GREY, BROKEN CORE IN PARTS, VERY STRONG, COMPACT.		
84.720	3.820	3.820	SILTSTONE	LIGHT, GREY, COALY CARBONACEOUS WISPS, SILTY, VERY STRONG, COMPACT, VERY FINE GRAINED, VERY THICKLY BEDDED.		
84.780	0.060	0.060	SIDERITE	GREY, VERY STRONG, COMPACT.		
86.020	1.240	1.240	SILTSTONE	GREY, BROKEN CORE IN PARTS, SILTY TOWARDS BASE OF UNIT, VERY STRONG, COMPACT, VERY FINE GRAINED.		
87.700	1.680	1.680	SANDSTONE FINE GRAINED	LIGHT, GREY, ABUNDANT SILTY WISPS, VERY FINE GRAINED, WELL SORTED, LAMINATED, 30.		
88.090	0.390	0.390	CLAYSTONE	GREY, STRONG, COMPACT.		
88.170	0.080	0.080	SIDERITE	GREY BROWN, BROKEN CORE.		
89.580	1.410	1.410	CLAYSTONE	GREY, SIDERITIC NODULES, STRONG, COMPACT.		
92.440	2.860	2.860	CLAYSTONE	GREY, CLAYEY IN PARTS, STRONG, COMPACT.		SAMPLE #30 ROOF.
92.610	0.170	0.170	NO RECOVERY/CORE LOSS		BRT	
92.690	0.080	0.080	CLAYSTONE	DARK, GREY, COALY BANDS, BROKEN CORE, STRONG.	BRT	
92.860	0.170	0.170	COAL	40-60% BRIGHT, BROKEN CORE.	BRT	
92.950	0.090	0.090	COAL	40-60% BRIGHT, BROKEN CORE.	BRT	
93.140	0.190	0.190	COAL	10-40% BRIGHT.	BRT	
93.220	0.080	0.080	COAL	40-60% BRIGHT.	BRT	
93.450	0.230	0.230	COAL	60-90% BRIGHT.	BRT	
94.250	0.800	0.800	COAL		BRT	SAMPLE 3 - GM217
95.040	0.790	0.790	COAL		BRT	SAMPLE 4 - GM054
95.320	0.280	0.280	COAL	60-90% BRIGHT.	BRT	
95.440	0.120	0.120	COAL	>90% BRIGHT.	BRT	
95.590	0.150	0.150	COAL	>90% BRIGHT.	BRT	
96.590	1.000	0.000	NO RECOVERY/CORE LOSS		BRT	CHECK CORE BOXES FOR CORE LOSS
97.150	0.560	0.560	COAL	60-90% BRIGHT.	BRT	
97.610	0.460	0.460	COAL	>90% BRIGHT.	BRT	
98.380	0.770	0.770	COAL		BRT	SAMPLE 5 - GW040
98.460	0.080	0.080	COAL	60-90% BRIGHT, BROKEN CORE.	BRT	
98.480	0.020	0.020	CARBONACEOUS CLAYSTONE	DARK, GREY BLACK, COALY PHASES, BROKEN CORE.	BRT	
98.530	0.050	0.050	COAL	DULL <1% BRIGHT.	BRT	
98.580	0.050	0.050	COAL	60-90% BRIGHT, BROKEN CORE.	BRT	
98.980	0.400	0.400	CLAYSTONE	DARK, GREY, BROKEN CORE, COALY WISPS.		SAMPLE 29 - FLOOR.
100.360	1.380	1.380	SANDSTONE FINE GRAINED	LIGHT, GREY, RARE CARBONACEOUS LENSES, LITHIC, VERY STRONG, COMPACT, FINE GRAINED.		
103.730	3.370	3.370	CONGLOMERATE	LIGHT, GREY GREEN, LITHIC, PEBBLE SIZED.		SAMPLE 28 - ROOF
104.500	0.770	0.770	COAL		BRL	SAMPLE 6 - GW029
104.540	0.040	0.040	COAL	>90% BRIGHT.	BRL	
104.620	0.080	0.080	COAL	40-60% BRIGHT, BROKEN CORE.	BRL	
104.770	0.150	0.150	COAL	60-90% BRIGHT, BROKEN CORE.	BRL	
104.850	0.080	0.080	COAL	>90% BRIGHT.	BRL	
104.890	0.040	0.040	COAL	60-90% BRIGHT.	BRL	
104.950	0.060	0.060	COAL	>90% BRIGHT.	BRL	
104.970	0.020	0.020	CLAYSTONE	GREY, CLAYEY, STRONG.	BRL	
105.090	0.120	0.120	COAL	1-10% BRIGHT.	BRL	
105.360	0.270	0.270	SANDSTONE FINE	LIGHT, GREY, LITHIC.		SAMPLE #27 FLOOR.

BORE NAME MAC252R — PAGE 4

DEPTH	THICKNESS	RECOVERED	GEOLOGICAL DESCRIPTION OF STRATA		SEAM	COMMENTS
			GRAINED			
			CLAYSTONE	60% INTERBEDDED, DARK, GREY, MINOR COALY WISPS, STRONG, COMPACT, MEDIUM BEDDED, 0.		
			SANDSTONE FINE GRAINED	40% LIGHT, GREY, LITHIC, VERY STRONG, COMPACT.		
106.830	1.470	1.470		"In General".		
107.230	0.400	0.400	CARBONACEOUS CLAYSTONE	DARK, GREY, MINOR COALY BANDS, STRONG, COMPACT.		
107.270	0.040	0.040	COAL	10-40% BRIGHT.		
107.370	0.100	0.100	COAL	60-90% BRIGHT.		
107.470	0.100	0.100	CARBONACEOUS CLAYSTONE	DARK, GREY, MINOR COALY BANDS, STRONG, COMPACT.		
107.550	0.080	0.080	COAL	STONY.		
			SANDSTONE FINE GRAINED	50% INTERBEDDED, LIGHT, GREY, LITHIC, RARE SILTY BANDS, VERY STRONG, COMPACT, FINE TO MEDIUM GRAINED, MEDIUM BEDDED, 0.		
			CLAYSTONE	50% GREY, MINOR COALY WISPS, STRONG, COMPACT.		
109.390	1.840	1.840		"In General".		
110.260	0.870	0.870	SANDSTONE MEDIUM GRAINED	LIGHT, GREY, LITHIC, STRONG, COMPACT.		
110.320	0.060	0.060	CLAYSTONE	GREY, CLAYEY PHASES, COALY BANDS, MEDIUM STRONG.		
110.400	0.080	0.080	COAL	>90% BRIGHT.		
110.560	0.160	0.160	CARBONACEOUS CLAYSTONE	DARK, GREY, COALY WISPS, LAMINATED, 0.		
110.610	0.050	0.050	COAL	DULL <1% BRIGHT.		
110.690	0.080	0.080	COAL	1-10% BRIGHT.		
110.820	0.130	0.130	CLAYSTONE	DARK, GREY, CARBONACEOUS IN PARTS, COALY WISPS, STRONG, COMPACT, LAMINATED.		
			SANDSTONE FINE GRAINED	60% INTERBEDDED, LIGHT, GREY, LITHIC, MINOR COALY WISPS, VERY STRONG, COMPACT, VERY FINE GRAINED.		
			CLAYSTONE	40% GREY, SILTY PHASES, VERY STRONG, COMPACT, VERY THICKLY BEDDED.		
112.080	1.260	1.310		"In General".		
115.150	3.070	3.120	CONGLOMERATE	LIGHT, GREY GREEN, LITHIC, VERY STRONG, COMPACT, COBBLE SIZED, THICKLY BEDDED.		
116.080	0.930	0.930	SILTSTONE	GREY, SABANDS, LITHIC, VERY STRONG, COMPACT.		SAMPLE 26 - (OVERBURDEN)
130.080	14.000	14.000	CONGLOMERATE	LIGHT, GREY GREEN, LITHIC, COBBLE SIZED, MASSIVE, IRREGULAR LOWER CONTACT.		SAMPLE 25 - ROOF.
130.110	0.030	0.030	COAL	STONY, DARK, GREY BROWN, VERY STRONG, COMPACT.	JEA	
130.690	0.580	0.580	COAL		JEA	SAMPLE 7 - GM363
135.730	5.040	5.040	SANDSTONE MEDIUM GRAINED	LIGHT, GREY, LITHIC, MINOR COALY BANDS, STRONG, COMPACT, THINLY BEDDED, 70.		SAMPLE 24 FLOOR. SAMPLE 23 ROOF
135.860	0.130	0.130	COAL	DULL <1% BRIGHT.	JEB	
135.960	0.100	0.100	COAL	10-40% BRIGHT.	JEB	
136.060	0.100	0.100	COAL	1-10% BRIGHT.	JEB	
136.160	0.100	0.110	COAL	40-60% BRIGHT.	JEB	
136.810	0.650	0.640	COAL		JEB	SAMPLE 8 - GM465
136.990	0.180	0.180	COAL	10-40% BRIGHT.	JEB	
137.280	0.290	0.290	COAL	1-10% BRIGHT.	JEB	
137.360	0.080	0.080	COAL	10-40% BRIGHT.	JEB	
137.780	0.420	0.420	CARBONACEOUS CLAYSTONE	DARK, GREY, MINOR COALY WISPS, VERY STRONG, COMPACT.		SAMPLE 22 FLOOR.

BORE NAME MAC252R PAGE 5

DEPTH	THICKNESS	RECOVERED	GEOLOGICAL DESCRIPTION OF STRATA		SEAM	COMMENTS
137.890	0.110	0.110	COAL	1-10% BRIGHT.		
138.050	0.160	0.160	COAL	10-40% BRIGHT.		
138.100	0.050	0.050	COAL	1-10% BRIGHT.		
138.850	0.750	0.750	CLAYSTONE	DARK, GREY, MINOR SANDY BANDS, VERY STRONG, COMPACT, LAMINATED.		
139.550	0.700	0.700	SANDSTONE FINE GRAINED	LIGHT, GREY, RARE SILTY LENSES, LITHIC, VERY STRONG, COMPACT, FINE GRAINED.		
143.460	3.910	3.910	CONGLOMERATE	LIGHT, GREY GREEN, LITHIC, VERY STRONG, COMPACT, MASSIVE.		
145.080	1.620	1.620	SILTSTONE	GREY, ABUNDANT CARBONACEOUS WISPS, SILTY, VERY STRONG, COMPACT, VERY FINE GRAINED, LAMINATED, 30.		
			SILTSTONE	50% INTERBEDDED, GREY, MINOR SIDERITIC BANDS, VERY STRONG, COMPACT, VERY THICKLY BEDDED, 0.		
			SANDSTONE FINE GRAINED	50% LIGHT, GREY, VERY STRONG, COMPACT.		
147.920	2.840	2.840		"In General".		
151.360	3.440	3.440	SANDSTONE MEDIUM GRAINED	LIGHT, GREY, LITHIC, VERY STRONG, COMPACT, MASSIVE, IRREGULAR LOWER CONTACT.		SAMPLE 21 INTERBURDEN
151.880	0.520	0.520	CLAYSTONE	DARK, GREY, MINOR CARBONACEOUS BANDS.		
151.980	0.100	0.100	CARBONACEOUS CLAYSTONE	DARK, GREY.		SAMPLE 20 ROOF
152.620	0.640	0.640	COAL		MEA	SAMPLE 9 - GM266
152.700	0.080	0.080	COAL	10-40% BRIGHT.	MEA	
152.730	0.030	0.030	COAL	>90% BRIGHT.	MEA	
152.880	0.150	0.150	COAL	1-10% BRIGHT.	MEA	
152.890	0.010	0.010	COAL	DULL <1% BRIGHT.	MEA	
152.970	0.080	0.080	SIDERITE	DARK, GREY BROWN, CALCITIC, VERY STRONG, COMPACT, BIOTURBATION, CALCITE.		SAMPLE 19 FLOOR SAMPLE 18 INTERBURDEN SAMPLE 17 ROOF
154.590	1.620	1.620	CLAYSTONE	DARK, GREY, CARBONACEOUS PHASES.		
155.340	0.750	0.750	COAL		MEB	SAMPLE 10 - GM198
155.450	0.110	0.110	COAL	1-10% BRIGHT.	MEB	
155.620	0.170	0.170	COAL	10-40% BRIGHT.	MEB	
155.810	0.190	0.190	COAL	1-10% BRIGHT.	MEB	
155.920	0.110	0.110	COAL	10-40% BRIGHT, BROKEN CORE.	MEB	
155.980	0.060	0.060	COAL	1-10% BRIGHT.	MEB	
156.040	0.060	0.060	COAL	10-40% BRIGHT, BROKEN CORE.	MEB	
156.350	0.310	0.310	COAL	1-10% BRIGHT.	MEB	
156.390	0.040	0.040	COAL	DULL <1% BRIGHT.	MEB	
156.750	0.360	0.360	CLAYSTONE	DARK, GREY, CARBONACEOUS PHASES, COALY IN PARTS, VERY STRONG, COMPACT.		SAMPLE 16 FLOOR SAMPLE 15 ROOF
156.970	0.220	0.280	COAL	DULL <1% BRIGHT.	MEC	
157.550	0.580	0.520	SANDSTONE FINE GRAINED	LIGHT, GREY GREEN, LITHIC, VERY STRONG, COMPACT, VERY FINE GRAINED, MASSIVE.		SAMPLE 14 FLOOR
161.700	4.150	4.150	CONGLOMERATE	LIGHT, GREY GREEN, LITHIC, VERY STRONG, COMPACT, MASSIVE.		SAMPLE 13 INTERBURDEN
170.870	9.170	9.170	CONGLOMERATE	LIGHT, GREY GREEN, LITHIC, VERY STRONG, COMPACT, COBBLE SIZED, MASSIVE.		
173.100	2.230	2.230	CLAYSTONE	LIGHT, GREY, MINOR SANDY BANDS, VERY STRONG, COMPACT.		
173.400	0.300	0.300	SANDSTONE FINE GRAINED	LIGHT, GREY, VERY FINE GRAINED, LAMINATED, 0.		
173.650	0.250	0.250	SANDSTONE MEDIUM GRAINED	LIGHT, GREY, LITHIC.		

BORE NAME MAC252R PAGE 6

DEPTH	THICKNESS	RECOVERED	GEOLOGICAL DESCRIPTION OF STRATA		SEAM	COMMENTS
182.420	8.770	8.770	SANDSTONE	LIGHT, GREY, LITHIC, RARE CARBONACEOUS WISPS, VERY STRONG, COMPACT, FINE TO MEDIUM GRAINED, MEDIUM BEDDED, 0.		
182.830	0.410	0.410	CLAYSTONE	GREY, CARBONACEOUS WISPS, VERY FINE GRAINED, LAMINATED, 0.		SAMPLE 12 ROOF
182.850	0.020	0.020	COAL	DULL <1% BRIGHT.	VEB	
183.620	0.770	0.770	COAL		VEB	SAMPLE 11 - GM154
183.680	0.060	0.060	COAL	60-90% BRIGHT.	VEB	
183.750	0.070	0.070	COAL	>90% BRIGHT.	VEB	
184.020	0.270	0.270	COAL	60-90% BRIGHT.	VEB	
184.320	0.300	0.280	CLAYSTONE	GREY, CARBONACEOUS TOWARDS BASE OF UNIT.		SAMPLE 11 ROOF/FLOOR
184.350	0.030	0.030	COAL	DULL <1% BRIGHT.	VEC	
184.530	0.180	0.180	COAL	>90% BRIGHT.	VEC	
184.600	0.070	0.070	COAL	40-60% BRIGHT.	VEC	
184.810	0.210	0.210	COAL	>90% BRIGHT.	VEC	
185.440	0.630	0.630	CLAYSTONE	BROWN GREY, SILTY, CARBONACEOUS TOWARDS BASE OF UNIT.		SAMPLE 10 FLOOR SAMPLE 9 ROOF
185.520	0.080	0.080	COAL	40-60% BRIGHT.	NAG	
185.620	0.100	0.100	COAL	60-90% BRIGHT.	NAG	
185.700	0.080	0.000	NO RECOVERY/CORE LOSS		NAG	
185.980	0.280	0.360	COAL	1-10% BRIGHT.	NAG	
186.110	0.130	0.130	COAL	40-60% BRIGHT.	NAG	
186.810	0.700	0.700	COAL		NAG	SAMPLE 12 - GM351
187.030	0.220	0.220	CLAYSTONE	DARK, GREY, CARBONACEOUS TOWARDS BASE OF UNIT, STRONG, COMPACT.		SAMPLE 8 - ROOF/FLOOR.
187.050	0.020	0.020	COAL	DULL <1% BRIGHT.	UPN	
187.210	0.160	0.160	COAL	40-60% BRIGHT.	UPN	
187.250	0.040	0.040	COAL	10-40% BRIGHT.	UPN	
187.480	0.230	0.230	COAL	>90% BRIGHT.	UPN	
187.680	0.200	0.200	COAL	10-40% BRIGHT.	UPN	
187.810	0.130	0.130	COAL	40-60% BRIGHT.	UPN	
188.230	0.420	0.390	COAL	>90% BRIGHT.	UPN	
188.300	0.070	0.000	NO RECOVERY/CORE LOSS		UPN	
190.820	2.520	2.520	CLAYSTONE	DARK, GREY, COALY BANDS IN PARTS.	SAMPLE	7 FLOOR.
191.370	0.550	0.550	SANDSTONE FINE GRAINED	LIGHT, GREY, SILTY WISPS, LITHIC, VERY STRONG, COMPACT.		
191.770	0.400	0.400	SANDSTONE MEDIUM GRAINED	LIGHT, GREY, LITHIC, VERY STRONG, COMPACT.		
192.840	1.070	1.070	SANDSTONE COARSE GRAINED	LIGHT, GREY, LITHIC, RARE CARBONACEOUS LENSES, VERY STRONG.		
193.300	0.460	0.460	SILTSTONE	DARK, GREY, STRONG.		
194.650	1.350	1.350	SANDSTONE MEDIUM GRAINED	LIGHT, GREY, VERY STRONG.		
195.520	0.870	0.870	SANDSTONE MEDIUM GRAINED	LIGHT, GREY, VERY STRONG.		
195.790	0.270	0.270	SANDSTONE COARSE GRAINED	LIGHT, GREY, CONGLOMERATIC TOWARDS BASE OF UNIT, VERY STRONG.		
196.520	0.730	0.730	SANDSTONE MEDIUM GRAINED	LIGHT, GREY, VERY STRONG.		
196.700	0.180	0.180	SANDSTONE MEDIUM GRAINED	LIGHT, GREY, COMMON CARBONACEOUS LENSES, VERY STRONG.		
197.030	0.330	0.330	SANDSTONE MEDIUM	LIGHT, GREY, VERY STRONG.		

BORE NAME MAC252R PAGE 7

DEPTH	THICKNESS	RECOVERED	GEOLOGICAL DESCRIPTION OF STRATA	SEAM	COMMENTS
			GRAINED		
197.140	0.110	0.110	SANDSTONE COARSE GRAINED LIGHT, GREY, VERY STRONG.		
197.550	0.410	0.410	SANDSTONE MEDIUM GRAINED LIGHT, GREY, LITHIC, VERY STRONG.		
197.610	0.060	0.060	NO RECOVERY/CORE LOSS		
197.710	0.100	0.100	SANDSTONE MEDIUM GRAINED LIGHT, GREY, VERY STRONG.		
198.200	0.490	0.490	SANDSTONE FINE GRAINED GREY, OCCASIONAL CARBONACEOUS BANDS, STRONG.		
198.570	0.370	0.370	SANDSTONE MEDIUM GRAINED		
198.850	0.280	0.280	SANDSTONE COARSE GRAINED CONGLOMERATIC IN PARTS.		
198.900	0.050	0.050	SILTSTONE MEDIUM, GREY, STRONG.		
199.410	0.510	0.510	SANDSTONE COARSE GRAINED LIGHT, GREY, VERY STRONG.		
200.050	0.640	0.640	SANDSTONE FINE GRAINED LIGHT, GREY, VERY STRONG.		
200.750	0.700	0.700	SANDSTONE COARSE GRAINED LIGHT, GREY, VERY STRONG.		
200.920	0.170	0.170	SANDSTONE FINE GRAINED LIGHT, GREY, VERY STRONG.		
201.140	0.220	0.220	SANDSTONE MEDIUM GRAINED MEDIUM, GREY, COMMON CARBONACEOUS LENSES, VERY STRONG.		
201.680	0.540	0.540	SANDSTONE FINE GRAINED LIGHT, GREY, VERY STRONG.		
202.060	0.380	0.380	SANDSTONE COARSE GRAINED LIGHT, GREY, COMMON CARBONACEOUS LENSES, VERY STRONG.		
202.140	0.080	0.080	SANDSTONE FINE GRAINED LIGHT, GREY, VERY STRONG.		
202.420	0.280	0.280	SILTSTONE MEDIUM, GREY, VERY STRONG.		
202.520	0.100	0.100	SANDSTONE FINE GRAINED LIGHT, GREY, VERY STRONG.		
202.710	0.190	0.190	SILTSTONE MEDIUM, GREY, THIN SANDSTONE BANDS, STRONG.		
203.170	0.460	0.460	SANDSTONE FINE GRAINED MEDIUM, GREY, OCCASIONAL CARBONACEOUS BANDS, VERY STRONG.		
203.440	0.270	0.270	SILTSTONE MEDIUM, GREY, STRONG.		
203.490	0.050	0.050	SANDSTONE FINE GRAINED LIGHT, GREY, VERY STRONG.		
203.650	0.160	0.160	SILTSTONE MEDIUM, GREY, STRONG.		
203.760	0.110	0.100	NO RECOVERY/CORE LOSS		
203.790	0.030	0.030	SANDSTONE FINE GRAINED LIGHT, GREY, VERY STRONG.		
204.260	0.470	0.470	SILTSTONE MEDIUM, GREY, STRONG.		
204.490	0.230	0.230	SANDSTONE FINE GRAINED LIGHT, GREY, VERY STRONG.		
204.660	0.170	0.170	SANDSTONE FINE GRAINED DARK, GREY, COMMON SILTSTONE BANDS, VERY STRONG.		
204.780	0.120	0.120	SANDSTONE FINE GRAINED LIGHT, GREY, VERY STRONG.		
204.920	0.140	0.140	SANDSTONE FINE MEDIUM, GREY, COMMON SILTSTONE BANDS, VERY		

