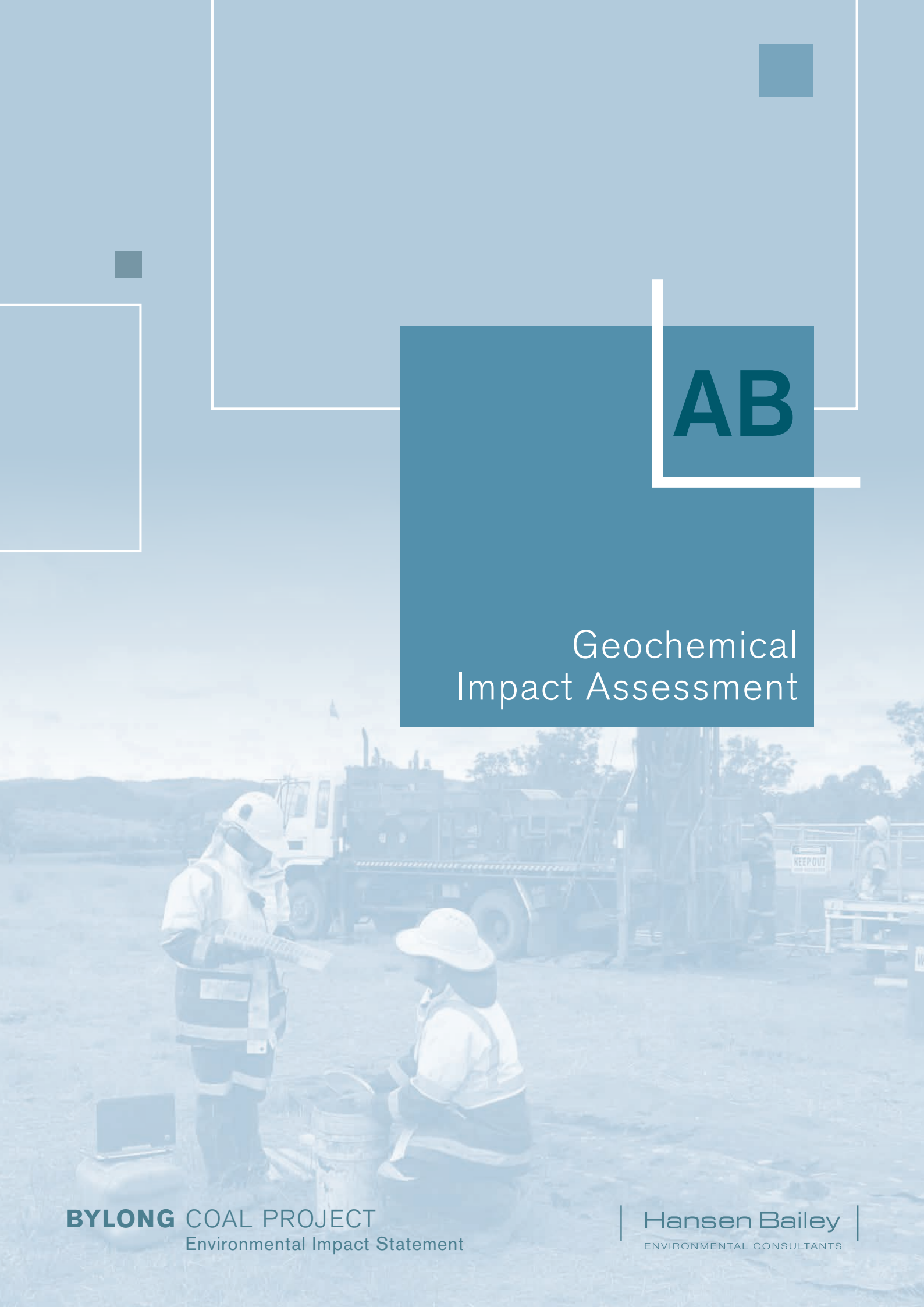




AB

Geochemical Impact Assessment

BYLONG COAL PROJECT
Environmental Impact Statement

Hansen Bailey
ENVIRONMENTAL CONSULTANTS



Bylong Coal Project

Geochemical Impact Assessment

Final report prepared for:

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PO Box 473
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Date: 10 April 2015
Project Number: 111211
Report Number: R001_A

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EXECUTIVE SUMMARY

ES1 Background

RGS Environmental Pty Ltd (RGS) was commissioned by Hansen Bailey Environmental Consultants (Hansen Bailey) to complete a geochemical impact assessment for coal and mining waste materials likely to be generated from mining and processing activities at the Bylong Coal Project (the 'Project'). Hansen Bailey has been commissioned to prepare an Environmental Impact Statement (EIS) for the Project.

The Project proposes the extraction of a portion of the known coal reserves within the Project Authorisations using both open cut and underground mining methods for a period of approximately 23 years following a construction period of up to 2 years. Decommissioning of Project infrastructure and the final rehabilitation activities may extend beyond the 25 years of the proposed Project.

The Project has an identified mineable Run of Mine (ROM) coal resource of approximately 124 Million tonnes (Mt) for the 25 years of the mine life. Further coal resources have been identified within the Project Boundary and will be the subject of future exploration and economic feasibility studies. The overburden:coal stripping ratio for the open cut mining areas is on average 4.6 bank cubic metres:ROM tonne of coal recovered.

The open cut mining operations will generate approximately 152 million bank cubic metres (bcm) of overburden material, which will either report to Overburden Emplacement Areas (OEA's) or be used to progressively backfill the open cut areas. Over the life of mine, approximately 23 million m³ of coal reject materials will be generated from the coal handling and preparation plant (CHPP) and will report to OEAs until storage capacity becomes available in the mined out open pit areas.

ES2 Geochemical Impact Assessment Strategy

In order to complete the geochemical impact assessment for coal and mining waste materials generated by the Project, RGS worked closely with Hansen Bailey personnel to develop an appropriate sampling and testing program. Representative samples were collected for:

- Overburden, interburden and minor uneconomic coal seam materials likely to report to OEAs and as backfill at the open pits;
- Potential coal reject materials (including roof/parting/floor, coarse reject and fine tailings) and simulated coal reject materials likely to be generated from the CHPP following processing; and
- Raw coal likely to report to the ROM stockpile area and CHPP for processing.

ES3 Scope of Work

The scope of work undertaken by RGS included:

- A desktop review of relevant existing Project information;
- A site visit and the design of a suitable sampling and geochemical test program;
- Co-ordination of the static and kinetic geochemical test program;
- Discussion of potential mitigation and management measures for the materials generated on-site;
- Interaction with Proponent, Hansen Bailey, and sub-consultant personnel; and
- Preparation of a geochemical impact assessment report suitable for inclusion in an EIS.

ES4 Sampling and Testing Program

The sampling (and geochemical testing) program for the Project was developed based on existing technical guidelines for the geochemical assessment of coal and mining waste materials in Australia and worldwide. The sampling strategy also took into account existing site knowledge to ensure that the sampling program was risk based and focussed on obtaining fresh representative samples for each of the Project coal and mining waste material types. Representative sub-samples of fresh drill core (and some drill chips) were collected for the rock types (lithologies) encountered throughout the stratigraphic profile, which included overburden, interburden and uneconomic seam samples, as well as raw coal and coal seam roof, parting and floor materials. Simulated coarse reject and tailing samples were also used as part of the geochemical assessment program.

All drilling and sampling programs were conducted under the supervision of a professional and experienced geologist to ensure accurate sample representation and high quality sample information for each drill hole. Samples were prepared and stored indoors in plastic bags to prevent cross-contamination between sample types and to minimise exposure to potential weathering conditions (oxidation) prior to transfer to ALS laboratory (ALS) in Brisbane for geochemical testing.