BORE NAME MAC252R PAGE 8

DEPTH	THICKNESS	RECOVERED	GEOLOGICAL DESCRIPTION OF STRATA		SEAM	COMMENTS
			GRAINED	STRONG.		
205.020	0.100	0.100	SANDSTONE FINE GRAINED	LIGHT, GREY, VERY STRONG.		
205.810	0.790	0.790	SANDSTONE COARSE GRAINED	LIGHT, GREY, RARE CARBONACEOUS WISPS, VERY STRONG.		
206.760	0.950	0.950	SANDSTONE COARSE GRAINED	LIGHT, GREY, CONGLOMERATIC, VERY STRONG.		
207.650	0.890	0.890	SANDSTONE COARSE GRAINED	LIGHT, GREY, CONGLOMERATIC, VERY STRONG.		
209.760	2.110	2.110	SILTSTONE	DARK, GREY, STRONG.		
212.760	3.000	3.000	SILTSTONE	DARK, GREY, MEDIUM STRONG.		SAMPLE 6 INTERBURDEN
213.190	0.430	0.430	SILTSTONE	DARK, GREY, COALY BANDS TOWARDS MIDDLE OF UNIT, MEDIUM STRONG.		
213.350	0.160	0.160	CARBONACEOUS MUDSTONE	DARK, BLACKISH GREY, WEAK.		
213.460	0.110	0.110	SILTSTONE	DARK, GREY, WEAK.		SAMPLE 5 ROOF.
213.630	0.170	0.170	COAL	1-10% BRIGHT, BLACK, VERY WEAK.	LRN	
213.690	0.060	0.060	NO RECOVERY/CORE LOSS		LRN	
214.460	0.770	0.770	COAL	40-60% BRIGHT, BLACK.	LRN	SAMPLE 13 - GM207AA
214.860	0.400	0.400	COAL	40-60% BRIGHT, BLACK.	LRN	
215.610	0.750	0.750	COAL	40-60% BRIGHT, BLACK.	LRN	SAMPLE 14 - GM1877
215.740	0.130	0.130	COAL	40-60% BRIGHT, BLACK.	LRN	
215.760	0.020	0.020	SILTSTONE	MEDIUM, GREY, WEAK.		
215.810	0.050	0.050	SILTSTONE	MEDIUM, GREY, WEAK.		SAMPLE 4 (1) SAMPLE ROOF & FLOOR TO THIN.
216.090	0.280	0.290	COAL	1-10% BRIGHT, BLACK, VERY WEAK, RARE, CALCITE, VEINING.	TER	
216.120	0.030	0.030	CARBONACEOUS MUDSTONE	GREY BLACK, WEAK.	TER	
216.680	0.560	0.230	COAL	1-10% BRIGHT, BLACK, VERY WEAK, COMMON, CALCITE, VEINING.	TER	
216.760	0.080	0.000	COAL	DULL <1% BRIGHT, BLACK, COMMON, CALCITE.	TER	
216.790	0.030	0.000	COAL	STONY, TAKEN FROM GEOPHYSICS.	TER	CHECK THIS UNIT IN CORE BOX
217.220	0.430	0.850	SILTSTONE	MEDIUM, BLACK GREY, CARBONACEOUS, WEAK.		SAMPLE 2&3 ROOF FLOOR] 1 SAMPLE.
217.410	0.190	0.190	COAL	1-10% BRIGHT, BLACK, VERY WEAK.	FLX	
217.820	0.410	0.390	COAL	DULL <1% BRIGHT, BLACK, VERY WEAK, RARE, PYRITE, CALCITE.	FLX	
217.960	0.140	0.130	SILTSTONE	DARK, GREY, WEAK.		SAMPLE 1 FLOOR.
218.440	0.480	0.480	CONGLOMERATE	DARK, GREY, STRONG.		
218.760	0.320	0.320	SILTSTONE	MEDIUM, GREY.		
219.180	0.420	0.420	SILTSTONE	DARK, GREY, CONGLOMERATIC IN PARTS, STRONG.		
220.620	1.440	1.440	SILTSTONE	MEDIUM, GREY, THIN SANDSTONE BANDS, STRONG.		
221.130	0.510	0.510	SANDSTONE FINE GRAINED	LIGHT, GREY, VERY STRONG, CALCITE, VEINING AT MIDDLE OF UNIT.		
221.760	0.630	0.630	NO RECOVERY/CORE LOSS			
222.150	0.390	0.390	SILTSTONE	MEDIUM, GREY, THIN SANDSTONE BANDS, STRONG.		
222.390	0.240	0.240	MUDSTONE	DARK, GREY.		
222.690	0.300	0.300	CLAYSTONE	MEDIUM, BROWN GREY, MEDIUM STRONG.		
223.040	0.350	0.350	MUDSTONE	DARK, GREY, MEDIUM STRONG.		
223.200	0.160	0.160	CLAYSTONE	MEDIUM, BROWN GREY, MEDIUM STRONG.		
223.370	0.170	0.170	MUDSTONE	DARK, GREY, MEDIUM STRONG.		
223.890	0.520	0.520	CLAYSTONE	MEDIUM, BROWN GREY, MEDIUM STRONG.		

BORE NAME MAC252R

PAGE 9

DEPTH	THICKNESS	RECOVERED	GEOLOGICAL DESCRIPTION OF STRATA		SEAM	COMMENTS
224.570	0.680	0.680	CLAYSTONE	DARK, PURPLE BROWN, MEDIUM STRONG.		
224.860	0.290	0.290	CLAYSTONE	MEDIUM, GREY PURPLE, MEDIUM STRONG.		
225.060	0.200	0.200	CLAYSTONE	MEDIUM, BROWN PURPLE, MEDIUM STRONG.		
227.250	2.190	2.190	SANDSTONE FINE GRAINED	LIGHT, GREY, VERY STRONG, COMMON, CALCITE, VEINING.		
227.360	0.110	0.110	CLAYSTONE	MEDIUM, GREY BROWN, STRONG.		
227.490	0.130	0.130	SANDSTONE FINE GRAINED	LIGHT, GREY, VERY STRONG, COMMON, CALCITE, VEINING.		
227.730	0.240	0.240	SILTSTONE	MEDIUM, GREY, STRONG, COMMON, CALCITE, VEINING.		
227.960	0.230	0.230	SANDSTONE FINE GRAINED	LIGHT, GREY, STRONG, COMMON, CALCITE, VEINING.		
231.060	3.100	3.100	SILTSTONE	LIGHT, GREY, STRONG, COMMON, CALCITE, VEINING.		BASE OF HOLE

ATTACHMENT B

Geochemical Assessment of Mine Waste Materials

ATTACHMENT B

GEOCHEMICAL ASSESSMENT OF MINE WASTE MATERIALS

ACID GENERATION AND PREDICTION

Acid generation is caused by the exposure of sulphide minerals, most commonly pyrite (FeS_2), to atmospheric oxygen and water. Sulphur assay results are used to calculate the maximum acid that could be generated by the sample by either directly determining the pyritic S content or assuming that all sulphur not present as sulphate occurs as pyrite. Pyrite reacts under oxidising conditions to generate acid according to the following overall reaction:

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

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

Net Acid Producing Potential

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

Determination of pH and EC

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

Total sulphur content and Maximum Potential Acidity (MPA)

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

Acid neutralising capacity (ANC)

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

Net acid producing potential (NAPP)

Calculated from the MPA and ANC results. The NAPP represents the balance between a sample's inherent capacities to generate and neutralise acid. If the MPA is greater than the ANC then the NAPP is positive. If the MPA is less than the ANC then the sample then the NAPP is negative.

Net Acid Generation (NAG)

The net acid generation (NAG) test involves the addition of hydrogen peroxide to a sample of mine rock or process residue to oxidise reactive sulphide, then measurement of pH and titration of any net acidity produced by the acid generation and neutralisation reactions occurring in the sample. A significant NAG result (*i.e.* final NAG_{pH} < 4.5) indicates that the sample is potentially acid forming (PAF) and the test provides a direct measure of the net amount of acid remaining in the sample after all acid generating and acid neutralising reactions have taken place. A NAG_{pH} > 4.5 indicates that the sample is non-acid forming (NAF). The NAG test provides a direct assessment of the potential for a material to produce acid after a period of exposure and weathering and is used to refine the results of the theoretical NAPP predictions. The NAG test can be used as a stand-alone test, but is recommended that this only be considered after site specific calibration work is carried out.

ASSESSMENT OF ELEMENT ENRICHMENT AND SOLUBILITY

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

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

The concentration of these elements in samples can be directly compared with relevant state or national environmental and health based concentration guideline criteria to determine the level of significance. Water extracts are used to determine the immediate element solubilities under the existing sample pH conditions of the sample. The following tests are normally carried out:

Multi-element composition of solids.

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

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

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

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

KINETIC LEACH COLUMN TESTS

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

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

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

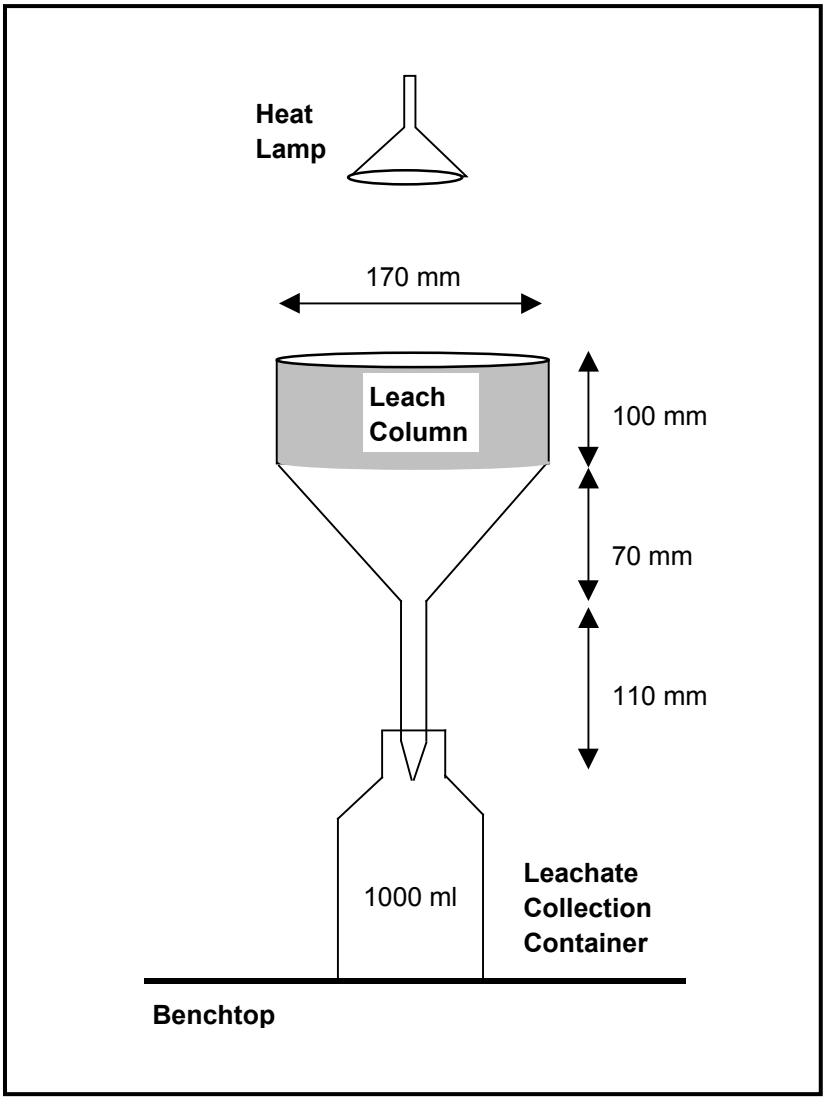
In kinetic column leach tests, water is added to a sample and the mixture allowed to leach products and by-products of acid producing and consuming reactions. Samples of leachate are then collected and analysed. Intermittent water application is applied to simulate rainfall and heat lamps are used to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

Figure B1 shows the kinetic leach column set up used by RGS adapted from *AMIRA, 2002*. The columns are placed under heat lamps to allow the sample to dry between water additions to ensure adequate oxygen ingress into the sample material.

Approximately 2-3 kg of sample is generally used in the leach columns and depending on the physical nature of the material and particle size can be used on an as-received basis (*i.e.* no crushing as with process residues) or crushed to nominal 5-10 mm particle size (as with overburden). The sample in the column is initially leached with deionised water at a rate of about 300 ml/kg of sample and the initial leachate from the columns collected and analysed. Subsequent column leaching is carried out at a rate of about 300 ml/kg per month and again collected and analysed. The leaching rate can be varied to better simulate expected site conditions or satisfy test program data requirements. The column must be exposed to drying conditions in between watering events. The residual water content and air void content in the column can be determined by comparing the wet and dry column weights. A heat lamp is generally used above the sample during daylight hours to maintain the leach column surface temperature at about 30^{o}C.

Figure B1

Kinetic Leach Column Setup



Reference:

AMIRA (2002). AMIRA International. *ARD Test Handbook. Project P387A Prediction & Kinetic Control of Acid Mine Drainage.* Ian Wark Institute and Environmental Geochemistry International Pty Ltd. May 2002, Melbourne, VIC.

ATTACHMENT C

KLC Test Results

Table KLC1: KLC Test Results for Overburden Sample 1 (Conglomerate)

Sample Weight (kg)	1.8	**MPA (kg H_2SO_4/t)**	1.2
pH	7.90	**ANC (kg H_2SO_4/t)**	21
EC (µS/cm)	114	**NAPP (kg H_2SO_4/t)**	-20
Total S (%)	0.04	**ANC/MPA**	18

Date	**17-Sep-10**	**1-Oct-10**	**15-Oct-10**	**29-Oct-10**	**12-Nov-10**	**26-Nov-10**	**10-Dec-10**
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Volume Collected (L)	0.760	0.800	0.780	0.760	0.780	0.760	0.780
Cum. Volume (L)	0.760	1.560	2.340	3.100	3.880	4.640	5.420
Pore Volumes	0.6	1.2	1.7	2.3	2.9	3.4	4.0
pH	7.69	7.76	8.82	8.52	6.72	7.55	6.86
EC (µS/cm)	188	122	98	124	100	87	72
Acidity (mg/L)*	1	<1	4	1	1	5	5
Alkalinity (mg/L)*	34	14	17	40	22	16	8
Net Alkalinity (mg/L)*	33	14	13	39	21	11	3
Dissolved elements (mg/L)							
Al	0.03	0.08	0.03	0.04	0.08	0.06	0.25
As	0.001	0.002	0.002	0.002	0.003	0.001	0.001
B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ca	14	10	8	6	7	5	5
Cd	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cl	9	2	2	<1	<1	<1	<1
Co	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cu	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Fe	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	0.10
K	4	4	3	3	2	2	2
Mg	4	2	2	2	2	2	2
Mn	0.018	0.008	0.005	0.005	0.006	0.007	0.004
Mo	0.003	0.002	0.005	0.003	0.008	0.004	0.002
Na	12	6	7	6	6	5	4
Ni	0.002	0.002	<0.001	0.001	0.001	0.002	0.002
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SO_4	31	27	19	21	20	16	18
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RESULTS**							
SO_4 Generation Rate	13	12	8	9	9	7	8
Cumulative SO_4 Gen.	13	25	33	42	51	58	65
Ca Generation Rate	6	4	3	3	3	2	2
Cumulative Ca Gen.	6	10	14	16	19	22	24
Mg Generation Rate	1.7	0.9	0.9	0.8	0.9	0.8	0.9
Cumulative Mg Gen.	2	3	3	4	5	6	7
Residual ANC (%)	99.9	99.8	99.8	99.7	99.7	99.6	99.6
Residual Sulfur (%)	98.9	97.9	97.2	96.5	95.8	95.2	94.5
SO_4/Ca	0.9	1.1	1.0	1.5	1.2	1.3	1.5

< indicates less than the analytical detection limit.

* Acidity and Alkalinity data calculated in mg $CaCO_3$/L

** SO4, Ca and Mg generation rates calculated in mg/kg/flush.

Total S = Total Sulfur, ANC = Acid Neutralising Capacity, NAPP = Net Acid Producing Potential and NAG = Net Acid Generation

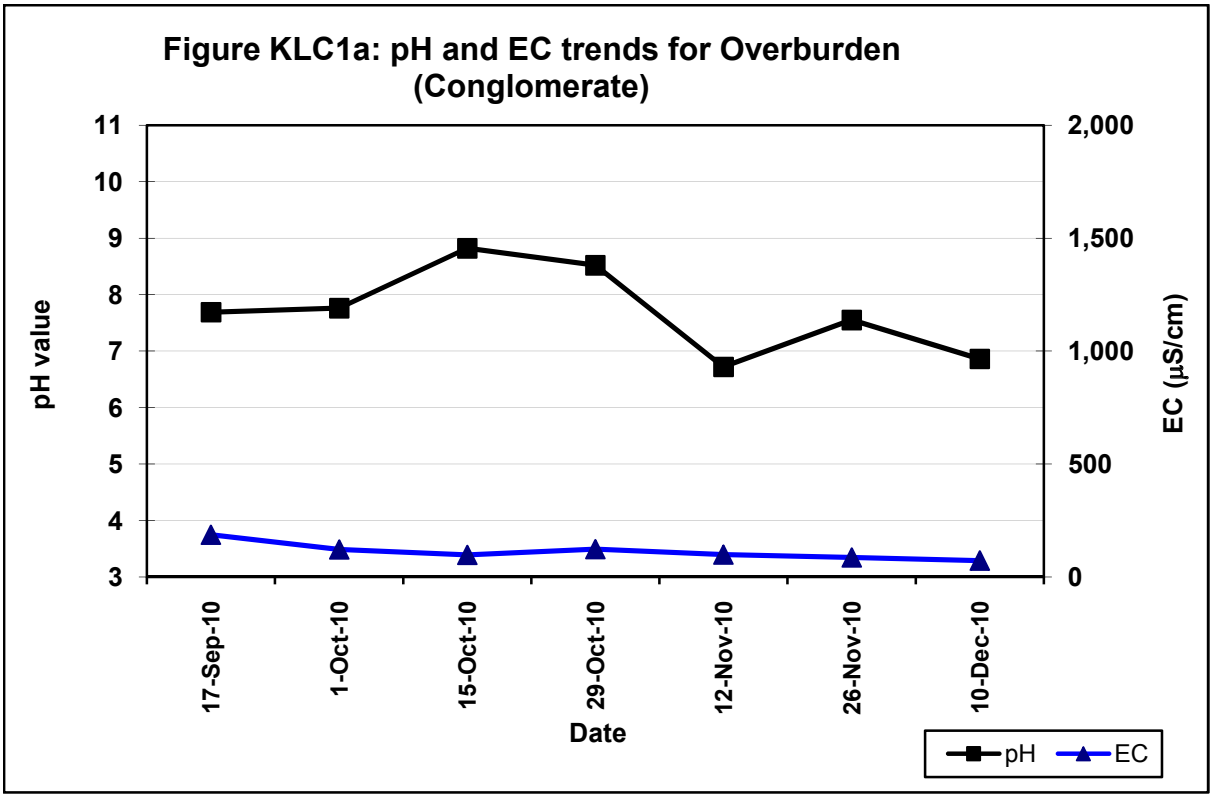


Figure KLC1a: pH and EC trends for Overburden (Conglomerate)
pH value
EC (µS/cm)
11
10
9
8
7
6
5
4
3
2,000
1,500
1,000
500
0
17-Sep-10
1-Oct-10
15-Oct-10
29-Oct-10
12-Nov-10
26-Nov-10
10-Dec-10
Date
pH
EC

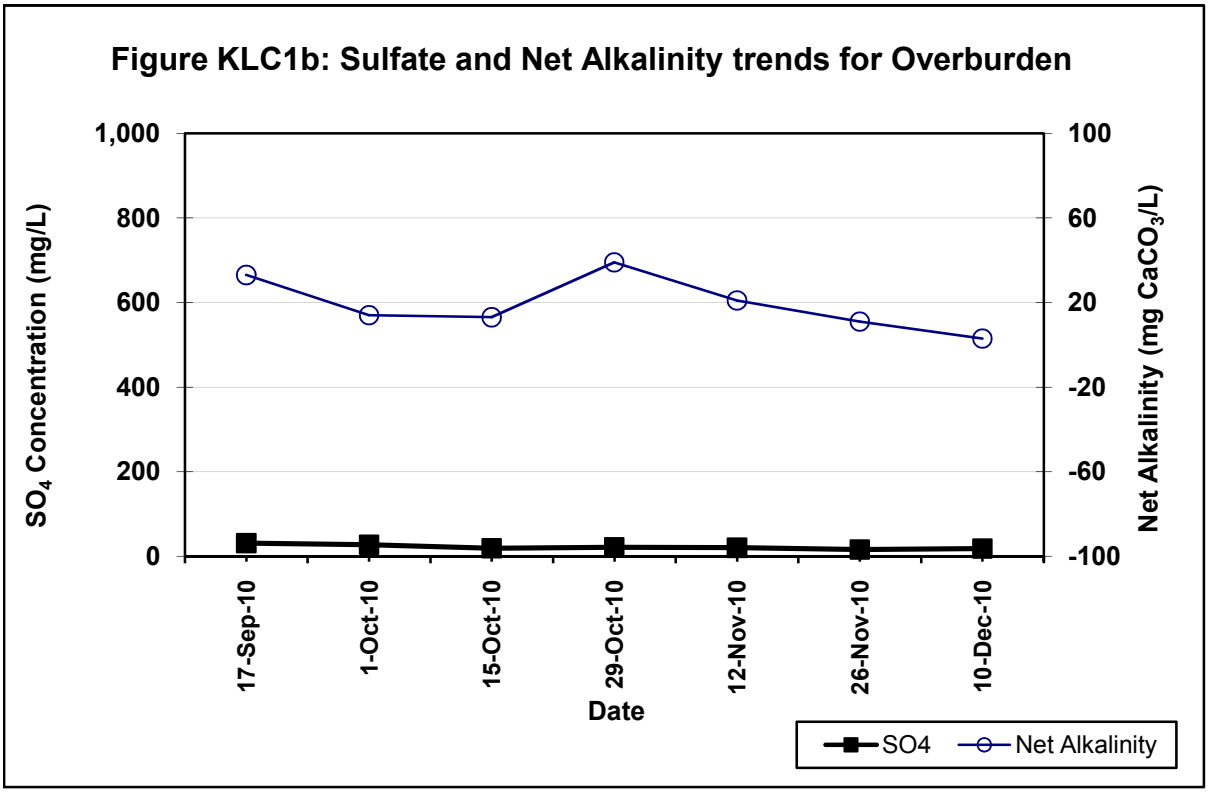


Figure KLC1b: Sulfate and Net Alkalinity trends for Overburden
SO4 Concentration (mg/L)
Net Alkalinity (mg CaCO3/L)
1,000
800
600
400
200
0
100
60
20
-20
-60
-100
17-Sep-10
1-Oct-10
15-Oct-10
29-Oct-10
12-Nov-10
26-Nov-10
10-Dec-10
Date
SO4
Net Alkalinity

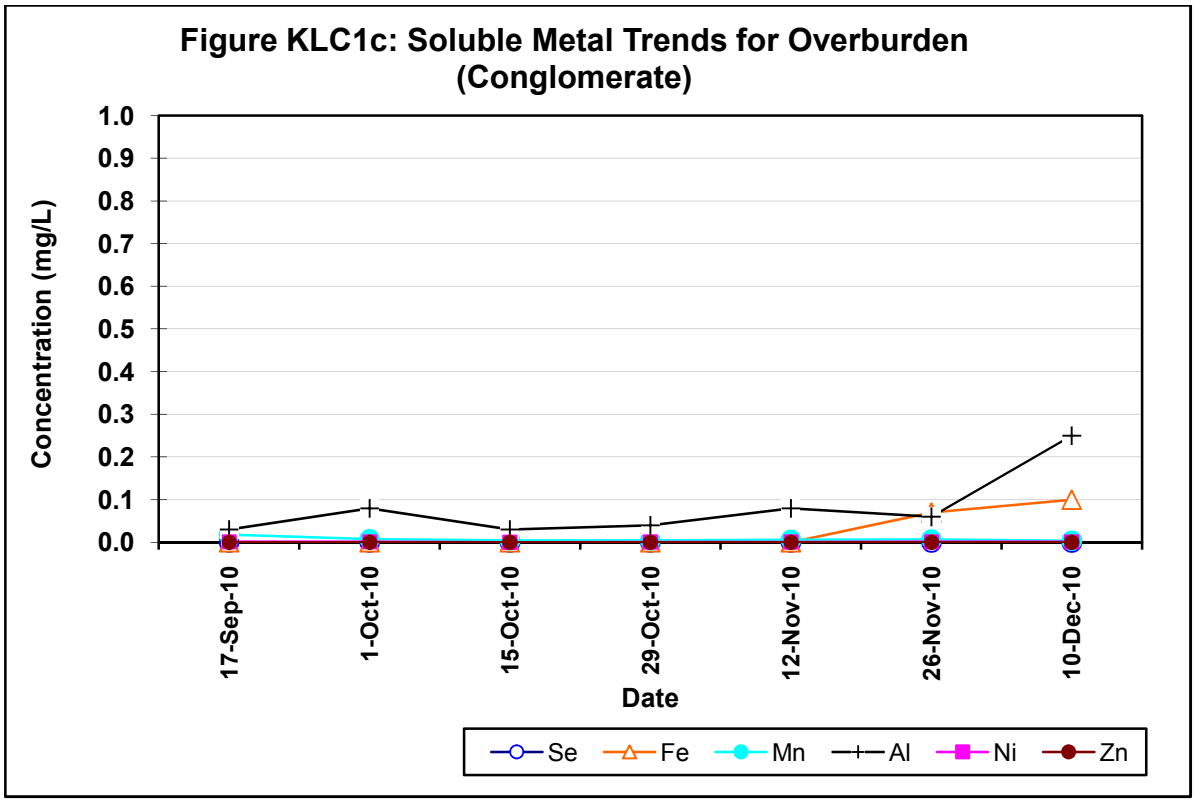


Figure KLC1c: Soluble Metal Trends for Overburden (Conglomerate)
Concentration (mg/L)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
17-Sep-10
1-Oct-10
15-Oct-10
29-Oct-10
12-Nov-10
26-Nov-10
10-Dec-10
Date
Se
Fe
Mn
Al
Ni
Zn

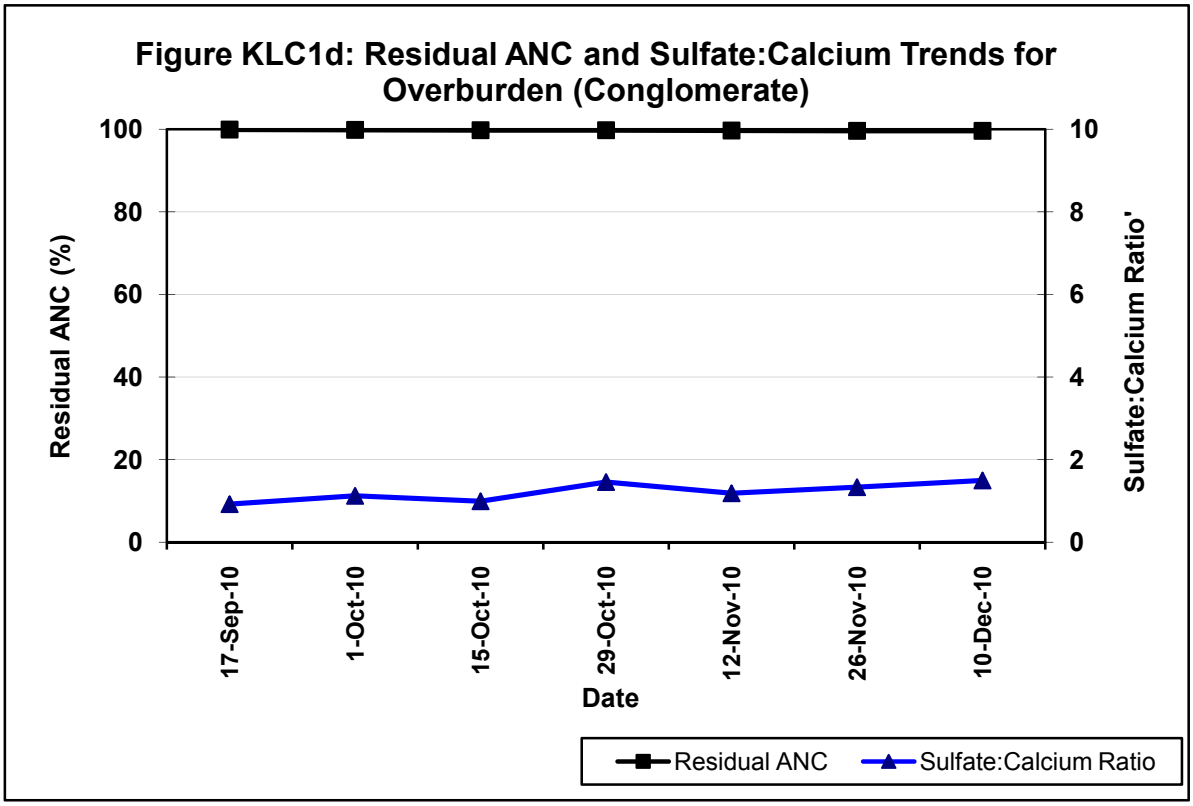


Figure KLC1d: Residual ANC and Sulfate:Calcium Trends for Overburden (Conglomerate)
Residual ANC (%)
100
80
60
40
20
0
Sulfate:Calcium Ratio'
10
8
6
4
2
0
17-Sep-10
1-Oct-10
15-Oct-10
29-Oct-10
12-Nov-10
26-Nov-10
10-Dec-10
Date
Residual ANC
Sulfate:Calcium Ratio

Table KLC2: KLC Test Results for Overburden Sample 2 (Sandstone)

Sample Weight (kg)	1.9	**MPA (kg H_2SO_4/t)**	1.2
pH	8.20	**ANC (kg H_2SO_4/t)**	78
EC (µS/cm)	140	**NAPP (kg H_2SO_4/t)**	-77
Total S (%)	0.04	**ANC/MPA**	65

Date	**17-Sep-10**	**1-Oct-10**	**15-Oct-10**	**29-Oct-10**	**12-Nov-10**	**26-Nov-10**	**10-Dec-10**
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Volume Collected (L)	0.800	0.760	0.780	0.780	0.760	0.780	0.760
Cum. Volume (L)	0.800	1.560	2.340	3.120	3.880	4.660	5.420
Pore Volumes	0.6	1.2	1.7	2.3	2.9	3.5	4.0
pH	8.16	7.86	7.77	6.86	6.85	7.08	7.13
EC (µS/cm)	111	118	79	128	130	139	139
Acidity (mg/L)*	1	1	2	1	2	5	5
Alkalinity (mg/L)*	22	10	13	10	13	26	26
Net Alkalinity (mg/L)*	21	9	11	9	11	21	21
Dissolved elements (mg/L)							
Al	0.16	0.08	0.05	<0.01	0.01	<0.01	<0.01
As	0.004	0.004	0.003	0.001	0.005	0.001	<0.001
B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ca	6	8	6	7	9	11	11
Cd	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cl	9	2	1	1	2	2	2
Co	<0.001	<0.001	<0.001	0.002	0.001	<0.001	0.003
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cu	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Fe	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05
K	2	3	2	2	2	2	2
Mg	2	2	2	2	3	4	5
Mn	0.008	0.007	0.006	0.012	0.011	<0.001	0.020
Mo	0.006	0.010	0.009	0.007	0.019	0.010	0.006
Na	11	8	6	6	8	7	9
Ni	0.001	0.001	0.001	0.008	0.004	0.003	0.010
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SO_4	13	30	15	30	37	37	42
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RESULTS**							
SO_4 Generation Rate	5	12	6	12	15	15	17
Cumulative SO_4 Gen.	5	17	24	36	51	66	83
Ca Generation Rate	3	3	2	3	4	5	4
Cumulative Ca Gen.	3	6	8	11	15	19	24
Mg Generation Rate	0.8	0.8	0.8	0.8	1.2	1.6	2.0
Cumulative Mg Gen.	1	2	2	3	4	6	8
Residual ANC (%)	100.0	100.0	100.0	99.9	99.9	99.9	99.9
Residual Sulfur (%)	99.5	98.5	98.0	97.0	95.8	94.5	93.1
SO_4/Ca	0.9	1.6	1.0	1.8	1.7	1.4	1.6

< indicates less than the analytical detection limit.

* Acidity and Alkalinity data calculated in mg $CaCO_3$/L

** SO_4, Ca and Mg generation rates calculated in mg/kg/flush.

Total S = Total Sulfur, ANC = Acid Neutralising Capacity, NAPP = Net Acid Producing Potential and NAG = Net Acid Generation

Figure KLC2a: pH and EC trends for Overburden (Sandstone)

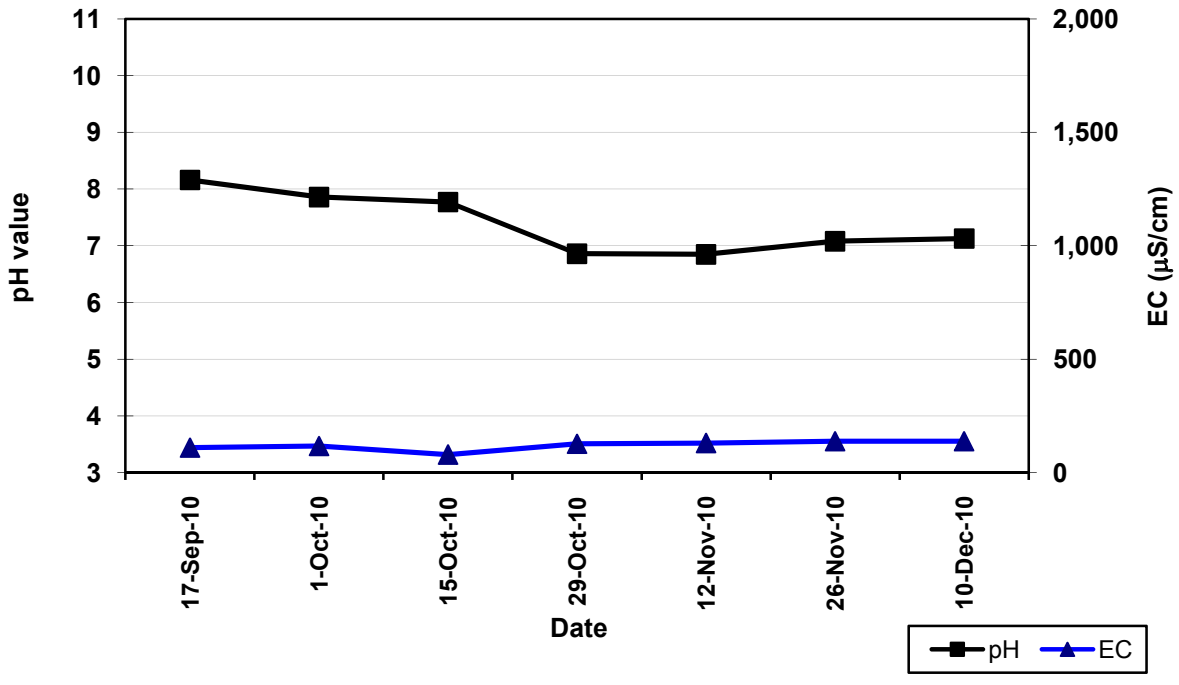


Figure KLC2b: Sulfate and Net Alkalinity trends for Overburden

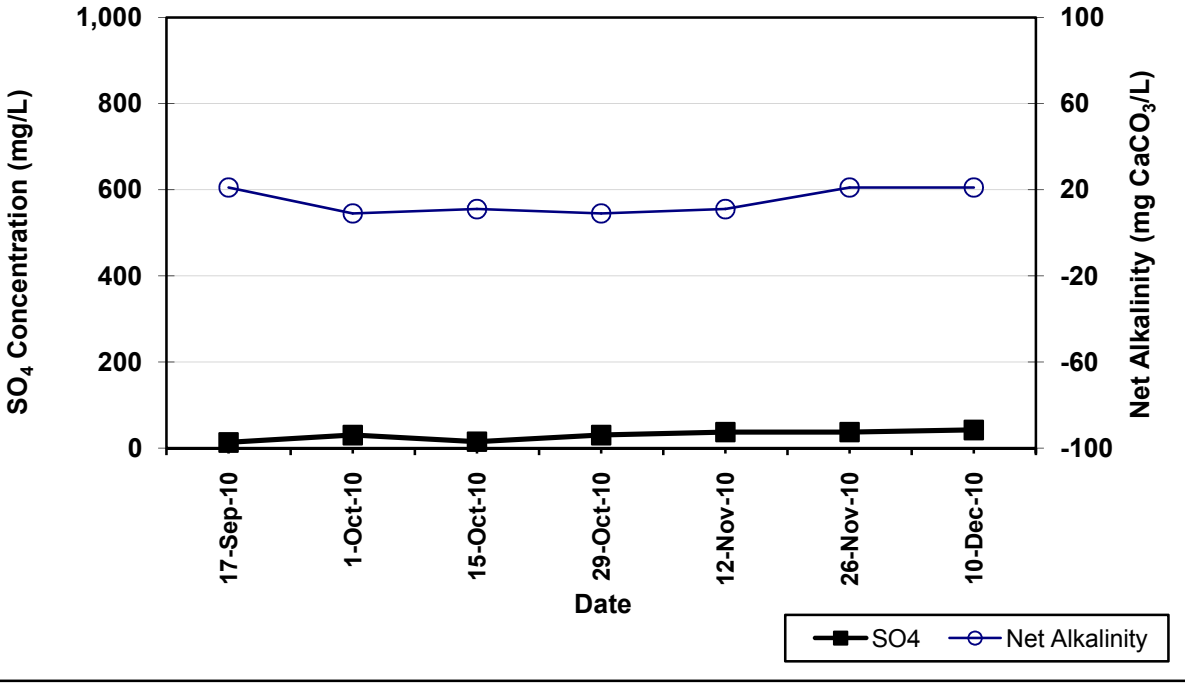


Figure KLC2c: Soluble Metal Trends for Overburden (Sandstone)

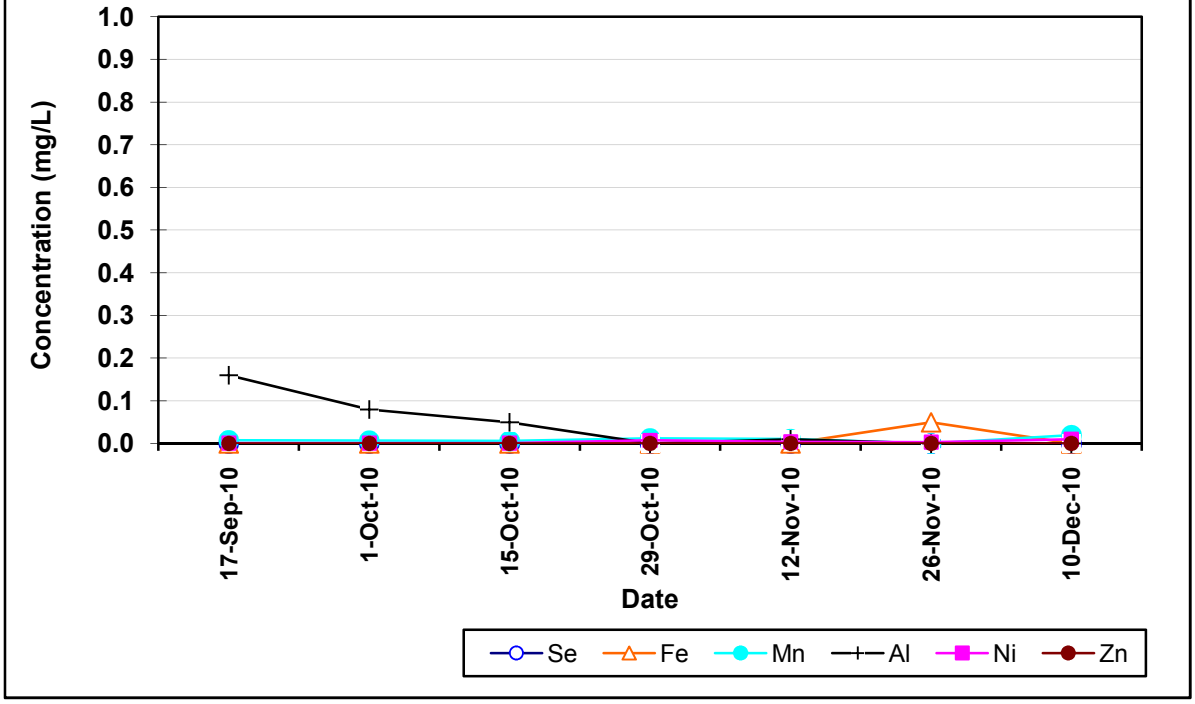


Figure KLC2d: Residual ANC and Sulfate:Calcium Trends for Overburden (Sandstone)

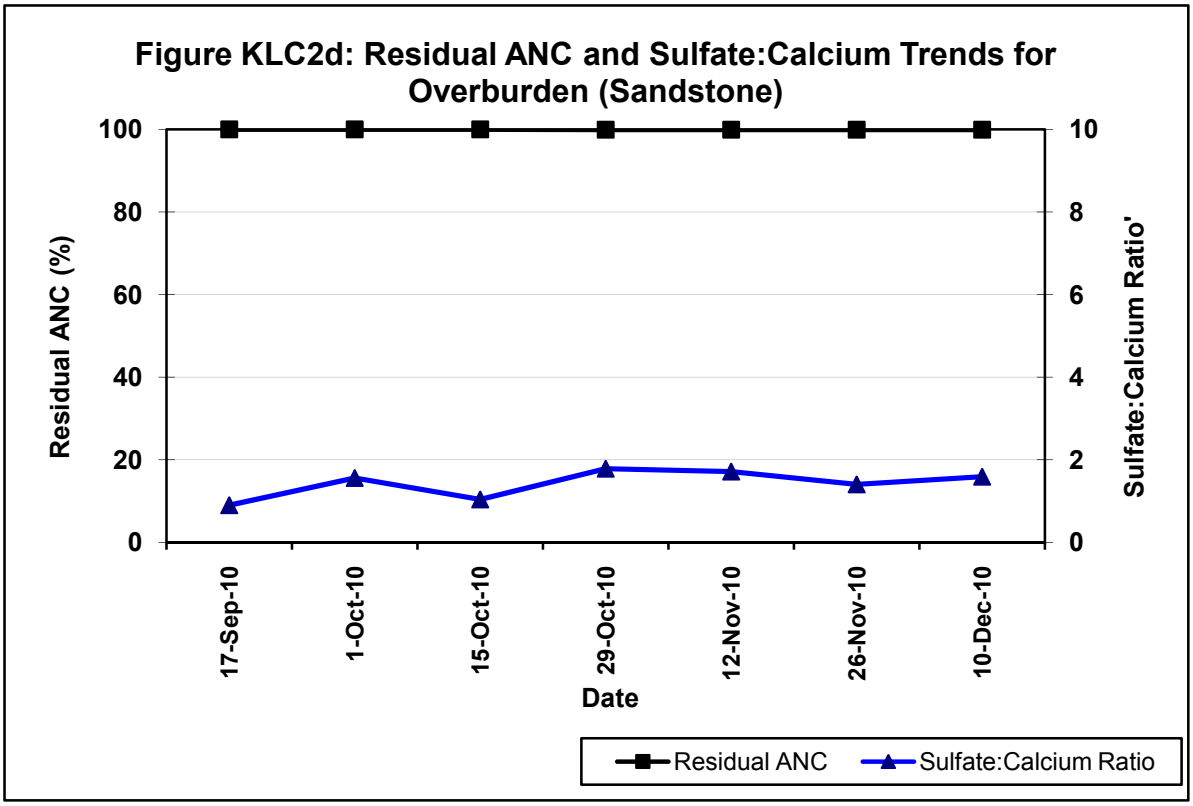


Table KLC3: KLC Test Results for Overburden Sample 3 (Siltstone)

Sample Weight (kg)	1.8	**MPA (kg H_2SO_4/t)**	0.9
pH	7.80	**ANC (kg H_2SO_4/t)**	11
EC (µS/cm)	105	**NAPP (kg H_2SO_4/t)**	-10
Total S (%)	0.03	**ANC/MPA**	12.0

Date	**17-Sep-10**	**1-Oct-10**	**15-Oct-10**	**29-Oct-10**	**12-Nov-10**	**26-Nov-10**	**10-Dec-10**
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Volume Collected (L)	0.840	0.820	0.840	0.820	0.840	0.840	0.820
Cum. Volume (L)	0.840	1.660	2.500	3.320	4.160	5.000	5.820
Pore Volumes	0.6	1.2	1.9	2.5	3.1	3.7	4.3
pH	7.48	7.41	7.81	6.86	7.20	7.69	7.52
EC (µS/cm)	129	232	184	216	205	207	177
Acidity (mg/L)*	3	2	2	1	2	5	5
Alkalinity (mg/L)*	23	36	35	36	26	38	95
Net Alkalinity (mg/L)*	20	34	33	35	24	33	90
Dissolved elements (mg/L)							
Al	0.07	0.06	0.06	0.05	0.04	0.02	0.26
As	0.003	0.01	0.007	0.004	0.014	0.013	0.015
B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ca	5	19	8	6	7	6	5
Cd	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cl	7	6	4	2	2	1	<1
Co	0.002	0.002	0.001	<0.001	<0.001	<0.001	0.001
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cu	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Fe	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
K	4	3	4	4	4	4	4
Mg	2	9	4	6	4	3	5
Mn	0.006	0.004	0.001	0.002	<0.001	<0.001	0.002
Mo	0.024	0.069	0.067	0.044	0.108	0.076	0.043
Na	14	14	23	16	23	24	35
Ni	0.002	0.001	0.001	0.001	0.001	<0.001	0.001
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SO_4	20	66	47	47	56	46	25
Sb	<0.001	0.001	0.001	<0.001	0.002	0.004	0.003
Se	<0.01	0.03	0.05	0.03	0.04	0.02	0.01
Zn	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RESULTS**							
SO_4 Generation Rate	9	30	22	21	26	21	11
Cumulative SO_4 Gen.	9	39	61	83	109	130	142
Ca Generation Rate	2	9	4	3	3	3	2
Cumulative Ca Gen.	2	11	15	17	21	24	26
Mg Generation Rate	0.9	4.1	1.9	2.7	1.9	1.4	2.3
Cumulative Mg Gen.	1	5	7	10	12	13	15
Residual ANC (%)	99.9	99.6	99.4	99.3	99.1	99.0	98.9
Residual Sulfur (%)	99.0	95.6	93.2	90.8	87.9	85.5	84.3
SO_4/Ca	1.7	1.4	2.4	3.3	3.3	3.2	2.1

< indicates less than the analytical detection limit.