ES5 Conclusions

RGS has completed a geochemical impact assessment of representative samples of coal and mining waste materials for the Project. The following conclusions were made as a result of this investigation:

- The majority of coal and mining waste materials are expected to have a low sulfur content, excess Acid Neutralising Capacity (ANC), and be classified as Non-Acid Forming (NAF);
- The majority of coal and mining waste materials are likely to have a high factor of safety with respect to potential acid generation;
- Some of the coal reject material generated from processing coal from the Ulan and Coggan seams is likely to be Potentially Acid Forming (PAF). This material will need to be well managed at the Project to reduce the risk of Acid and Metalliferous Drainage (AMD), Neutral Mine Drainage (NMD) and saline drainage;
- Some of the floor material from the Coggan seam is likely to be PAF and therefore there is some potential for parts of the final pit floor at the proposed open cut operation to be a source of AMD;
- The concentration of total metals/metalloids in coal and mining waste materials is typically low and below the applied guideline criteria for soils, and is therefore unlikely to present any environmental issues associated with revegetation and rehabilitation;
- Most NAF coal and mining waste materials reporting to stockpile and storage areas should generate pH neutral to slightly alkaline run-off/seepage with low salinity values, following surface exposure. The salinity of run-off/seepage from these materials is expected to remain low even with extended exposure to oxidising conditions;
- The concentration of trace metals/metalloids in surface run-off and seepage from most NAF coal and mining waste materials in the field situation is likely to be low;
- Overall, the risk of potentially significant water quality impacts from NAF coal and mining waste material is low;
- Some coal materials could have a medium to high propensity to spontaneously combust, however the risk of self-heating can be significantly moderated, with appropriate controls being identified and implemented as part of a Spontaneous Combustion Management Plan; and
- Coal reject materials generated for the Project are likely to be well mixed and hence dilution of the relatively small amount of pyritic coal reject material with low pyrite coal reject material is

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likely to produce a composite coal reject material with a lower propensity to spontaneously combust.

ES5 Potential Management Measures

The ongoing management of coal and mining waste materials at the Project 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 suggested that KEPCO considers the recommendations listed below.

- Pre-stripping topsoil from any areas to be used for stockpiling of coal or surface storage of coal reject materials for use in final rehabilitation activities (surface cover or vegetation growth medium).
- Further delineation of the occurrence and distribution of PAF potential coal reject and actual coal reject materials during the operational phase of the Project through geochemical testing of a broader range of representative samples of these materials.
- Development of a calibrated total sulfur grid/layer geological/geochemical model consistent with the current geochemical impact assessment and subsequent management plans (e.g. Mine Waste Management Plan).
- Scale-up of leaching tests for PAF materials and alkaline amendment tests as part of operational planning.
- Preferential placement of coal reject materials as backfill deep in the open pits, below the level of the predicted post mining groundwater recovery level, and encapsulation with at least 5 m of benign NAF overburden material, prior to rehabilitation. The emplaced coal reject materials will be a mixture of NAF and PAF materials and should be paddock dumped, dozed, traffic compacted and amended with alkaline material, prior to encapsulation.
- In early mine life whilst no storage capacity is available at the open pits, coal reject materials should be encapsulated in cells by at least 5 m of benign NAF overburden material at the OEAs with operational management methods, such as paddock dumping, dosing, traffic compaction and lime dosing used as described above.
- Provision for treatment of acid water in underground workings (or for water pumped to surface from underground workings) or in the open cut pit may be required, which could include use of a mobile lime dosing plant and/or broadcast application of agricultural lime.
- Development of a Mine Waste Management Plan to provide more details on how mine waste materials will be practically managed during operations.
- Development of a Water Management Plan to include water quality monitoring measures for the Project. The water quality monitoring program should contain geochemical water quality trigger parameters for surface run-off and seepage from the coal stockpile and mine waste storage areas, including pH and salinity with management contingency for lime dosing and management review, as required. Major anions (sulfate, chloride) and cations (calcium, magnesium, sodium and potassium), acidity/alkalinity and the range of soluble metals/metalloids described in this report at **Table B5 (Attachment B)** should also be included in the range of parameters tested in these water samples, initially on a quarterly basis (for 12 months), and then on an annual basis throughout the life of mine.
- Additional overburden testing, including field trials, when the mine is operational and bulk overburden materials become available, so as to determine the best management option for rehabilitation of these materials progressively and during mine closure.