* Acidity and Alkalinity data calculated in mg $CaCO_3$/L

** SO4, Ca and Mg generation rates calculated in mg/kg/flush.

Total S = Total Sulfur, ANC = Acid Neutralising Capacity, NAPP = Net Acid Producing Potential and NAG = Net Acid Generation

Figure KLC3a: pH and EC trends for Overburden (Siltstone)

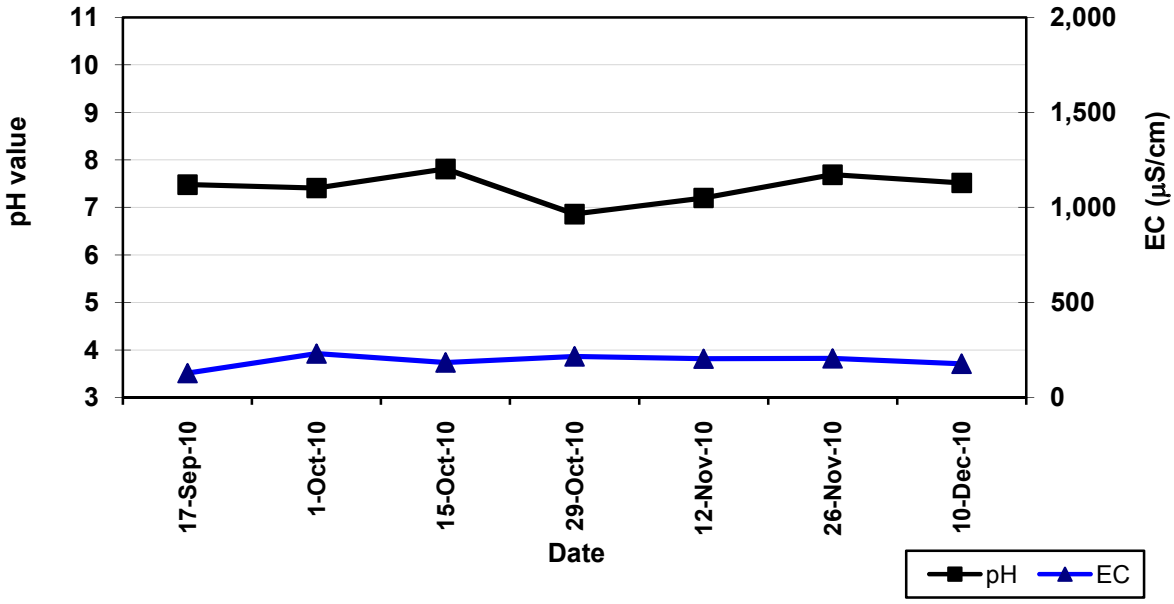


Figure KLC3b: Sulfate and Net Alkalinity trends for Overburden

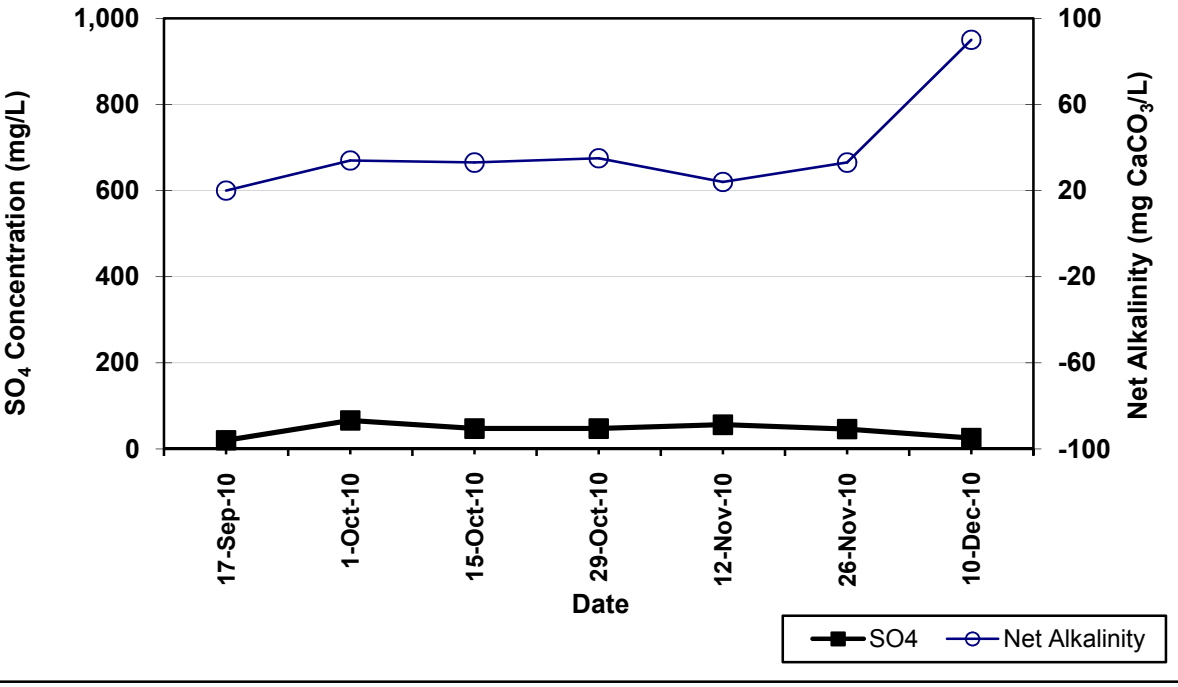


Figure KLC3c: Soluble Metal Trends for Overburden (Siltstone)

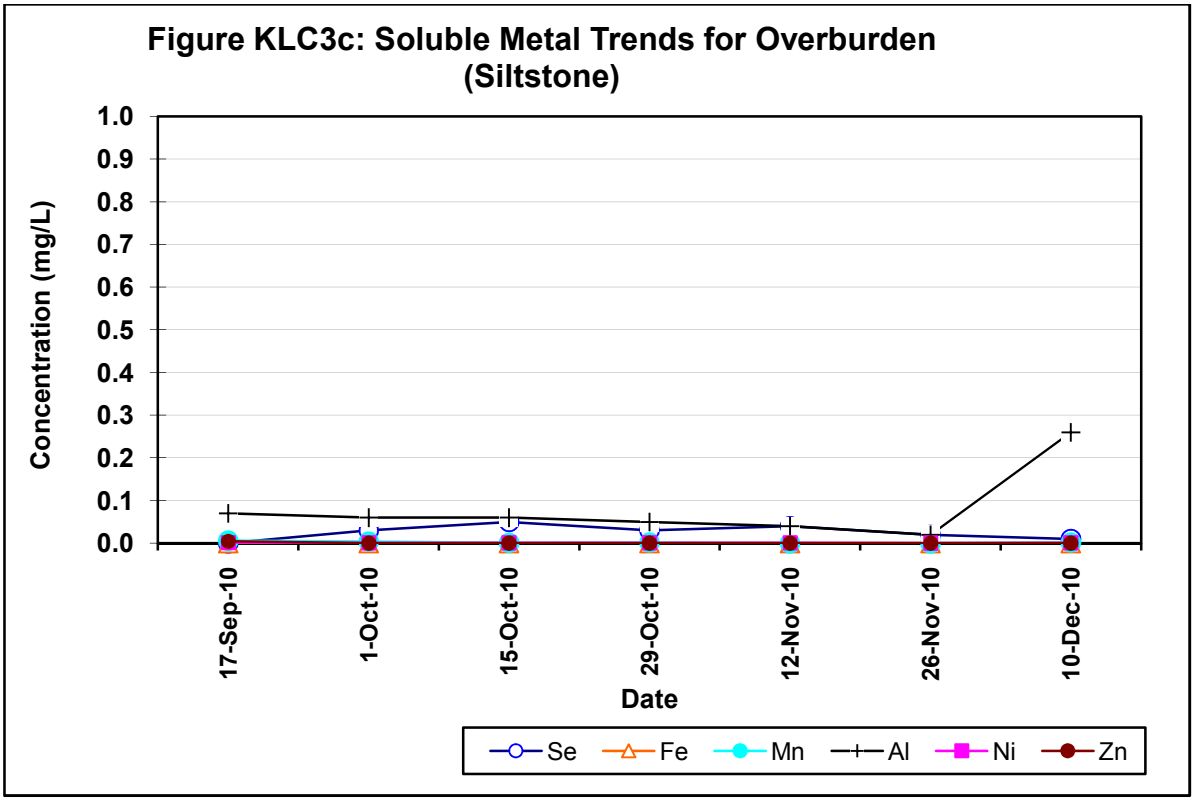


Figure KLC3d: Residual ANC and Sulfate:Calcium Trends for Overburden (Siltstone)

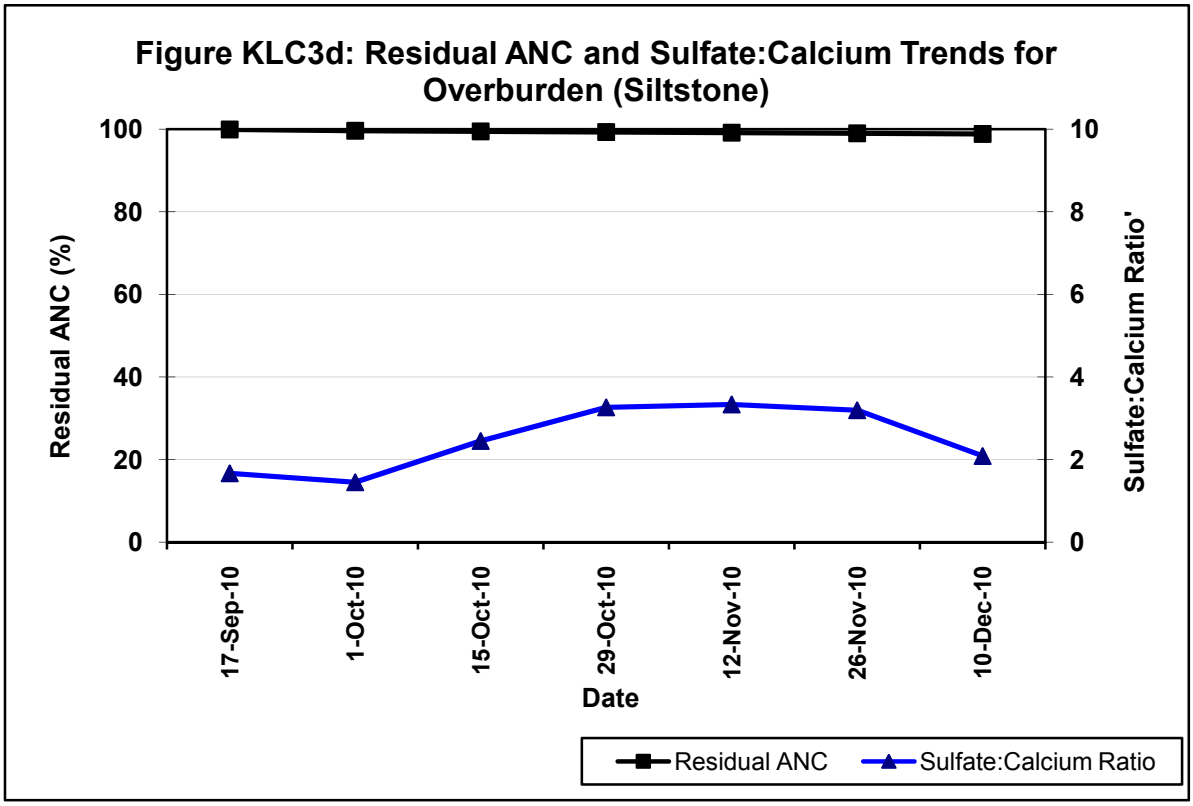


Table KLC4: KLC Test Results for Potential Coal Reject Sample 4 (Braymont Seam)

Sample Weight (kg)	2.1	**MPA (kg H_2SO_4/t)**	4.2
pH	7.20	**ANC (kg H_2SO_4/t)**	6.4
EC (µS/cm)	135	**NAPP (kg H_2SO_4/t)**	-2.2
Total S (%)	0.14	**ANC/MPA**	1.5

Date	**17-Sep-10**	**1-Oct-10**	**15-Oct-10**	**29-Oct-10**	**12-Nov-10**	**26-Nov-10**	**10-Dec-10**
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Volume Collected (L)	0.750	0.800	0.780	0.800	0.780	0.800	0.780
Cum. Volume (L)	0.750	1.550	2.330	3.130	3.910	4.710	5.490
Pore Volumes	0.6	1.1	1.7	2.3	2.9	3.5	4.1
pH	6.72	7.16	5.70	5.39	5.05	6.45	5.78
EC (µS/cm)	290	228	132	318	479	346	267
Acidity (mg/L)*	3	2	2	8	13	5	8
Alkalinity (mg/L)*	4	4	4	3	3	3	3
Net Alkalinity (mg/L)*	1	2	2	-5	-10	-2	-5
Dissolved elements (mg/L)							
Al	0.05	0.02	0.05	0.05	0.19	<0.01	0.02
As	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ca	24	21	13	17	35	24	19
Cd	<0.0001	<0.0001	<0.0001	0.0001	0.0004	0.0001	0.0001
Cl	9	1	1	<1	2	2	<1
Co	0.059	0.020	0.016	0.022	0.062	0.024	0.020
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cu	0.002	0.001	0.003	0.010	0.022	0.003	0.006
Fe	0.67	<0.05	0.24	3.23	3.89	<0.05	0.10
K	5	5	2	4	7	6	6
Mg	6	5	3	5	18	9	7
Mn	0.025	0.012	0.006	0.012	0.062	0.016	0.014
Mo	0.003	0.009	0.004	<0.001	0.002	0.011	0.002
Na	16	11	6	10	19	18	13
Ni	0.058	0.031	0.029	0.04	0.13	0.04	0.03
Pb	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001
SO_4	99	83	46	88	206	133	108
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	0.02	0.03	0.02	0.02	0.06	0.05	0.03
Zn	0.032	0.030	0.034	0.061	0.150	0.057	0.057
RESULTS**							
SO_4 Generation Rate	35	32	17	34	77	51	40
Cumulative SO_4 Gen.	35	67	84	118	194	245	285
Ca Generation Rate	9	8	5	6	13	9	7
Cumulative Ca Gen.	9	17	21	28	41	50	57
Mg Generation Rate	2.1	1.9	1.1	1.9	6.7	3.4	2.6
Cumulative Mg Gen.	2	4	5	7	14	17	20
Residual ANC (%)	99.5	99.1	98.9	98.5	97.6	97.0	96.6
Residual Sulfur (%)	99.2	98.4	98.0	97.2	95.4	94.2	93.2
SO_4/Ca	1.7	1.6	1.5	2.2	2.5	2.3	2.4

< indicates less than the analytical detection limit.

* Acidity and Alkalinity data calculated in mg $CaCO_3$/L

** SO4, Ca and Mg generation rates calculated in mg/kg/flush.

Total S = Total Sulfur, ANC = Acid Neutralising Capacity, NAPP = Net Acid Producing Potential and NAG = Net Acid Generation

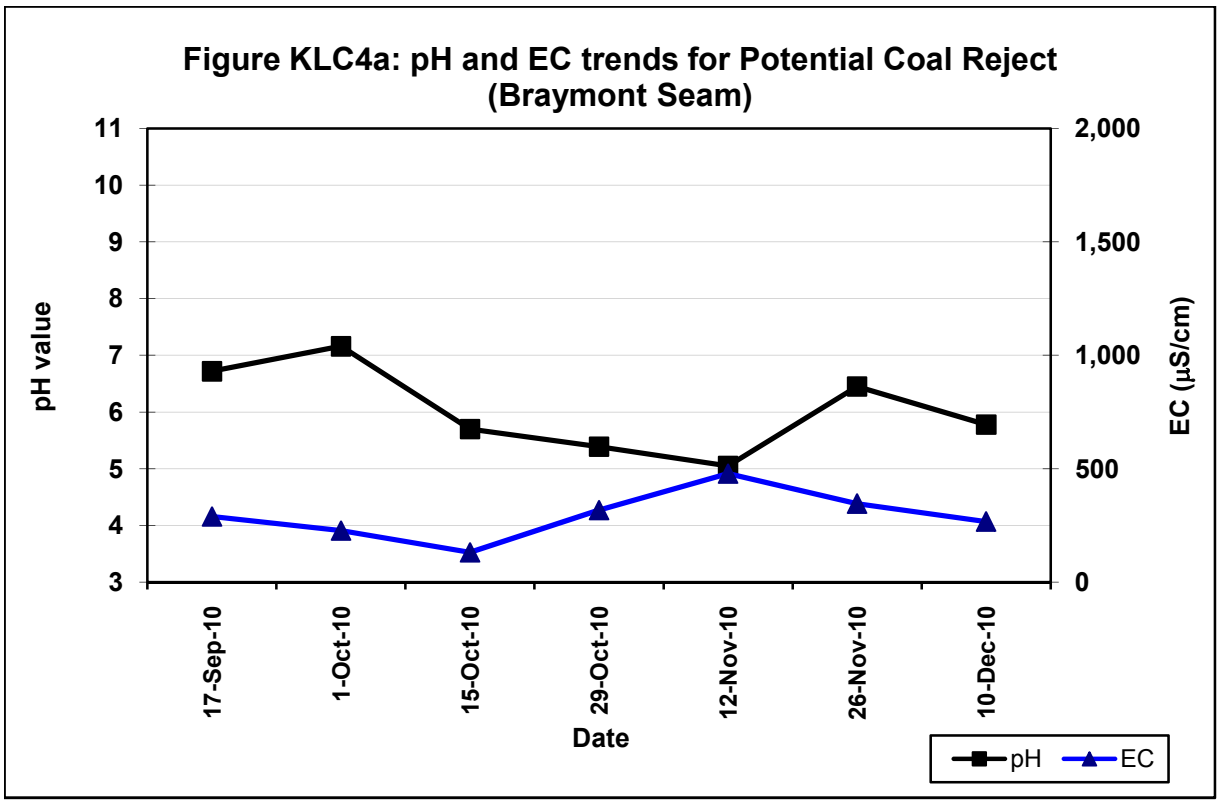


Figure KLC4a: pH and EC trends for Potential Coal Reject (Braymont Seam)
pH value
EC (µS/cm)
11
10
9
8
7
6
5
4
3
2,000
1,500
1,000
500
0
17-Sep-10
1-Oct-10
15-Oct-10
29-Oct-10
12-Nov-10
26-Nov-10
10-Dec-10
Date
pH
EC

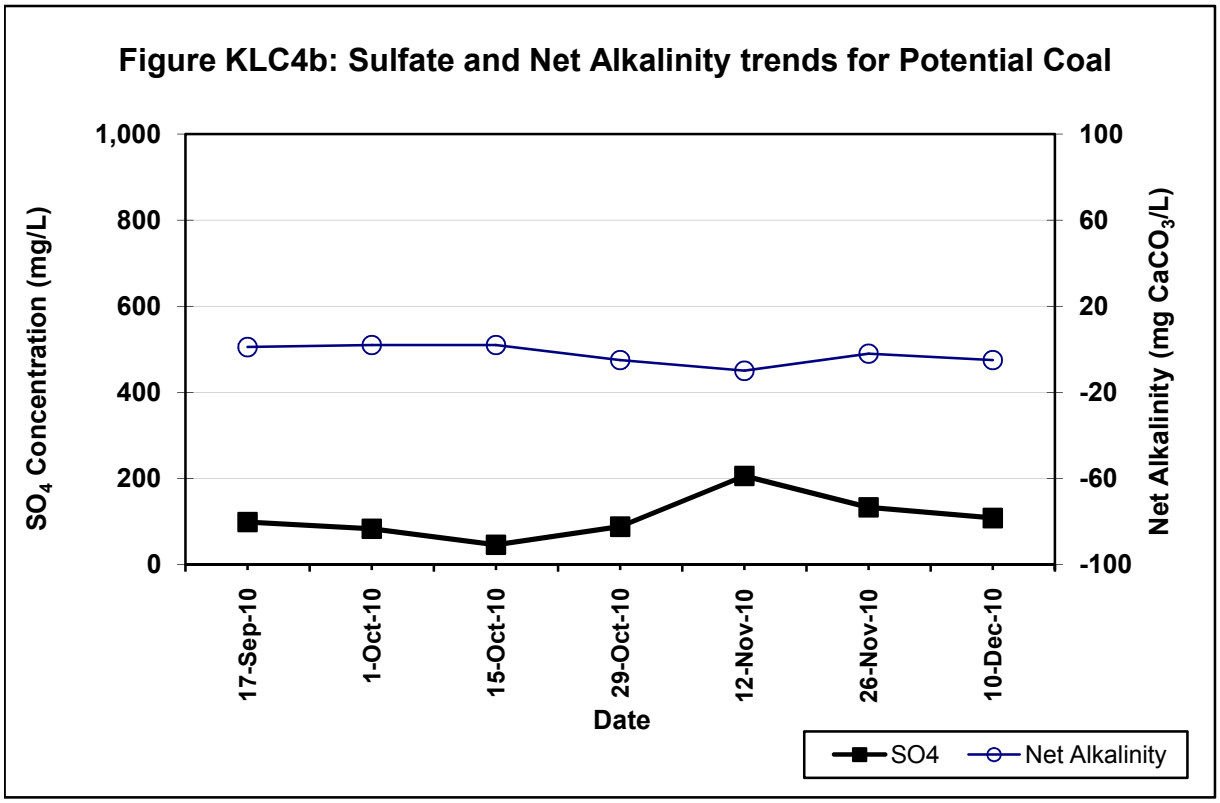


Figure KLC4b: Sulfate and Net Alkalinity trends for Potential Coal
SO4 Concentration (mg/L)
Net Alkalinity (mg CaCO3/L)
1,000
800
600
400
200
0
100
60
20
-20
-60
-100
17-Sep-10
1-Oct-10
15-Oct-10
29-Oct-10
12-Nov-10
26-Nov-10
10-Dec-10
Date
SO4
Net Alkalinity

Figure KLC4c: Soluble Metal Trends for Potential Coal Reject (Braymont Seam)

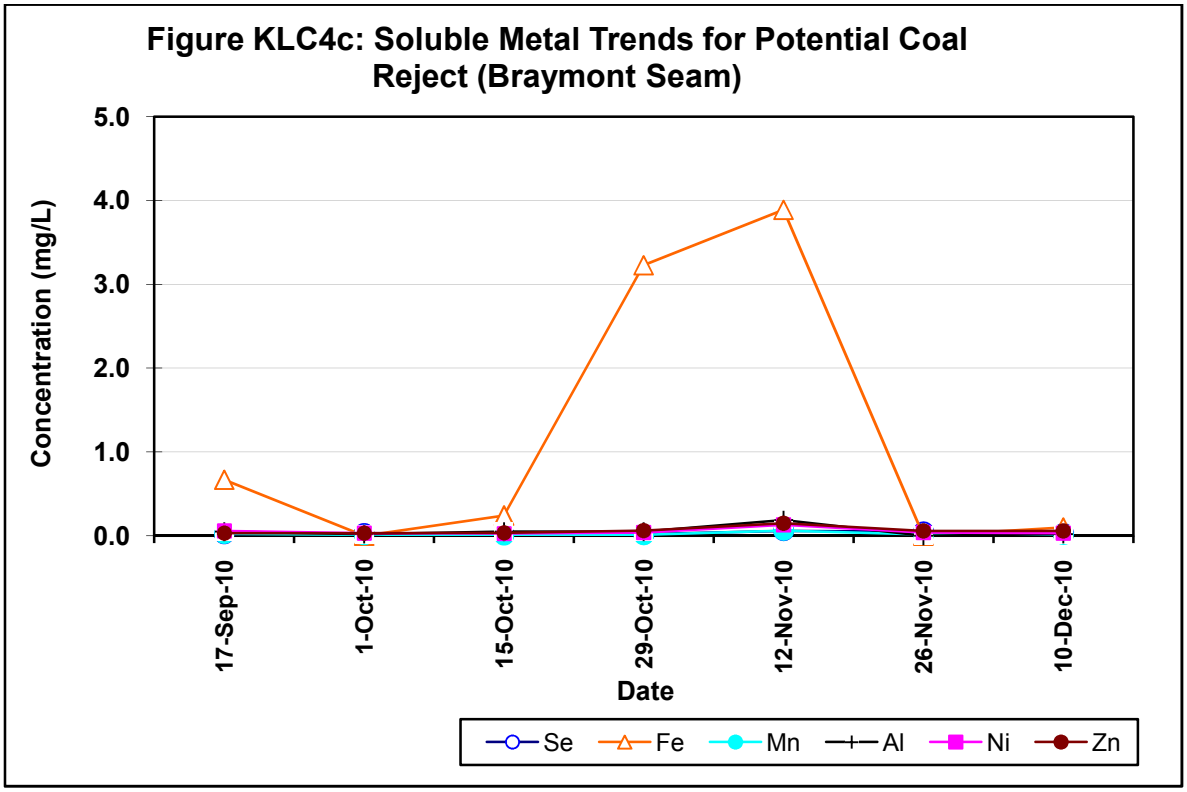


Figure KLC4d: Residual ANC and Sulfate:Calcium Trends for Potential Coal Reject (Braymont Seam)

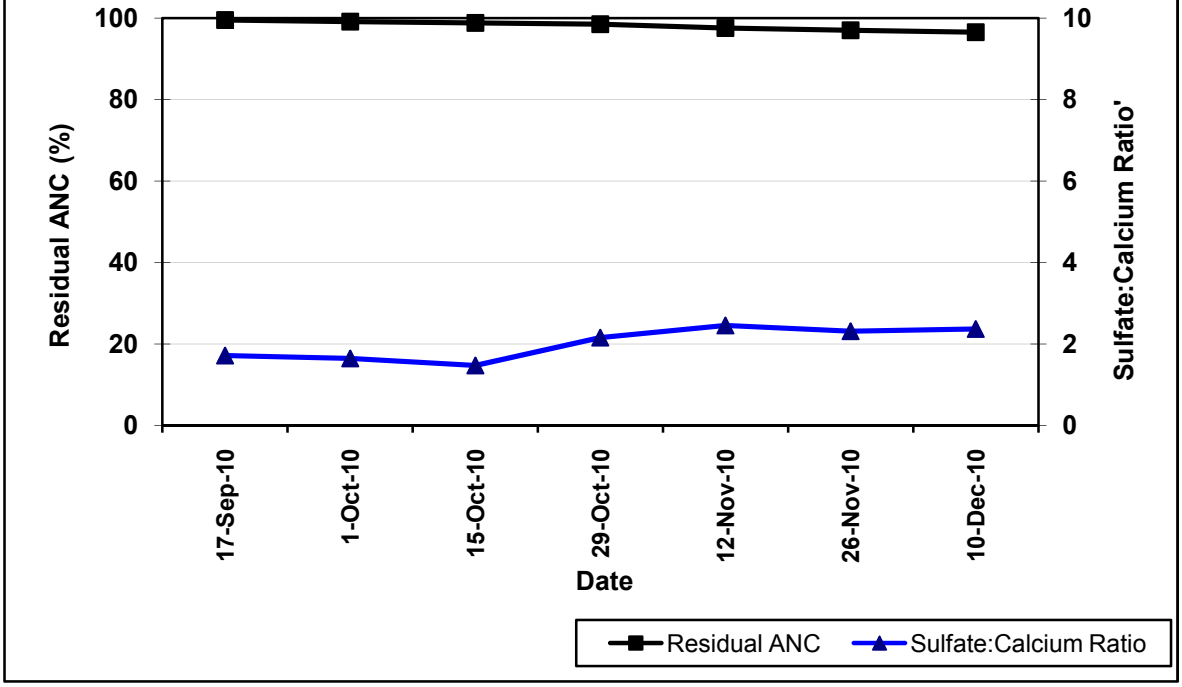


Table KLC5: KLC Test Results for Potential Coal Reject Sample 5 (Herndale Seam)

Sample Weight (kg)	1.2	**MPA (kg H_2SO_4/t)**	142
pH	5.90	**ANC (kg H_2SO_4/t)**	30
EC (µS/cm)	548	**NAPP (kg H_2SO_4/t)**	112
Total S (%)	4.6	**ANC/MPA**	0.2

Date	**17-Sep-10**	**1-Oct-10**	**15-Oct-10**	**29-Oct-10**	**12-Nov-10**	**26-Nov-10**	**10-Dec-10**
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Volume Collected (L)	0.900	0.880	0.890	0.900	0.880	0.890	0.900
Cum. Volume (L)	0.900	1.780	2.670	3.570	4.450	5.340	6.240
Pore Volumes	0.7	1.3	2.0	2.6	3.3	4.0	4.6
pH	4.06	6.37	4.87	3.27	4.27	4.52	3.00
EC (µS/cm)	569	604	653	1,620	1,670	1,180	2,090
Acidity (mg/L)*	66	4	18	176	101	20	415
Alkalinity (mg/L)*	<1	3	3	<1	<1	1	<1
Net Alkalinity (mg/L)*	-66	-1	-15	-176	-101	-19	-415
Dissolved elements (mg/L)							
Al	1.01	<0.01	0.16	1.15	0.64	0.08	2.13
As	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ca	37	61	66	64	144	107	139
Cd	0.0004	0.0001	0.0002	0.0004	0.0009	0.0002	0.0012
Cl	8	3	3	1	<1	4	3
Co	0.070	0.002	0.040	0.059	0.114	0.024	0.083
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
Cu	0.023	0.025	0.013	0.069	0.040	0.009	0.191
Fe	19.6	0.5	6.6	73.7	40.0	3.6	161.0
K	3	4	4	4	7	5	6
Mg	23	35	45	51	138	90	120
Mn	0.10	0.08	0.13	0.22	0.59	0.20	0.57
Mo	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Na	12	6	6	4	14	9	8
Ni	0.153	0.049	0.084	0.197	0.335	0.072	0.34
Pb	0.003	<0.001	<0.001	0.005	<0.001	<0.001	0.003
SO_4	238	296	354	537	965	623	1160
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0001
Se	<0.01	0.01	0.01	<0.01	0.05	0.03	0.02
Zn	0.159	0.041	0.068	0.13	0.24	0.05	0.26
RESULTS**							
SO_4 Generation Rate	179	217	263	403	708	462	870
Cumulative SO_4 Gen.	179	396	658	1061	1769	2231	3101
Ca Generation Rate	28	45	49	48	106	79	104
Cumulative Ca Gen.	28	72	121	169	275	354	459
Mg Generation Rate	17.3	25.7	33.4	38.3	101.2	66.8	90.0
Cumulative Mg Gen.	17	43	76	115	216	282	372
Residual ANC (%)	99.5	98.8	98.0	97.1	94.9	93.3	91.2
Residual Sulfur (%)	99.9	99.7	99.5	99.2	98.7	98.4	97.8
SO_4/Ca	2.7	2.0	2.2	3.5	2.8	2.4	3.5

< indicates less than the analytical detection limit.

* Acidity and Alkalinity data calculated in mg $CaCO_3$/L

** SO4, Ca and Mg generation rates calculated in mg/kg/flush.

Total S = Total Sulfur, ANC = Acid Neutralising Capacity, NAPP = Net Acid Producing Potential and NAG = Net Acid Generation

Figure KLC5a: pH and EC trends for Potential Coal Reject (Herndale Seam)

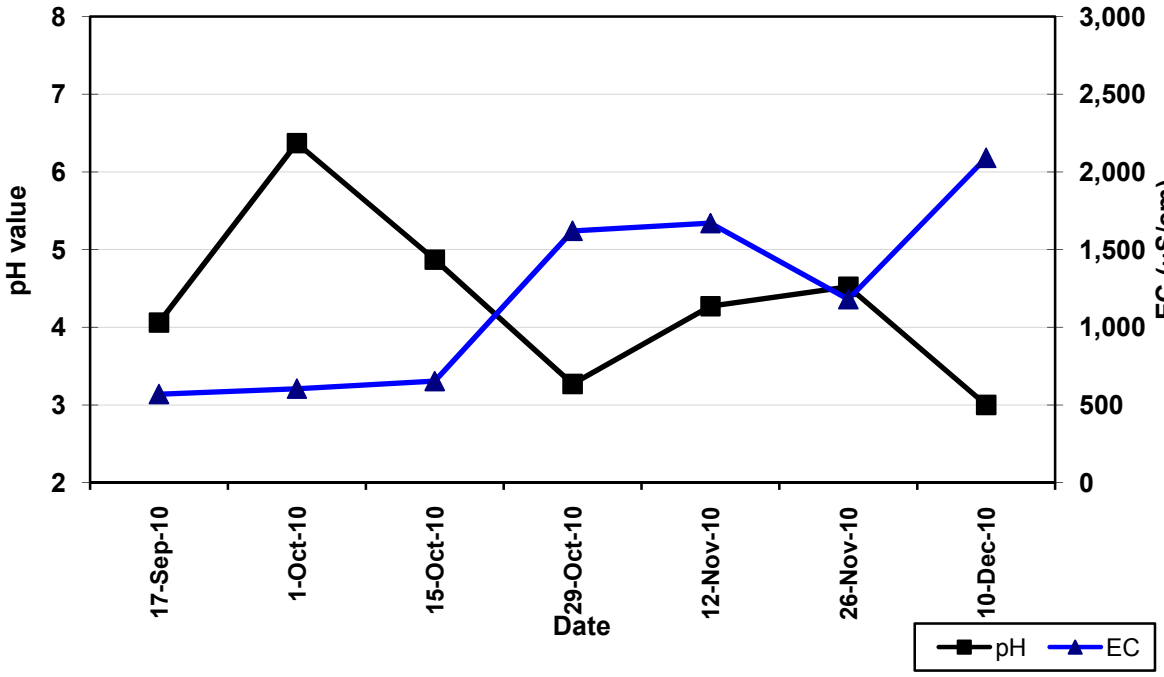


Figure KLC5b: Sulfate and Net Alkalinity trends for Potential Coal Reject

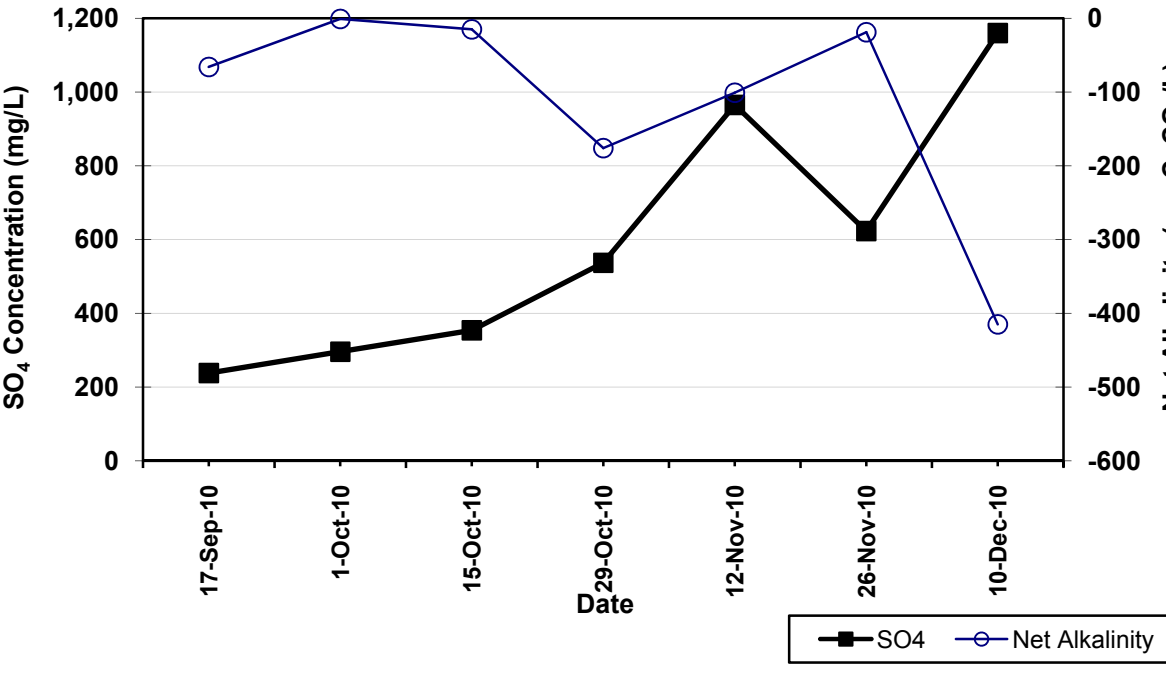


Figure KLC5c: Soluble Metal Trends for Potential Coal Reject (Herndale Seam)

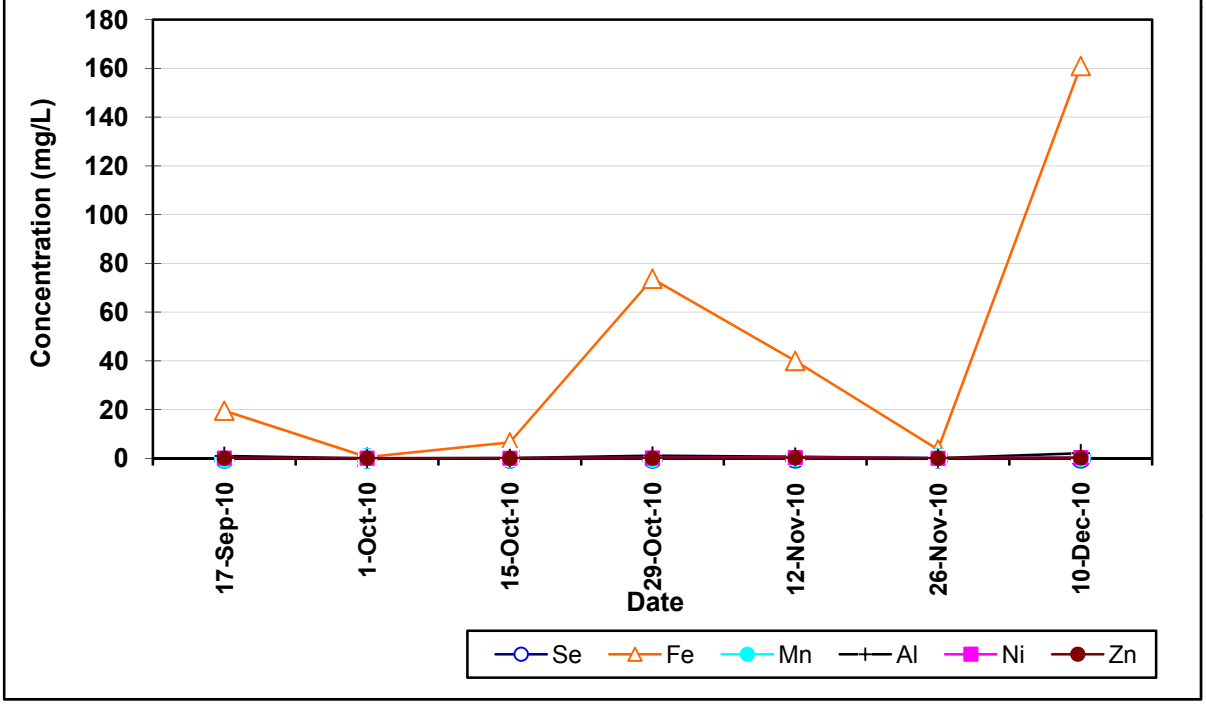


Figure KLC5d: Residual ANC and Sulfate:Calcium Trends for Potential Coal Reject (HerndaleSeam)

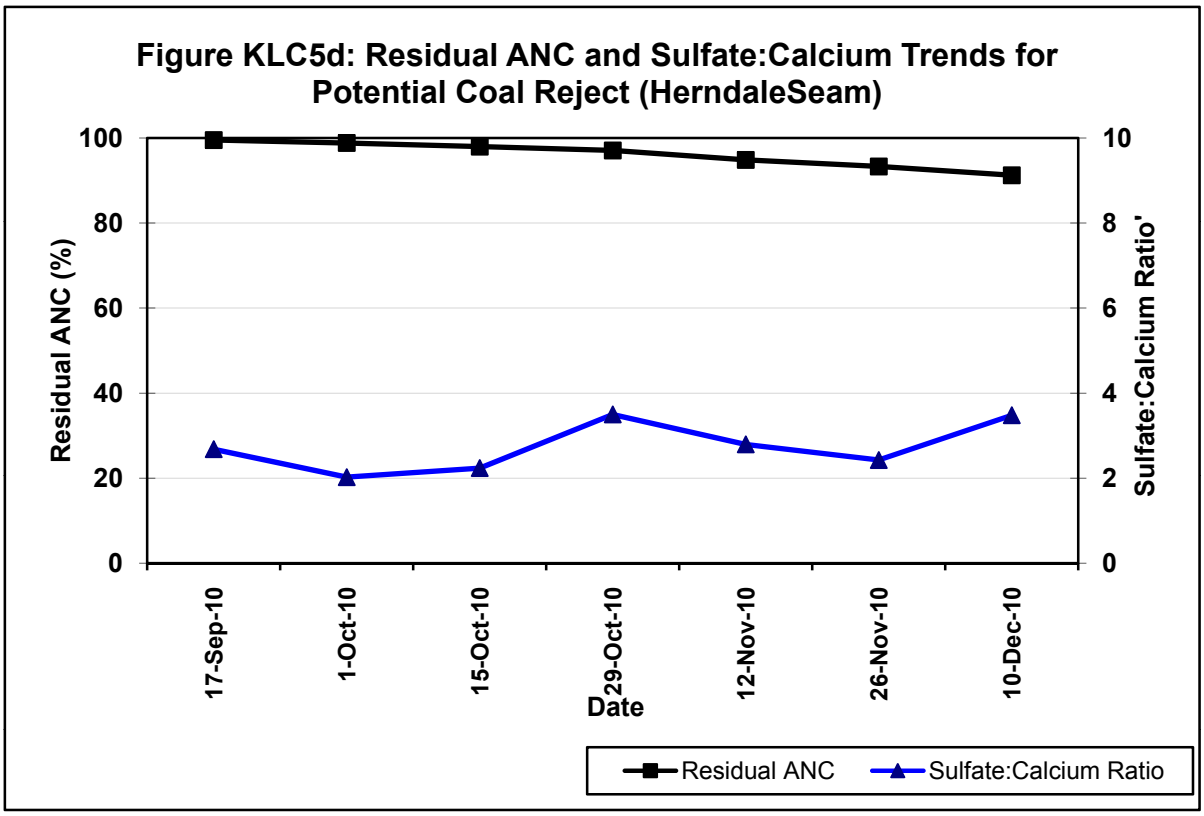


Table KLC6: KLC Test Results for Potential Coal Reject Sample 6 (Onivale Seam)