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- Whilst the propensity of most coal and coal reject materials from the Project can be managed through the development of a Spontaneous Combustion and Monitoring Management Plan (SCMMP), it is recommended that further testing of a wider range of samples be completed during the operational phase of the Project, to further confirm these findings.

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GLOSSARY OF TECHNICAL TERMS AND ACRONYMS

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.
ANC	Acid neutralising capacity, expressed 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.
AMD	Acid and Metalliferous Drainage from mine waste materials characterised by low pH, elevated metal/metalloid concentrations, high sulfate concentrations and high salinity.
Coal Reject	Mixture of coarse and finely ground materials from which the desired mineral (coal) values have been largely extracted.
Coal Tailings	Finely ground materials from which the desired mineral (coal) values have been largely extracted.
Coarse Reject	Coarse ground materials from which the desired mineral (coal) values have been largely extracted.
CHPP	Coal Handling and Preparation Plant.
eCEC	Effective Cation Exchange Capacity. The amount of exchangeable major cations in a sample expressed as meq/100g.
EC	Electrical Conductivity, expressed as $\mu S/cm$.
ESP	Exchangeable Sodium Percentage. The proportion of exchangeable sodium in a sample compared to the cation exchange capacity, expressed as a percentage. Used to assess the risk of a material being dispersive/erosive.
Kinetic test	Procedure used to measure the geochemical/weathering behaviour of a sample of mine material over time.
MPA	Maximum Potential Acidity calculated by multiplying the total sulfur content of a sample by 30.6 (stoichiometric factor) and expressed as kg H_2SO_4 per tonne.
NAF	Non Acid Forming. Geochemical classification criterion for a sample that will not generate acid conditions.
NAPP	Net Acid Producing Potential expressed as kg H_2SO_4 per tonne. Calculated by subtracting the ANC from the MPA.
NMD	Neutral Mine Drainage from mine waste materials characterised by neutral pH, elevated sulfate concentrations and salinity, and potentially elevated metal/metalloid concentrations.
Over-/Inter-burden	Material that overlies or is between the seams of a coal resource which must be removed in order to mine the coal.
PAF	Potentially Acid Forming. Geochemical classification criterion for a sample that has the potential to generate acid conditions.
ROM	Run-of-Mine coal materials stockpiled prior to processing at the CHPP.
SCMMP	Spontaneous Combustion and Monitoring Management Plan.
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.
Total Sulfur	Total sulfur content of a sample generally measured using a 'Leco' high temperature analyser expressed as % S.

1.0 INTRODUCTION

1.1 Background

In December 2010, KEPCO Bylong Australia Pty Ltd (KEPCO) acquired Authorisations (A) 287 and 342. Since this time, extensive exploration and mine planning work has been undertaken to determine the most socially responsible mine plan to recover the known coal resources within the two Authorisations.

In August 2014, KEPCO commissioned WorleyParsons Services Pty Ltd (WorleyParsons) to manage the Project exploration activities, mine feasibility study planning, environmental approvals and ongoing environmental monitoring for the Bylong Coal Project (the Project).

The Project is wholly located within A287 and A342, which are located within the Mid-Western Regional Council (MWRC) Local Government Area (LGA). The closest regional centre is Mudgee, located approximately 55 km south-west of the Project Boundary. The Project is approximately 230 km by rail from the Port of Newcastle. **Figure 1** illustrates the locality of the Project within New South Wales (NSW). **Figure 2** shows the regional locality of the Project in relation to the neighbouring town centres, mining authorities, major transport routes and reserves.

KEPCO is seeking State Significant Development Consent under Division 4.1 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the development and operation of the Project. The State Significant Development Application will be supported by an Environmental Impact Statement (EIS), which is being prepared by Hansen Bailey.

In October 2012, RGS Environmental Pty Ltd (RGS) was commissioned by Hansen Bailey to complete a geochemical impact assessment for coal and mining waste materials likely to be generated from mining and processing activities at the Project.

1.2 Project Description

The Project life is anticipated to be approximately 25 years, comprising a two year construction period and a 23 year operational period, with underground mining operations commencing in Year 7. Various rehabilitation and decommissioning activities will be undertaken during both the course of, and following the 25 years of the Project. It is noted that further mineable coal resources exist within both A287 and A342.

The Project is to be developed on land within the Project Boundary as illustrated in **Figure 3**. Key features of the Project are conceptually shown in **Figure 3** and include:

- The initial development of two open cut mining areas with associated haul roads and Overburden Emplacement Areas (OEAs), utilising a mining fleet of excavators and trucks and supporting ancillary equipment;
- The two open cut mining areas will be developed and operated 24 hours a day, 7 days a week over an approximate 10 year period and will ultimately provide for the storage of coal processing waste from the longer term underground mining activities;
- Construction and operation of administration, workshop, bathhouse, explosives magazine and other open cut mining related facilities;
- Construction and operation of an underground coal mine operating 24 hours a day, 7 days a week for a 20 year period, commencing in around Year 7 of the Project;
- A combined maximum extraction rate of up to 6.5 Million tonnes per annum (Mtpa) Run of Mine (ROM) coal;
- A workforce of up to approximately 800 during construction and a peak of 470 full-time equivalent operations employees at full production;

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- Underground mining operations utilising longwall mining techniques with primary access provided via drifts constructed adjacent to the rail loop and Coal Handling and Preparation Plant (CHPP);
- The construction and operation of facilities to support underground mining operations including personnel and materials access to the underground mining area, ventilation shafts, workshop, offices and employee amenities, fuel and gas management facilities;
- Construction and operation of a CHPP with a designed throughput of approximately 6 Mtpa of ROM coal, with capacity for peak fluctuations beyond this;
- The dewatering of fine reject materials through belt press filters within the CHPP and the co-disposal of dewatered fine and coarse reject materials within OEAs and final open cut voids (avoiding the need for a tailings dam);
- Construction and operation of a rail loop and associated rail load out facility and connection to the Sandy Hollow to Gulgong Railway Line to facilitate the transport of product coal;
- The construction and operation of surface and groundwater management and water reticulation infrastructure including diversion drains, dams (clean, dirty and raw water), pipelines and pumping stations;
- The installation of communications and electricity reticulation infrastructure;
- Construction and operation of a Workforce Accommodation Facility (WAF) and associated access road from the Bylong Valley Way;
- The upgrade of Upper Bylong Road and the construction and operation of a mine access road to provide access to the site facilities;
- Relocation of sections of some existing public roads to enable alternate access routes for private landholders surrounding the Project; and
- Infilling of mining voids, progressive rehabilitation of disturbed areas, decommissioning of Project infrastructure and rehabilitation of the land progressively following mining operations.

1.3 Geochemical Impact Assessment Strategy

In order to complete the geochemical impact assessment for coal and mining waste materials generated by the Project, RGS worked closely with Hansen Bailey personnel to develop an appropriate sampling and testing program (RGS, 2012). Representative samples were collected for:

- Overburden, interburden and minor uneconomic coal seam materials likely to report the OEAs and to the open cut as backfill;
- Potential coal reject materials (including roof/parting/floor, coarse reject and fine tailings) likely to be generated from the CHPP following coal processing; and
- Raw coal likely to report to the ROM stockpile area and CHPP for processing.

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

The sampling strategy was also based on existing knowledge of the geology and stratigraphy at the Project, and an overview of these parameters is provided in **Section 2.0** of this report.