Sample Weight (kg)	1.2	**MPA (kg H_2SO_4/t)**	189
pH	4.90	**ANC (kg H_2SO_4/t)**	3
EC (µS/cm)	655	**NAPP (kg H_2SO_4/t)**	186
Total S (%)	0.62	**ANC/MPA**	0.02

Date	**17-Sep-10**	**1-Oct-10**	**15-Oct-10**	**29-Oct-10**	**12-Nov-10**	**26-Nov-10**	**10-Dec-10**
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Volume Collected (L)	0.850	0.820	0.840	0.820	0.840	0.820	0.840
Cum. Volume (L)	0.850	1.670	2.510	3.330	4.170	4.990	5.830
Pore Volumes	0.6	1.2	1.9	2.5	3.1	3.7	4.3
pH	3.11	3.25	2.90	2.81	2.78	2.77	2.63
EC (µS/cm)	1,340	1,140	1,120	2,720	2,230	1,860	2,320
Acidity (mg/L)*	290	220	210	588	500	525	805
Alkalinity (mg/L)*	<1	<1	<1	<1	<1	<1	<1
Net Alkalinity (mg/L)*	-290	-220	-220	-588	-500	-525	-805
Dissolved elements (mg/L)							
Al	1.9	1.6	1.8	5.2	6.8	4.9	9.7
As	0.002	0.003	0.012	0.093	0.025	0.020	0.131
B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ca	79	78	72	66	95	96	74
Cd	0.002	0.002	0.002	0.0028	0.0051	0.0050	0.0044
Cl	8	1	1	31	1	2	<1
Co	0.245	0.236	0.207	0.243	0.365	0.325	0.298
Cr	0.001	0.001	<0.001	0.001	0.002	0.002	0.003
Cu	0.104	0.133	0.182	0.293	0.447	0.503	0.666
Fe	119	66	76	280	190	86	286
K	3	4	2	2	4	2	2
Mg	27	39	34	44	87	86	64
Mn	0.203	0.208	0.181	0.224	0.340	0.339	0.345
Mo	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	0.004
Na	14	12	11	10	21	17	9
Ni	0.86	0.75	0.73	1.10	1.40	1.25	1.26
Pb	0.018	0.014	0.007	0.024	0.019	0.008	0.005
SO_4	611	543	521	986	1060	760	1010
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zn	0.72	0.87	0.53	1.34	2.39	2.34	2.11
RESULTS**							
SO_4 Generation Rate	433	371	365	674	742	519	707
Cumulative SO_4 Gen.	433	804	1169	1842	2584	3104	3811
Ca Generation Rate	56	53	50	45	67	66	52
Cumulative Ca Gen.	56	109	160	205	271	337	389
Mg Generation Rate	19.1	26.7	23.8	30.1	60.9	58.8	44.8
Cumulative Mg Gen.	19	46	70	100	161	219	264
Residual ANC (%)	92.9	84.9	77.6	69.9	56.3	43.0	32.8
Residual Sulfur (%)	97.7	95.7	93.7	90.1	86.1	83.3	79.5
SO_4/Ca	3.2	2.9	3.0	6.2	4.6	3.3	5.7

< indicates less than the analytical detection limit.

* Acidity and Alkalinity data calculated in mg $CaCO_3$/L

** SO4, Ca and Mg generation rates calculated in mg/kg/flush.

Total S = Total Sulfur, ANC = Acid Neutralising Capacity, NAPP = Net Acid Producing Potential and NAG = Net Acid Generation

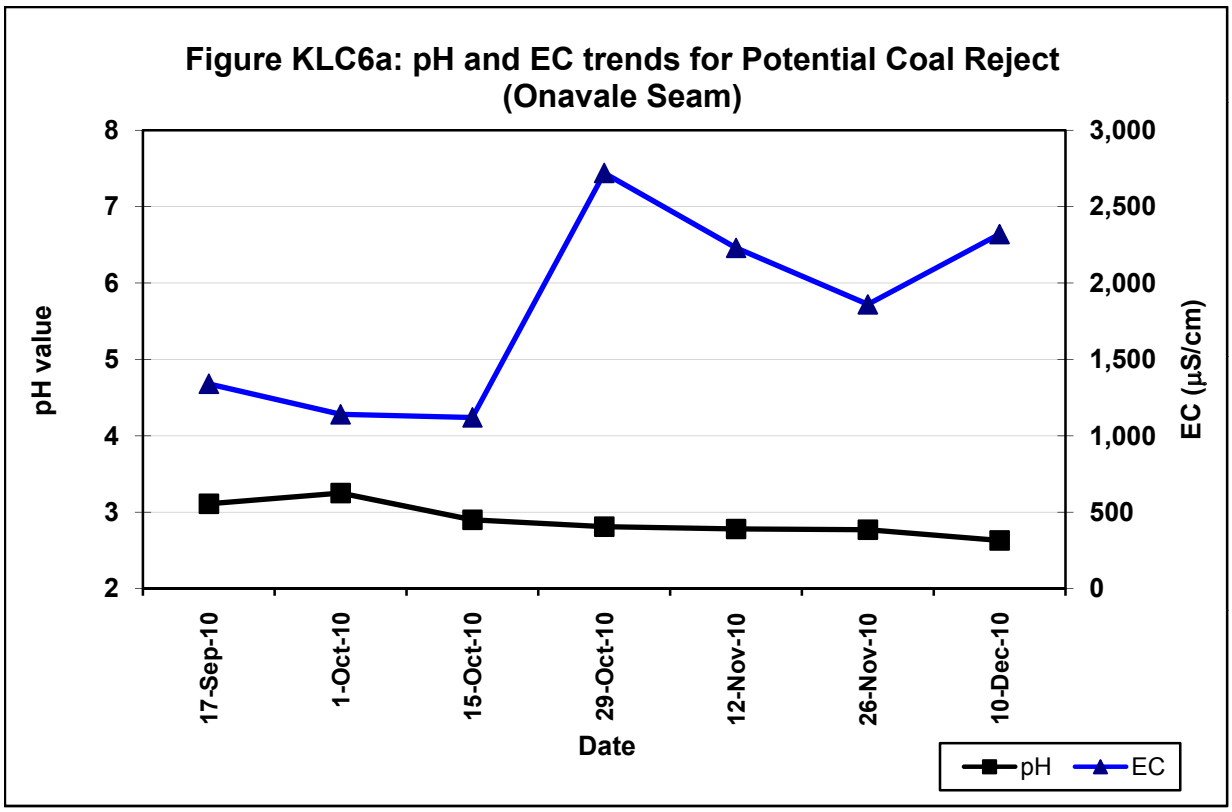


Figure KLC6a: pH and EC trends for Potential Coal Reject (Onavale Seam)
pH value
EC (µS/cm)
8
7
6
5
4
3
2
3,000
2,500
2,000
1,500
1,000
500
0
17-Sep-10
1-Oct-10
15-Oct-10
29-Oct-10
12-Nov-10
26-Nov-10
10-Dec-10
Date
pH
EC

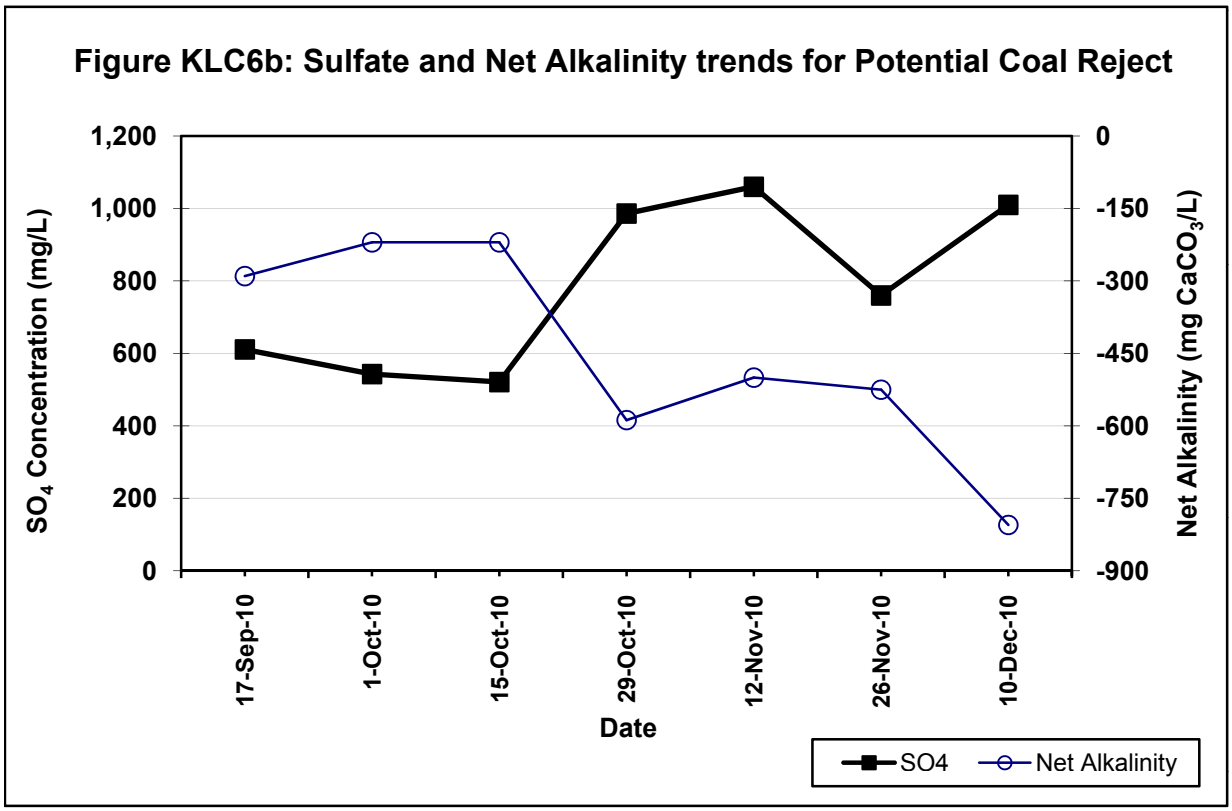


Figure KLC6b: Sulfate and Net Alkalinity trends for Potential Coal Reject
SO4 Concentration (mg/L)
Net Alkalinity (mg CaCO3/L)
1,200
1,000
800
600
400
200
0
0
-150
-300
-450
-600
-750
-900
17-Sep-10
1-Oct-10
15-Oct-10
29-Oct-10
12-Nov-10
26-Nov-10
10-Dec-10
Date
SO4
Net Alkalinity

Figure KLC6c: Soluble Metal Trends for Potential Coal Reject (Onavale Seam)

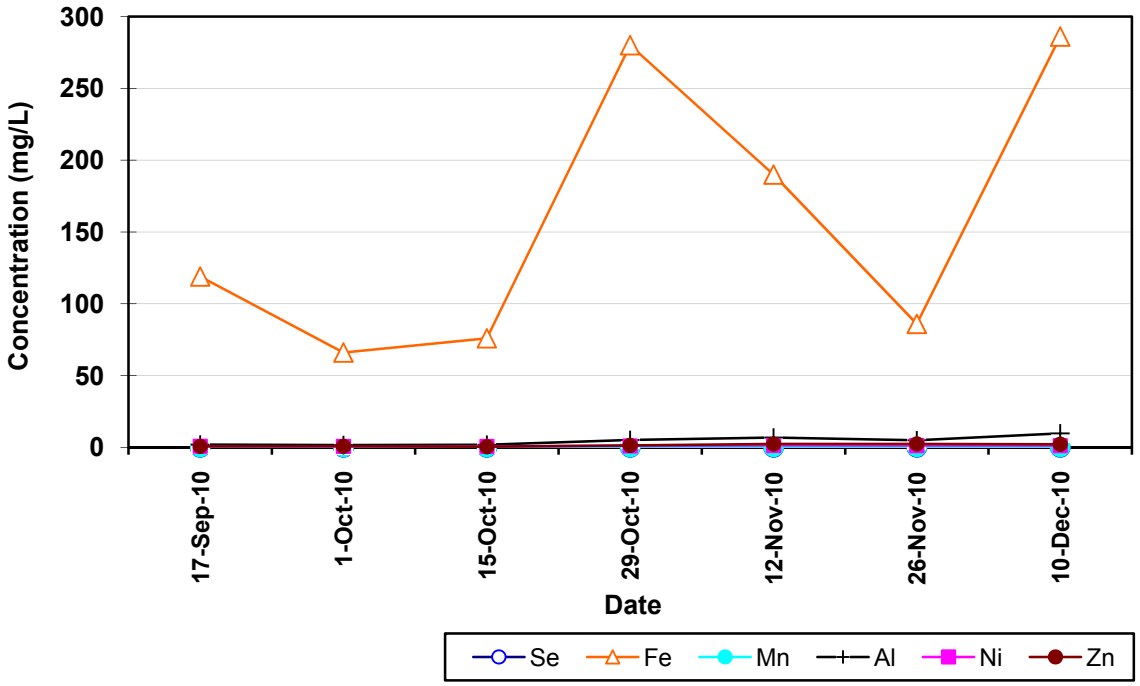
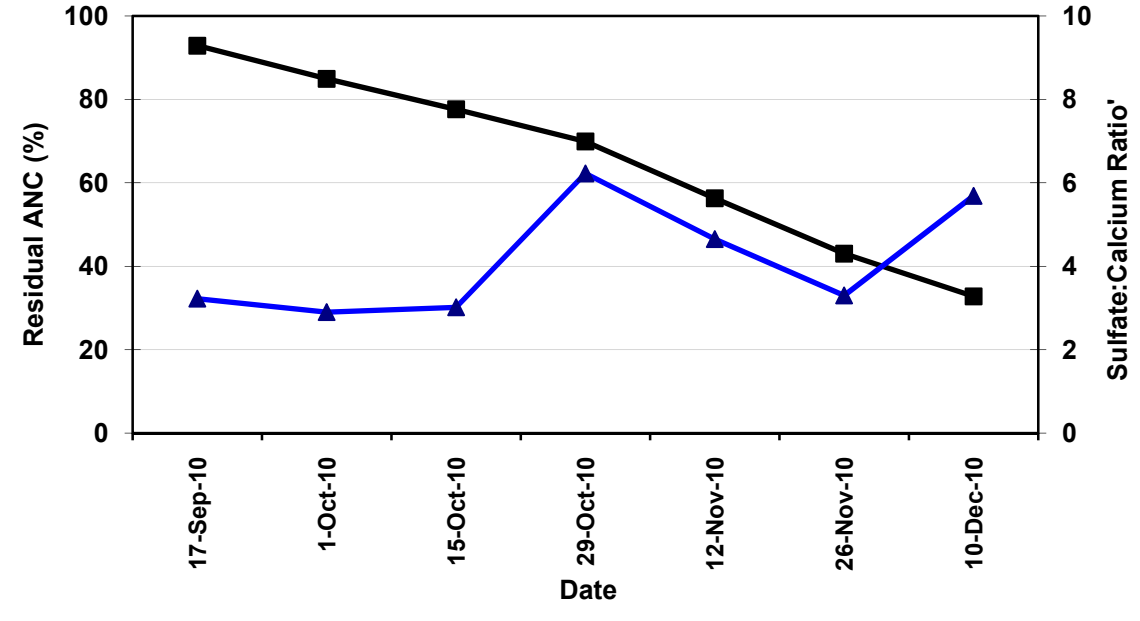


Figure KLC6d: Residual ANC and Sulfate:Calcium Trends for Potential Coal Reject (Onavale Seam)



ATTACHMENT D

ALS Laboratory Results

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1013377**	Page	: 1 of 20
Client	: **RGS ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Carsten Emrich
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: brisbane.enviro.services@alsglobal.com
Telephone	: +61 07 3856 5591	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Aston Resources	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 29-JUL-2010
Sampler	: ----	Issue Date	: 23-AUG-2010
Site	: Maules Creek		
		No. of samples received	: 130
Quote number	: BN/284/09	No. of samples analysed	: 86

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.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils
Kim McCabe	Senior Inorganic Chemist	Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY

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 insuffient 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 date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

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

- **ANC Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong.**

Page	:	3 of 20
Work Order	:	EB1013377
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 13.56-13.82	MAC264 34.71-34.87	MAC264 36.75-36.90	MAC264 37.77-37.97	MAC264 38.46-38.64
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-001	EB1013377-002	EB1013377-003	EB1013377-004	EB1013377-005
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.3	9.0	8.6	8.8	8.6
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-2.2	-320	-5.0	-71.3	-5.0
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		20	203	74	163	64
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		3.0	321	5.9	73.0	5.8
^ ANC as CaCO3	----	0.1	% CaCO3		0.3	32.7	0.6	7.4	0.6
Fizz Rating	----	0	Fizz Unit		0	3	0	2	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.02	0.03	0.03	0.05	0.03

Page : 4 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 42.59-42.64	MAC264 47.08-47.40	MAC264 61.98-62.09	MAC264 64.17-64.32	MAC264 63.75-63.88
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-006	EB1013377-007	EB1013377-008	EB1013377-009	EB1013377-010
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**3.4**	**7.5**	**5.2**	**8.0**	**4.0**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**398**	**-9.6**	**9.5**	**7.6**	**14.4**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**1330**	**259**	**598**	**107**	**143**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		<0.5	**13.4**	**2.3**	**3.1**	<0.5
^ ANC as CaCO3	----	0.1	% CaCO3		<0.1	**1.4**	**0.2**	**0.3**	<0.1
Fizz Rating	----	0	Fizz Unit		**0**	**0**	**0**	**0**	**0**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**13.0**	**0.12**	**0.38**	**0.35**	**0.47**

Page	:	5 of 20
Work Order	:	EB1013377
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 66.21-66.56	MAC264 88.45-88.76	MAC264 90.17-90.32	MAC264 92.10-92.27	MAC264 95.15-95.41
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-011	EB1013377-012	EB1013377-013	EB1013377-014	EB1013377-015
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.8	8.7	8.9	8.9	8.8
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-4.8	-53.5	-13.3	-7.8	-32.8
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		88	159	61	72	128
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		5.6	54.4	14.5	8.7	33.6
^ ANC as CaCO3	----	0.1	% CaCO3		0.6	5.6	1.5	0.9	3.4
Fizz Rating	----	0	Fizz Unit		0	2	2	2	2
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.03	0.04	0.03	0.02

Page : 6 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 98.99-99.11	MAC264 99.63-99.73	MAC264 102.15-102.33	MAC264 105.74-105.81	MAC264 106.09-106.26
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-016	EB1013377-017	EB1013377-018	EB1013377-019	EB1013377-020
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.0**	**8.8**	**8.9**	**8.8**	**7.9**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-64.9**	**-37.3**	**-58.4**	**-2.6**	**7.1**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**115**	**84**	**133**	**78**	**27**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**66.0**	**38.2**	**59.1**	**4.3**	**1.7**
^ ANC as CaCO3	----	0.1	% CaCO3		**6.7**	**3.9**	**6.0**	**0.4**	**0.2**
Fizz Rating	----	0	Fizz Unit		**2**	**2**	**2**	**0**	**0**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.04**	**0.03**	**0.02**	**0.06**	**0.29**

Page	:	7 of 20
Work Order	:	EB1013377
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 106.84-107.01	MAC264 109.35-109.55	MAC264 116.42-116.54	MAC264 117.04-117.21	MAC264 120.38-120.59
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-021	EB1013377-022	EB1013377-023	EB1013377-024	EB1013377-025
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**8.6**	**8.1**	**9.0**	**9.1**	**8.8**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-1.6**	**-8.8**	**-7.7**	**-6.2**	**-47.2**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**80**	**175**	**89**	**104**	**168**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**2.7**	**10.0**	**8.6**	**7.2**	**48.1**
^ ANC as CaCO3	----	0.1	% CaCO3		**0.3**	**1.0**	**0.9**	**0.7**	**4.9**
Fizz Rating	----	0	Fizz Unit		**0**	**0**	**0**	**0**	**2**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.04**	**0.04**	**0.03**	**0.03**	**0.03**

Page : 8 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 125.64-125.78	MAC264 127.92-128.01	MAC264 131.77-131.92	MAC264 133.57-133.75	MAC264 143.50-143.73
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-026	EB1013377-027	EB1013377-028	EB1013377-029	EB1013377-030
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.8	8.8	8.8	8.7	8.7
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-8.8	-17.8	-3.1	-3.7	-10.4
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		108	108	95	113	115
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		14.7	18.8	4.3	4.7	11.9
^ ANC as CaCO3	----	0.1	% CaCO3		1.5	1.9	0.4	0.5	1.2
Fizz Rating	----	0	Fizz Unit		0	0	0	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.19	0.03	0.04	0.03	0.05

Page : 9 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 146.21-146.36	MAC264 162.89-163.03	MAC264 170.02-170.23	MAC264 175.49-175.70	MAC264 177.42-177.72
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-031	EB1013377-032	EB1013377-033	EB1013377-034	EB1013377-035
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**8.9**	**4.2**	**7.5**	**8.6**	**8.5**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-12.2**	**17.7**	**-2.9**	**-8.2**	**-5.0**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**135**	**136**	**487**	**64**	**85**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**13.0**	<0.5	**4.4**	**8.9**	**6.0**
^ ANC as CaCO3	----	0.1	% CaCO3		**1.3**	<0.1	**0.4**	**0.9**	**0.6**
Fizz Rating	----	0	Fizz Unit		**0**	**0**	**0**	**0**	**0**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.02**	**0.58**	**0.05**	**0.02**	**0.03**

Page : 10 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 211.48-211.66	MAC264 212.13-212.30	MAC264 212.99-213.22	MAC264 215.75-215.90	MAC264 227.24-227.24
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-036	EB1013377-037	EB1013377-038	EB1013377-039	EB1013377-040
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**8.0**	**8.6**	**8.7**	**8.7**	**8.8**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-7.4**	**-7.5**	**-7.1**	**-5.0**	**-11.4**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**125**	**46**	**79**	**63**	**84**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**8.4**	**8.4**	**8.0**	**5.7**	**12.2**
^ ANC as CaCO3	----	0.1	% CaCO3		**0.9**	**0.9**	**0.8**	**0.6**	**1.2**
Fizz Rating	----	0	Fizz Unit		**0**	**0**	**0**	**0**	**0**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.03**	**0.03**	**0.03**	**0.02**	**0.03**

Page : 11 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 229.82-229.99	MAC264 230.92-231.18	MAC264 231.97-232.14	MAC264 233.19-233.30	MAC264 236.59-236.79
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-041	EB1013377-042	EB1013377-043	EB1013377-044	EB1013377-045
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**7.1**	**8.0**	**7.4**	**8.6**	**9.0**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-286**	**-6.9**	**1.2**	**-3.6**	**-13.8**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**90**	**108**	**18**	**67**	**120**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**288**	**8.1**	**4.2**	**4.8**	**14.7**
^ ANC as CaCO3	----	0.1	% CaCO3		**29.3**	**0.8**	**0.4**	**0.5**	**1.5**
Fizz Rating	----	0	Fizz Unit		**3**	**2**	**0**	**0**	**0**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.03**	**0.04**	**0.18**	**0.04**	**0.03**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 276.30-276.53	MAC264 276.69-276-82	MAC264 279.23-279.38	MAC264 280.05-280-16	MAC264 281.90-282.06
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-046	EB1013377-047	EB1013377-048	EB1013377-049	EB1013377-050
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.5**	**8.0**	**9.1**	**9.3**	**9.3**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-5.4**	**2.4**	**-8.1**	**-7.2**	**-241**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**76**	**16**	**85**	**95**	**162**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**6.8**	**4.2**	**8.8**	**8.1**	**243**
^ ANC as CaCO3	----	0.1	% CaCO3		**0.7**	**0.4**	**0.9**	**0.8**	**24.8**
Fizz Rating	----	0	Fizz Unit		**0**	**0**	**0**	**0**	**3**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.05**	**0.22**	**0.02**	**0.03**	**0.04**

Page : 13 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 289.47-289.60	MAC264 290.36-290.61	MAC264 297.31-297.48	MAC264 297.87-297.99	MAC264 298.82-299.00
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-051	EB1013377-052	EB1013377-053	EB1013377-054	EB1013377-055
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		9.2	9.6	9.4	8.6	9.0
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-8.2	-35.7	-3.0	-5.9	-0.9
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		159	169	129	89	129
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		9.1	36.5	4.1	13.1	4.7
^ ANC as CaCO3	----	0.1	% CaCO3		0.9	3.7	0.4	1.3	0.5
Fizz Rating	----	0	Fizz Unit		0	2	0	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.02	0.04	0.24	0.12

Page : 14 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC264 299.11-299.27	MAC272 201.44-201.62	MAC272 200.98-201.13	MAC272 198.94-199.09	MAC272 197.85-197.99
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-056	EB1013377-057	EB1013377-058	EB1013377-059	EB1013377-060
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.6	9.1	8.7	8.9	9.0
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		3.9	-6.9	-2.1	-5.0	-19.4
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		67	257	91	126	163
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		5.5	7.9	3.5	5.7	20.3
^ ANC as CaCO3	----	0.1	% CaCO3		0.6	0.8	0.4	0.6	2.1
Fizz Rating	----	0	Fizz Unit		0	0	0	0	2
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.31	0.03	0.05	0.02	0.03

Page : 15 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC272 196.49-196.64	MAC272 134.39-134.51	MAC272 133.38-133.54	MAC272 131.82-132.00	MAC272 120.49-120.65
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-061	EB1013377-062	EB1013377-063	EB1013377-064	EB1013377-065
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.0**	**8.3**	**8.4**	**8.4**	**8.0**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-256**	**-0.9**	<0.5	**-14.3**	**-6.5**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**130**	**115**	**109**	**72**	**89**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**257**	**1.9**	**1.8**	**26.2**	**7.5**
^ ANC as CaCO3	----	0.1	% CaCO3		**26.2**	**0.2**	**0.2**	**2.7**	**0.8**
Fizz Rating	----	0	Fizz Unit		**3**	**0**	**0**	**0**	**2**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.02**	**0.03**	**0.06**	**0.39**	**0.03**

Page : 16 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC272 123.51-123.76	MAC272 117.82-117.97	MAC272 116.81-116.94	MAC272 108.32-108.44	MAC272 107.40-107.53
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-066	EB1013377-067	EB1013377-068	EB1013377-069	EB1013377-070
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.1	8.3	8.7	8.3	8.4
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-4.4	-3.1	-54.8	-1.0	-5.6
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		137	114	151	74	95
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		5.6	4.6	55.6	2.5	6.5
^ ANC as CaCO3	----	0.1	% CaCO3		0.6	0.5	5.7	0.2	0.7
Fizz Rating	----	0	Fizz Unit		0	0	2	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.04	0.05	0.03	0.05	0.03

Page : 17 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC272 106.31-106.47	MAC272 105.81-106.04	MAC272 105.33-105.47	MAC272 104.68-104.86	MAC272 102.49-102.62
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-071	EB1013377-072	EB1013377-073	EB1013377-074	EB1013377-075
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.3	8.4	8.3	7.9	8.3
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-5.7	-5.3	-1.8	-19.2	-12.9
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		71	64	61	234	182
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		6.7	6.2	2.6	20.8	13.9
^ ANC as CaCO3	----	0.1	% CaCO3		0.7	0.6	0.3	2.1	1.4
Fizz Rating	----	0	Fizz Unit		0	0	0	2	2
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.03	0.03	0.05	0.03

Page : 18 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC272 81.28-81.51	MAC272 73.54-73.72	MAC272 69.52-69.68	MAC272 58.07-58.23	MAC272 56.96-57.09
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-076	EB1013377-077	EB1013377-078	EB1013377-079	EB1013377-080
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.8	8.0	8.9	8.5	8.5
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		<0.5	-1.7	-172	-2.5	-3.8
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		35	61	189	58	90
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		1.1	3.0	172	3.4	4.8
^ ANC as CaCO3	----	0.1	% CaCO3		0.1	0.3	17.6	0.3	0.5
Fizz Rating	----	0	Fizz Unit		0	0	3	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.04	0.03	0.03	0.03

Page : 19 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC272 36.73-36.90	MAC272 32.76-32.92	MAC272 30.96-31.11	MAC1261 6.00-12.00	MAC1261 18.00-19.00
				Client sampling date / time	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45	30-JUL-2010 11:45
					EB1013377-081	EB1013377-082	EB1013377-083	EB1013377-084	EB1013377-085
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.5	7.7	7.8	8.5	8.6
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-1.2	-1.1	-4.7	-14.6	-1.2
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		39	68	72	176	78
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		2.0	2.5	5.5	15.5	2.2
^ ANC as CaCO3	----	0.1	% CaCO3		0.2	0.2	0.6	1.6	0.2
Fizz Rating	----	0	Fizz Unit		0	0	0	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.05	0.02	0.03	0.03

Page : 20 of 20
Work Order : EB1013377
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MAC1261 30.00-36.00	----	----	----	----
			Client sampling date / time	30-JUL-2010 11:45	----	----	----	----
				EB1013377-086	----	----	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.3**	----	----	----	----
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	**0.7**	----	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**34**	----	----	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	----	----	----	----
^ ANC as CaCO3	----	0.1	% CaCO3	<0.1	----	----	----	----
Fizz Rating	----	0	Fizz Unit	**0**	----	----	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.02**	----	----	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1014622**	Page	: 1 of 13
Client	: **RGS ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Carsten Emrich
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 3856 5591	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Aston Resources	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 19-AUG-2010
Sampler	: Hugh Jennings	Issue Date	: 02-SEP-2010
Site	: Maules Creek		
		No. of samples received	: 75
Quote number	: BN/284/09	No. of samples analysed	: 51

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.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils
Kim McCabe	Senior Inorganic Chemist	Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY

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 insuffient 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 date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

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

- **ANC Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong.**
- **LCS recovery for EA010 (Conductivity) analyses fall outside Dynamic Control Limits. They are however within ALS Static Control Limits and hence deemed acceptable.**

Page	:	3 of 13
Work Order	:	EB1014622
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC252R 217.82-218.04	MAC252R 217.04-217.22	MAC252R 216.79-216.94	MAC252R 215.74-218.81	MAC252R 213.29-213.46
				Client sampling date / time	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]
					EB1014622-001	EB1014622-002	EB1014622-003	EB1014622-004	EB1014622-005
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.3	7.8	7.8	8.3	8.5
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		37.0	-10.3	-10.2	-18.3	-5.2
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		222	72	73	175	141
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		12.0	12.0	11.7	21.2	11.1
^ ANC as CaCO3	----	0.1	% CaCO3		1.2	1.2	1.2	2.2	1.1
Fizz Rating	----	0	Fizz Unit		0	0	0	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		1.60	0.05	0.05	0.09	0.19

Page : 4 of 13
Work Order : EB1014622
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC252R 212.59-212.76	MAC252R 188.30-188.52	MAC252R 186.81-187.03	MAC252R 185.20-185.44	MAC252R 184.81-185.04
				Client sampling date / time	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]
					EB1014622-006	EB1014622-007	EB1014622-008	EB1014622-009	EB1014622-010
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.8	8.4	8.5	8.7	8.5
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-13.7	-8.2	-10.5	-10.2	-9.4
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		156	106	90	132	119
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		14.7	10.1	11.5	11.4	10.7
^ ANC as CaCO3	----	0.1	% CaCO3		1.5	1.0	1.2	1.2	1.1
Fizz Rating	----	0	Fizz Unit		0	0	0	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.06	0.03	0.04	0.04

Page : 5 of 13
Work Order : EB1014622
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC252R 184.02-184.32	MAC252R 182.67-182.83	MAC252R 157.57-157.79	MAC252R 156.97-157.12	MAC252R 156.58-156.75
				Client sampling date / time	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]
					EB1014622-011	EB1014622-012	EB1014622-013	EB1014622-014	EB1014622-015
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.7	9.0	8.4	8.7	8.6
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-10.2	-9.1	-15.8	-10.1	-9.3
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		121	170	132	126	131
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		11.1	10.3	16.7	11.7	10.6
^ ANC as CaCO3	----	0.1	% CaCO3		1.1	1.0	1.7	1.2	1.1
Fizz Rating	----	0	Fizz Unit		0	0	0	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.04	0.03	0.05	0.04

Page : 6 of 13
Work Order : EB1014622
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC252R 156.39-156.58	MAC252R 154.42-154.59	MAC252R 153.14-153.35	MAC252R 152.89-153.11	MAC252R 151.73-151.98
				Client sampling date / time	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]
					EB1014622-016	EB1014622-017	EB1014622-018	EB1014622-019	EB1014622-020
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.6	8.7	8.5	8.2	8.2
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-10.4	-10.1	-15.1	-0.8	-10.1
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		139	145	134	172	183
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		11.8	11.3	16.2	2.6	11.4
^ ANC as CaCO3	----	0.1	% CaCO3		1.2	1.2	1.6	0.3	1.2
Fizz Rating	----	0	Fizz Unit		0	0	0	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.05	0.04	0.04	0.06	0.04

Page	:	7 of 13
Work Order	:	EB1014622
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC252R 148.40-148.58	MAC252R 137.36-137.51	MAC252R 135.44-135.73	MAC252R 13069-130.86	MAC252R 129.93-130.11
				Client sampling date / time	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]
					EB1014622-021	EB1014622-022	EB1014622-023	EB1014622-024	EB1014622-025
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.8	8.5	8.7	8.8	8.5
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-18.1	-9.4	-49.5	-14.4	-226
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		152	159	155	132	214
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		19.5	10.9	50.4	15.3	228
^ ANC as CaCO3	----	0.1	% CaCO3		2.0	1.1	5.1	1.6	23.3
Fizz Rating	----	0	Fizz Unit		0	0	2	0	3
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.05	0.05	0.03	0.03	0.05

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC252R 129.44-129.67	MAC252R 105.09-105.36	MAC252R 103.60-103.73	MAC252R 98.58-98.76	MAC252R 92.29-92.44
				Client sampling date / time	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]
					EB1014622-026	EB1014622-027	EB1014622-028	EB1014622-029	EB1014622-030
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**8.6**	**8.4**	**8.7**	**8.0**	**8.2**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-62.5**	**-9.4**	**-8.3**	**-8.6**	**-7.8**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**164**	**158**	**126**	**86**	**105**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**63.7**	**10.2**	**10.1**	**9.9**	**10.0**
^ ANC as CaCO3	----	0.1	% CaCO3		**6.5**	**1.0**	**1.0**	**1.0**	**1.0**
Fizz Rating	----	0	Fizz Unit		**2**	**0**	**0**	**0**	**0**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.04**	**0.03**	**0.06**	**0.04**	**0.07**

Page	:	9 of 13
Work Order	:	EB1014622
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC252R 55.86-56.06	MAC252R 54.40-54.68	MAC252R 53.47-53.66	MAC252R 39.75-39.95	MAC252R 38.85-39.02
				Client sampling date / time	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]
					EB1014622-031	EB1014622-032	EB1014622-033	EB1014622-034	EB1014622-035
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**8.6**	**8.9**	**8.4**	**8.6**	**8.4**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-12.7**	**-11.8**	**-197**	**-8.0**	**-10.0**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**176**	**113**	**159**	**129**	**135**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**13.8**	**12.6**	**198**	**10.1**	**11.1**
^ ANC as CaCO3	----	0.1	% CaCO3		**1.4**	**1.3**	**20.2**	**1.0**	**1.1**
Fizz Rating	----	0	Fizz Unit		**0**	**0**	**3**	**0**	**0**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.03**	**0.02**	**0.03**	**0.07**	**0.04**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MAC252R 35.88-36.00	MAC252R 32.00-32.21	MAC252R 31.62-31.74	MAC252R 30.35-30.52	MAC252R 28.58-28.84
				Client sampling date / time	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]
					EB1014622-036	EB1014622-037	EB1014622-038	EB1014622-039	EB1014622-040
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.2	8.6	7.9	7.3	8.6
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		-14.6	-12.9	-249	-7.9	-9.6
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		98	104	172	113	124
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		15.5	14.3	250	9.7	11.1
^ ANC as CaCO3	----	0.1	% CaCO3		1.6	1.4	25.5	1.0	1.1
Fizz Rating	----	0	Fizz Unit		0	0	3	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.04	0.04	0.06	0.05

Page : 11 of 13
Work Order : EB1014622
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MAC252R 27.51-27.68	45-47 Composite # 1	54-60 Composite # 2	67-69 Composite # 3	84-86 Composite # 4
Client sampling date / time				[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]
				EB1014622-041	EB1014622-066	EB1014622-067	EB1014622-068	EB1014622-069
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.6	7.6	8.7	2.7	9.0
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	-14.9	8.0	-13.7	33.3	-41.0
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	126	500	95	1770	127
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	15.9	17.2	15.2	5.5	44.6
^ ANC as CaCO3	----	0.1	% CaCO3	1.6	1.8	1.6	0.6	4.5
Fizz Rating	----	0	Fizz Unit	0	0	0	0	2
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.03	0.82	0.05	1.27	0.12

Page : 12 of 13
Work Order : EB1014622
Client : RGS ENVIRONMENTAL PTY LTD
Project : Aston Resources

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: 90-96 Composite # 5	97-100 Composite # 6	112-113 Composite # 7	126-132 Composite # 9	138-150 Composite # 10
				Client sampling date / time: [19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]	[19-AUG-2010]
				EB1014622-070	EB1014622-071	EB1014622-072	EB1014622-073	EB1014622-074
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.9	8.7	9.0	9.1	9.1
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	-50.1	-6.2	-17.6	-33.1	-70.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	124	103	108	106	135
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	52.7	15.5	27.2	34.2	71.2
^ ANC as CaCO3	----	0.1	% CaCO3	5.4	1.6	2.8	3.5	7.3
Fizz Rating	----	0	Fizz Unit	2	0	2	2	2
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.08	0.30	0.31	0.04	0.02

Page	:	13 of 13
Work Order	:	EB1014622
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Aston Resources

Analytical Results

Sub-Matrix: SOIL				Client sample ID	115-163 Composite # 11	----	----	----	----
				Client sampling date / time	[19-AUG-2010]	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1014622-075	----	----	----	----
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.7	----	----	----	----
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		4.2	----	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		88	----	----	----	----
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		12.2	----	----	----	----
^ ANC as CaCO3	----	0.1	% CaCO3		1.2	----	----	----	----
Fizz Rating	----	0	Fizz Unit		0	----	----	----	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.54	----	----	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1016795**	Page	: 1 of 8
Client	: **RGS ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Carsten Emrich
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 3856 5591	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Maules Creek	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 16-SEP-2010
Sampler	: Alan Robertson	Issue Date	: 05-OCT-2010
Site	: ----		
		No. of samples received	: 129
Quote number	: BN/567/10	No. of samples analysed	: 15

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.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics

Page	:	2 of 8
Work Order	:	EB1016795
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Maules Creek

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 insuffient 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

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: Comp_001	Comp_002	Comp_003	Comp_004	Comp_005
				Client sampling date / time: 30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00
				EB1016795-115	EB1016795-116	EB1016795-117	EB1016795-118	EB1016795-119
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.8	8.8	8.8	8.7	7.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	153	174	150	122	187
ED007: Exchangeable Cations								
^ Exchangeable Calcium	----	0.1	meq/100g	12.3	14.7	8.8	6.2	5.1
^ Exchangeable Magnesium	----	0.1	meq/100g	1.8	4.4	2.8	5.3	2.9
^ Exchangeable Potassium	----	0.1	meq/100g	0.7	0.6	0.4	0.7	0.5
^ Exchangeable Sodium	----	0.1	meq/100g	0.3	0.4	0.4	0.5	0.3
^ Cation Exchange Capacity	----	0.1	meq/100g	15.1	20.1	12.5	12.8	8.9
^ Exchangeable Sodium Percent	----	0.1	%	2.2	2.0	3.0	4.0	3.8
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	4910	26400	3340	1490	743
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	4760	26300	2970	1360	743
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	146	98	372	124	<1
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	80	50	90	60	180
ED045: Chloride								
Chloride	16887-00-6	10	mg/kg	20	40	10	120	20
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	40	50	40	10	60
Magnesium	7439-95-4	10	mg/kg	20	20	20	<10	20
Sodium	7440-23-5	10	mg/kg	60	70	70	80	60
Potassium	7440-09-7	10	mg/kg	50	40	30	30	40
ED093T: Total Major Cations								
Sodium	7440-23-5	10	mg/kg	230	210	190	190	120
Potassium	7440-09-7	10	mg/kg	810	880	660	1120	860
Calcium	7440-70-2	10	mg/kg	6580	28700	7910	2550	1290
Magnesium	7439-95-4	10	mg/kg	1560	10400	3050	2680	570
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	<1	<1	<1	2	<1
Antimony	7440-36-0	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	7440-38-2	0.1	mg/kg	<0.1	0.2	0.7	0.2	<0.1
Boron	7440-42-8	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Page : 4 of 8
Work Order : EB1016795
Client : RGS ENVIRONMENTAL PTY LTD
Project : Maules Creek

Analytical Results

Sub-Matrix: PULP				Client sample ID	Comp_001	Comp_002	Comp_003	Comp_004	Comp_005
				Client sampling date / time	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00
Compound	CAS Number	LOR	Unit		EB1016795-115	EB1016795-116	EB1016795-117	EB1016795-118	EB1016795-119
EG005S : Soluble Metals by ICPAES - Continued									
Iron	7439-89-6	1	mg/kg		<1	<1	<1	<1	<1
Lead	7439-92-1	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	7439-98-7	0.1	mg/kg		<0.1	**0.1**	**0.3**	**0.2**	**0.1**
Nickel	7440-02-0	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	**0.1**
Zinc	7440-66-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		**2350**	**3260**	**2340**	**3880**	**3420**
Antimony	7440-36-0	5	mg/kg		<5	<5	<5	<5	<5
Arsenic	7440-38-2	5	mg/kg		<5	<5	**10**	<5	**6**
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		**44**	**12**	**10**	**5**	**5**
Cobalt	7440-48-4	2	mg/kg		**4**	**4**	**12**	**13**	**5**
Copper	7440-50-8	5	mg/kg		**5**	**13**	**9**	**24**	**20**
Iron	7439-89-6	50	mg/kg		**8410**	**28200**	**8920**	**14100**	**1470**
Lead	7439-92-1	5	mg/kg		**9**	**11**	**13**	**18**	**19**
Manganese	7439-96-5	5	mg/kg		**117**	**585**	**66**	**106**	**8**
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg		**12**	**11**	**23**	**21**	**12**
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg		**26**	**66**	**47**	**132**	**59**
Phosphorus	7723-14-0	50	mg/kg		**100**	**130**	**90**	**180**	**70**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	----	0.1	mg/kg		<0.1	<0.1	**0.2**	<0.1	**0.4**

Page : 5 of 8
Work Order : EB1016795
Client : RGS ENVIRONMENTAL PTY LTD
Project : Maules Creek

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: Comp_006	Comp_007	Comp_008	Comp_009	Comp_010
				Client sampling date / time: 30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00
				EB1016795-120	EB1016795-121	EB1016795-122	EB1016795-123	EB1016795-124
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**7.1**	**8.8**	**9.2**	**8.5**	**8.9**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1060**	**141**	**155**	**140**	**194**
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	**1490**	**7490**	**1980**	**991**	**1490**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	**1490**	**7250**	**1730**	**867**	**1240**
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	**248**	**248**	**124**	**248**
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**2540**	**50**	**10**	**30**	**40**
ED045: Chloride								
Chloride	16887-00-6	10	mg/kg	**20**	**80**	**420**	**260**	**180**
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	**590**	**50**	<10	**30**	<10
Magnesium	7439-95-4	10	mg/kg	**390**	**20**	<10	<10	<10
Sodium	7440-23-5	10	mg/kg	**20**	**40**	**160**	**80**	**200**
Potassium	7440-09-7	10	mg/kg	**20**	**40**	**20**	**40**	**20**
ED093T: Total Major Cations								
Sodium	7440-23-5	10	mg/kg	**110**	**120**	**370**	**150**	**360**
Potassium	7440-09-7	10	mg/kg	**820**	**800**	**1160**	**980**	**680**
Calcium	7440-70-2	10	mg/kg	**8560**	**11400**	**4850**	**2660**	**3510**
Magnesium	7439-95-4	10	mg/kg	**3820**	**2790**	**2520**	**1690**	**700**
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	<1	<1	**4**	**1**	**1**
Antimony	7440-36-0	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	7440-38-2	0.1	mg/kg	<0.1	**0.1**	**0.9**	<0.1	**0.2**
Boron	7440-42-8	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/kg	**0.6**	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Iron	7439-89-6	1	mg/kg	<1	<1	<1	<1	<1
Lead	7439-92-1	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/kg	**1.8**	<0.1	<0.1	<0.1	<0.1
Molybdenum	7439-98-7	0.1	mg/kg	<0.1	**0.1**	**0.1**	<0.1	**0.1**
Nickel	7440-02-0	0.1	mg/kg	**1.5**	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/kg	**0.2**	<0.1	<0.1	<0.1	<0.1

Page : 6 of 8
Work Order : EB1016795
Client : RGS ENVIRONMENTAL PTY LTD
Project : Maules Creek

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID	Comp_006	Comp_007	Comp_008	Comp_009	Comp_010
				Client sampling date / time	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00
					EB1016795-120	EB1016795-121	EB1016795-122	EB1016795-123	EB1016795-124
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		**2300**	**2730**	**3440**	**2960**	**4040**
Antimony	7440-36-0	5	mg/kg		<5	<5	<5	<5	<5
Arsenic	7440-38-2	5	mg/kg		**8**	<5	**5**	<5	<5
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		**5**	**14**	**4**	**3**	**5**
Cobalt	7440-48-4	2	mg/kg		**5**	**2**	**6**	**3**	**4**
Copper	7440-50-8	5	mg/kg		**16**	**19**	**26**	**25**	**35**
Iron	7439-89-6	50	mg/kg		**47800**	**27800**	**3920**	**71300**	**6200**
Lead	7439-92-1	5	mg/kg		**18**	**13**	**14**	**12**	**15**
Manganese	7439-96-5	5	mg/kg		**48**	**524**	**53**	**1770**	**57**
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg		**21**	**11**	**15**	**12**	**9**
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg		**30**	**52**	**30**	**52**	**119**
Phosphorus	7723-14-0	50	mg/kg		<50	**80**	**90**	**100**	**60**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	----	0.1	mg/kg		<0.1	<0.1	**0.5**	<0.1	**0.2**

Page : 7 of 8
Work Order : EB1016795
Client : RGS ENVIRONMENTAL PTY LTD
Project : Maules Creek

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: Comp_011	Comp_012	Comp_013	Comp_014	Comp_015
				Client sampling date / time: 30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00
				EB1016795-125	EB1016795-126	EB1016795-127	EB1016795-128	EB1016795-129
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	4.3	8.5	8.0	8.8	8.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	538	167	114	216	106
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	<1	1490	1120	4580	1120
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	<1	1360	1120	4340	991
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	124	<1	248	124
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	1260	40	30	50	30
ED045: Chloride								
Chloride	16887-00-6	10	mg/kg	20	130	160	200	260
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	220	40	30	20	<10
Magnesium	7439-95-4	10	mg/kg	140	10	10	<10	<10
Sodium	7440-23-5	10	mg/kg	50	90	40	210	90
Potassium	7440-09-7	10	mg/kg	80	40	40	20	30
ED093T: Total Major Cations								
Sodium	7440-23-5	10	mg/kg	140	180	120	390	200
Potassium	7440-09-7	10	mg/kg	910	950	940	710	1170
Calcium	7440-70-2	10	mg/kg	970	2710	2630	21300	1380
Magnesium	7439-95-4	10	mg/kg	610	1200	1870	8980	920
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	<1	<1	2	1	3
Antimony	7440-36-0	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	7440-38-2	0.1	mg/kg	<0.1	0.3	0.2	3.0	0.1
Boron	7440-42-8	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/kg	0.5	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Iron	7439-89-6	1	mg/kg	23	<1	<1	<1	<1
Lead	7439-92-1	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/kg	0.4	<0.1	<0.1	<0.1	<0.1
Molybdenum	7439-98-7	0.1	mg/kg	<0.1	<0.1	0.1	0.6	<0.1
Nickel	7440-02-0	0.1	mg/kg	1.7	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/kg	2.3	<0.1	<0.1	<0.1	<0.1

Page	:	8 of 8
Work Order	:	EB1016795
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Maules Creek

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: Comp_011	Comp_012	Comp_013	Comp_014	Comp_015
				Client sampling date / time: 30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00	30-JUL-2010 15:00
				EB1016795-125	EB1016795-126	EB1016795-127	EB1016795-128	EB1016795-129
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**2610**	**3970**	**3060**	**3860**	**3340**
Antimony	7440-36-0	5	mg/kg	<5	<5	<5	<5	<5
Arsenic	7440-38-2	5	mg/kg	**8**	<5	**6**	**23**	<5
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**3**	**6**	**3**	**6**	**6**
Cobalt	7440-48-4	2	mg/kg	**3**	**5**	**4**	**5**	**3**
Copper	7440-50-8	5	mg/kg	**14**	**31**	**22**	**48**	**23**
Iron	7439-89-6	50	mg/kg	**3920**	**5320**	**18200**	**7960**	**4330**
Lead	7439-92-1	5	mg/kg	**9**	**16**	**14**	**16**	**15**
Manganese	7439-96-5	5	mg/kg	<5	**32**	**152**	**59**	**35**
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	**2**	<2
Nickel	7440-02-0	2	mg/kg	**16**	**11**	**13**	**29**	**6**
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg	**36**	**50**	**45**	**49**	**75**
Phosphorus	7723-14-0	50	mg/kg	<50	**70**	**60**	<50	**70**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	----	0.1	mg/kg	<0.1	**0.1**	**0.2**	**1.2**	<0.1

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1017550**	Page	: 1 of 8
Client	: **RGS ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Carsten Emrich
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 3856 5591	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 091022 Maules Creek	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 04-OCT-2010
Sampler	: A Robertson	Issue Date	: 11-OCT-2010
Site	: ----		
		No. of samples received	: 12
Quote number	: BN/567/10	No. of samples analysed	: 12

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.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics

Page	:	2 of 8
Work Order	:	EB1017550
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091022 Maules Creek

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 insuffient 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

Page : 3 of 8
Work Order : EB1017550
Client : RGS ENVIRONMENTAL PTY LTD
Project : 091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Maules Creek 1	Maules Creek 2	Maules Creek 3	Maules Creek 4	Maules Creek 5
				Client sampling date / time: 17-SEP-2010 15:00	17-SEP-2010 15:00	17-SEP-2010 15:00	17-SEP-2010 15:00	17-SEP-2010 15:00
				EB1017550-001	EB1017550-002	EB1017550-003	EB1017550-004	EB1017550-005
EA005: pH								
pH Value	----	0.01	pH Unit	**7.69**	**8.16**	**7.48**	**6.72**	**4.06**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**188**	**111**	**129**	**290**	**569**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**34**	**22**	**24**	**4**	<1
Total Alkalinity as CaCO3	----	1	mg/L	**34**	**22**	**23**	**4**	<1
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	**1**	**1**	**3**	**3**	**66**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**31**	**13**	**20**	**99**	**238**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**9**	**9**	**7**	**9**	**8**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**14**	**6**	**5**	**24**	**37**
Magnesium	7439-95-4	1	mg/L	**4**	**2**	**2**	**6**	**23**
Sodium	7440-23-5	1	mg/L	**12**	**11**	**14**	**16**	**12**
Potassium	7440-09-7	1	mg/L	**4**	**2**	**4**	**5**	**3**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.03**	**0.16**	**0.07**	**0.05**	**1.01**
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	**0.001**	**0.004**	**0.003**	**0.002**	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	**0.0004**
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**	**0.023**
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	**0.002**	**0.059**	**0.070**
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.001**	**0.002**	**0.058**	**0.153**
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	**0.003**
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	**0.005**	**0.032**	**0.159**
Manganese	7439-96-5	0.001	mg/L	**0.018**	**0.008**	**0.006**	**0.025**	**0.103**
Molybdenum	7439-98-7	0.001	mg/L	**0.003**	**0.006**	**0.024**	**0.003**	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	**0.02**	<0.01
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	**0.67**	**19.6**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**1.58**	**0.95**	**1.06**	**2.39**	**5.20**

Page	:	4 of 8
Work Order	:	EB1017550
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Maules Creek 1	Maules Creek 2	Maules Creek 3	Maules Creek 4	Maules Creek 5
				Client sampling date / time: 17-SEP-2010 15:00	17-SEP-2010 15:00	17-SEP-2010 15:00	17-SEP-2010 15:00	17-SEP-2010 15:00
				EB1017550-001	EB1017550-002	EB1017550-003	EB1017550-004	EB1017550-005
EN055: Ionic Balance - Continued								
^ Total Cations	----	0.01	meq/L	**1.66**	**1.03**	**1.16**	**2.59**	----
Total Cations	----	0.01	meq/L	----	----	----	----	**5.41**
Ionic Balance	----	0.01	%	----	----	----	----	**1.98**

Page : 5 of 8
Work Order : EB1017550
Client : RGS ENVIRONMENTAL PTY LTD
Project : 091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Maules Creek 6	Maules Creek 1	Maules Creek 2	Maules Creek 3	Maules Creek 4
				Client sampling date / time: 17-SEP-2010 15:00	01-OCT-2010 15:00	01-OCT-2010 15:00	01-OCT-2010 15:00	01-OCT-2010 15:00
				EB1017550-006	EB1017550-007	EB1017550-008	EB1017550-009	EB1017550-010
EA005: pH								
pH Value	----	0.01	pH Unit	3.11	7.76	7.86	7.41	7.16
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1340	122	118	232	228
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	14	10	36	4
Total Alkalinity as CaCO3	----	1	mg/L	<1	14	10	36	4
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	290	<1	1	2	2
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	611	27	30	70	83
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	8	2	2	3	1
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	79	10	8	9	21
Magnesium	7439-95-4	1	mg/L	27	2	2	5	5
Sodium	7440-23-5	1	mg/L	14	6	8	25	11
Potassium	7440-09-7	1	mg/L	3	4	3	5	5
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	1.90	0.08	0.08	0.06	0.02
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.004	0.010	<0.001
Cadmium	7440-43-9	0.0001	mg/L	0.0020	<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	0.104	<0.001	<0.001	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	0.245	<0.001	<0.001	0.002	0.020
Nickel	7440-02-0	0.001	mg/L	0.857	0.002	0.001	0.001	0.031
Lead	7439-92-1	0.001	mg/L	0.018	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.717	<0.005	<0.005	<0.005	0.030
Manganese	7439-96-5	0.001	mg/L	0.203	0.008	0.007	0.004	0.012
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.002	0.010	0.069	0.009
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	0.03	0.03
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L	119	<0.05	<0.05	<0.05	<0.05
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	13.0	0.91	0.88	2.26	1.86

Page	:	6 of 8
Work Order	:	EB1017550
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Maules Creek 6	Maules Creek 1	Maules Creek 2	Maules Creek 3	Maules Creek 4
				Client sampling date / time: 17-SEP-2010 15:00	01-OCT-2010 15:00	01-OCT-2010 15:00	01-OCT-2010 15:00	01-OCT-2010 15:00
				EB1017550-006	EB1017550-007	EB1017550-008	EB1017550-009	EB1017550-010
EN055: Ionic Balance - Continued								
^ Total Cations	----	0.01	meq/L	----	**1.06**	**1.02**	**2.07**	**2.06**
Total Cations	----	0.01	meq/L	**13.3**	----	----	----	----
Ionic Balance	----	0.01	%	**1.41**	----	----	----	----

Page : 7 of 8
Work Order : EB1017550
Client : RGS ENVIRONMENTAL PTY LTD
Project : 091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Maules Creek 5 Client sampling date / time: 01-OCT-2010 15:00 EB1017550-011	Maules Creek 6 01-OCT-2010 15:00 EB1017550-012	---- ---- ----	---- ---- ----	---- ---- ----
EA005: pH								
pH Value	----	0.01	pH Unit	**6.37**	**3.25**	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**604**	**1140**	----	----	----
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	**3**	<1	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**3**	<1	----	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	**4**	<1	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**296**	**543**	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**3**	**1**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**61**	**78**	----	----	----
Magnesium	7439-95-4	1	mg/L	**35**	**39**	----	----	----
Sodium	7440-23-5	1	mg/L	**6**	**12**	----	----	----
Potassium	7440-09-7	1	mg/L	**4**	**4**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	**1.60**	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.003**	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	**0.0001**	**0.0021**	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.001**	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.002**	**0.133**	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.025**	**0.236**	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.049**	**0.754**	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	**0.014**	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.041**	**0.866**	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.077**	**0.208**	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	**0.01**	<0.01	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.50**	**66.3**	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**6.31**	**11.3**	----	----	----

Page	:	8 of 8
Work Order	:	EB1017550
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**				Client sample ID	Maules Creek 5	Maules Creek 6	----	----	----
				Client sampling date / time	01-OCT-2010 15:00	01-OCT-2010 15:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1017550-011**	**EB1017550-012**	**----**	**----**	**----**
EN055: Ionic Balance - Continued									
^ Total Cations	----	0.01	meq/L		**6.34**	----	----	----	----
Total Cations	----	0.01	meq/L		----	**11.3**	----	----	----
^ Ionic Balance	----	0.01	%		**0.26**	----	----	----	----
Ionic Balance	----	0.01	%		----	**0.18**	----	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1022759**	Page	: 1 of 8
Client	: **RGS ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Carsten Emrich
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 3856 5591	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 091022 Maules Creek	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 13-DEC-2010
Sampler	: A. Robertson	Issue Date	: 29-DEC-2010
Site	: ----		
		No. of samples received	: 12
Quote number	: BN/567/10	No. of samples analysed	: 12

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.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics

Page	:	2 of 8
Work Order	:	EB1022759
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091022 Maules Creek

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 insuffient 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

- **EG020-F (Dissolved Metals): LCS recovery for Sb falls outside Dynamic Control Limits. It is however within ALS Static Control Limits and hence deemed acceptable.**
- **Ionic balances are within acceptable limits as detailed in the 21st Ed. APHA "Standard Methods for the Examination of Water and Wastewater".**

Page : 3 of 8
Work Order : EB1022759
Client : RGS ENVIRONMENTAL PTY LTD
Project : 091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Maules Creek 1	Maules Creek 2	Maules Creek 3	Maules Creek 4	Maules Creek 5
				Client sampling date / time: 26-NOV-2010 15:00	26-NOV-2010 15:00	26-NOV-2010 15:00	26-NOV-2010 15:00	26-NOV-2010 15:00
				EB1022759-001	EB1022759-002	EB1022759-003	EB1022759-004	EB1022759-005
EA005: pH								
pH Value	----	0.01	pH Unit	**7.55**	**7.08**	**7.69**	**6.45**	**4.52**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**87**	**139**	**207**	**346**	**1180**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**16**	**26**	**38**	**3**	**1**
Total Alkalinity as CaCO3	----	1	mg/L	**16**	**26**	**38**	**3**	**1**
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	**5**	**5**	**5**	**5**	**20**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**16**	**37**	**46**	**133**	**623**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	<1	**2**	**1**	**2**	**4**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**5**	**11**	**6**	**24**	**107**
Magnesium	7439-95-4	1	mg/L	**2**	**4**	**3**	**9**	**90**
Sodium	7440-23-5	1	mg/L	**5**	**7**	**24**	**18**	**9**
Potassium	7440-09-7	1	mg/L	**2**	**2**	**4**	**6**	**5**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.06**	<0.01	**0.02**	<0.01	**0.08**
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	**0.004**	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	**0.001**	**0.001**	**0.013**	<0.001	<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	**0.003**	**0.009**
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	**0.024**	**0.024**
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.003**	<0.001	**0.040**	**0.072**
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	**0.057**	**0.047**
Manganese	7439-96-5	0.001	mg/L	**0.007**	<0.001	<0.001	**0.016**	**0.202**
Molybdenum	7439-98-7	0.001	mg/L	**0.004**	**0.010**	**0.076**	**0.011**	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	**0.02**	**0.05**	**0.03**
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L	**0.07**	**0.05**	<0.05	<0.05	**3.60**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**0.66**	**1.34**	**1.76**	**2.88**	**13.1**

Page : 4 of 8
Work Order : EB1022759
Client : RGS ENVIRONMENTAL PTY LTD
Project : 091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Maules Creek 1	Maules Creek 2	Maules Creek 3	Maules Creek 4	Maules Creek 5
				Client sampling date / time: 26-NOV-2010 15:00	26-NOV-2010 15:00	26-NOV-2010 15:00	26-NOV-2010 15:00	26-NOV-2010 15:00
				EB1022759-001	EB1022759-002	EB1022759-003	EB1022759-004	EB1022759-005
EN055: Ionic Balance - Continued								
^ Total Cations	----	0.01	meq/L	**0.68**	**1.25**	**1.74**	**2.86**	**13.3**
^ Ionic Balance	----	0.01	%	----	----	----	----	**0.78**

Page : 5 of 8
Work Order : EB1022759
Client : RGS ENVIRONMENTAL PTY LTD
Project : 091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Maules Creek 6	Maules Creek 1	Maules Creek 2	Maules Creek 3	Maules Creek 4
				Client sampling date / time: 26-NOV-2010 15:00	10-DEC-2010 15:00	10-DEC-2010 15:00	10-DEC-2010 15:00	10-DEC-2010 15:00
				EB1022759-006	EB1022759-007	EB1022759-008	EB1022759-009	EB1022759-010
EA005: pH								
pH Value	----	0.01	pH Unit	**2.77**	**6.86**	**7.13**	**7.52**	**5.78**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1860**	**72**	**139**	**177**	**267**
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	**8**	**25**	**95**	**3**
Total Alkalinity as CaCO3	----	1	mg/L	<1	**8**	**25**	**95**	**3**
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	**525**	**5**	**5**	**5**	**825**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**760**	**18**	**42**	**25**	**108**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**2**	<1	**2**	<1	<1
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**96**	**5**	**11**	**5**	**19**
Magnesium	7439-95-4	1	mg/L	**83**	**2**	**5**	**5**	**7**
Sodium	7440-23-5	1	mg/L	**17**	**4**	**9**	**35**	**13**
Potassium	7440-09-7	1	mg/L	**2**	**2**	**2**	**4**	**5**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**4.88**	**0.25**	<0.01	**0.26**	**0.02**
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	**0.003**	<0.001
Arsenic	7440-38-2	0.001	mg/L	**0.020**	**0.001**	<0.001	**0.015**	<0.001
Cadmium	7440-43-9	0.0001	mg/L	**0.0050**	<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	**0.503**	<0.001	<0.001	<0.001	**0.006**
Cobalt	7440-48-4	0.001	mg/L	**0.325**	<0.001	**0.003**	**0.001**	**0.020**
Nickel	7440-02-0	0.001	mg/L	**1.25**	**0.002**	**0.010**	**0.001**	**0.033**
Lead	7439-92-1	0.001	mg/L	**0.008**	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	**2.34**	<0.005	<0.005	<0.005	**0.057**
Manganese	7439-96-5	0.001	mg/L	**0.339**	**0.004**	**0.020**	**0.002**	**0.014**
Molybdenum	7439-98-7	0.001	mg/L	<0.001	**0.002**	**0.006**	**0.043**	**0.002**
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	**0.01**	**0.03**
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L	**85.8**	**0.10**	<0.05	<0.05	**0.10**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	----	**0.54**	**1.43**	**2.42**	**2.31**

Page	:	6 of 8
Work Order	:	EB1022759
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Maules Creek 6	Maules Creek 1	Maules Creek 2	Maules Creek 3	Maules Creek 4
				Client sampling date / time: 26-NOV-2010 15:00	10-DEC-2010 15:00	10-DEC-2010 15:00	10-DEC-2010 15:00	10-DEC-2010 15:00
				EB1022759-006	EB1022759-007	EB1022759-008	EB1022759-009	EB1022759-010
EN055: Ionic Balance - Continued								
Total Anions	----	0.01	meq/L	**15.9**	----	----	----	----
^ Total Cations	----	0.01	meq/L	----	**0.58**	**1.40**	**2.29**	**2.21**
Total Cations	----	0.01	meq/L	**16.1**	----	----	----	----
Ionic Balance	----	0.01	%	**0.69**	----	----	----	----

Page : 7 of 8
Work Order : EB1022759
Client : RGS ENVIRONMENTAL PTY LTD
Project : 091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Maules Creek 5	Maules Creek 6	----	----	----
				Client sampling date / time: 10-DEC-2010 15:00	10-DEC-2010 15:00	----	----	----
				EB1022759-011	EB1022759-012	----	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	**3.00**	**2.63**	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**2090**	**2320**	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	----	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	**415**	**805**	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**1160**	**1010**	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**3**	<1	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**139**	**74**	----	----	----
Magnesium	7439-95-4	1	mg/L	**120**	**64**	----	----	----
Sodium	7440-23-5	1	mg/L	**8**	**9**	----	----	----
Potassium	7440-09-7	1	mg/L	**6**	**2**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**2.13**	**9.70**	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.002**	**0.131**	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	**0.0012**	**0.0044**	----	----	----
Chromium	7440-47-3	0.001	mg/L	**0.002**	**0.003**	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.191**	**0.666**	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.083**	**0.298**	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.340**	**1.26**	----	----	----
Lead	7439-92-1	0.001	mg/L	**0.003**	**0.005**	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.258**	**2.11**	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.574**	**0.345**	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	**0.004**	----	----	----
Selenium	7782-49-2	0.01	mg/L	**0.02**	<0.01	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	----
Iron	7439-89-6	0.05	mg/L	**161**	**286**	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**24.2**	**21.0**	----	----	----

Page	:	8 of 8
Work Order	:	EB1022759
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091022 Maules Creek

Analytical Results

Sub-Matrix: **WATER**				Client sample ID	Maules Creek 5	Maules Creek 6	----	----	----
				Client sampling date / time	10-DEC-2010 15:00	10-DEC-2010 15:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1022759-011**	**EB1022759-012**	**----**	**----**	**----**
EN055: Ionic Balance - Continued									
Total Cations	----	0.01	meq/L		**23.1**	**19.6**	----	----	----
Ionic Balance	----	0.01	%		**2.44**	**3.40**	----	----	----