A more detailed explanation of the methodology used to perform the geochemical impact assessment can be found in **Section 3.0**. A desktop review of available information on previous geochemical

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studies at a nearby coal mine site (Moolarben) was completed (**Section 2.5**), and the findings were taken into consideration during the development of the sampling methodology used by RGS. The Moolarben operation mines similar coal seams and uses similar coal-processing techniques to those proposed for the Project.

A series of static and kinetic geochemical tests were performed as part of the assessment process, and the results obtained for the various sample types are presented in **Section 4.0** of this report. This is followed by a discussion of the main findings and potential management implications in **Section 5.0**. The main conclusions and potential management measures for the coal and mining waste materials likely to be generated from the Project are presented in **Section 6.0**.

1.4 Scope of Work

The scope of work undertaken by RGS included:

- A desktop review of relevant literature, previous geochemical assessments and accompanying data and exploration studies, so as to determine sampling requirements, based on existing information;
- A site visit in November 2012 and design of a suitable sampling program in conjunction with the site geologist, on-site drilling program and core sample availability;
- A review of existing Project information such as background documents, mine plans, geological reports, cross-sections, drill hole logs, aerial photographs, and topographical maps;
- Co-ordination of the static geochemical analysis of samples delivered to Australian Laboratory Services in Brisbane (ALS Brisbane), and the completion of kinetic leach column tests at the RGS in-house laboratory;
- Discussion of feasible and reasonable mitigation and management measures for the materials generated on-site;
- Interaction with other sub-consultants to obtain the most up-to-date Project information, including liaison with experts in the fields of soil science, surface hydrology, hydrogeology and geotechnical studies; and
- Preparation of a geochemical impact assessment report suitable for inclusion in an EIS, based on existing and acquired information, and confirming any potential for acid and metalliferous drainage (AMD), neutral mine drainage (NMD) and/or other salinity and sodicity issues related to the Project.

The NSW Secretary's Environmental Assessment Requirements (SEARs) for the Project are now available and those directly related to mining waste geochemistry, and where they have been addressed in this report, are summarised in **Table 1-1** (overleaf).

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Table 1-1: SEAR's Related to Mine Waste Geochemistry

Requirement	Regulator	Where Addressed
Waste - including: - accurate estimates of the quantity and nature of the potential waste streams of the development, including tailings and coarse reject; and - a detailed description of the measures that would be implemented to minimise the production of waste on site, and ensure that any waste produced is appropriately managed.	DP&E	Section 1.2, Section 2.5 and Section 6.2
- A life of mine tailings management strategy, which details measures to be implemented to avoid the exposure of tailings material that may cause environmental risk, as well as promote geotechnical stability of the rehabilitated landform.	DRE	Section 2.5 and Section 6.2
Waste, chemicals and hazardous materials The EIS should identify all wastes to be generated by all aspects of the project and identify procedures for the handling and management of all wastes produced. The handling of rejects, tailings and overburden material are important aspects for consideration. Assessment of the potential for acid mine drainage from acid forming materials should be assessed and management/mitigation measures identified. Management actions for recovered fines from the CHPP should be identified, including actions to prevent potential impacts to groundwater, surface water or any other environmental aspect. Provide details of the quantity and type of both liquid and non-liquid waste generated, handled, processed or disposed of at the premises. Wastes must be classified according to the Waste Classification Guidelines (DECC 2008).	EPA	Section 1.2, Section 2.3, Section 2.5, Section 5 and Section 6.2
Provide details of how waste will be handled and managed onsite to minimise pollution, including: a) Stockpile location and management - Labelling of stockpiles for identification, ensuring that all waste is clearly identified and stockpiled separately from other types of material (especially the separation of any contaminated and non-contaminated waste). - Proposed height limits for all waste to reduce the potential for dust and odour. - Procedures for minimising the movement of waste around the site and double handling. - Measures to minimise leaching from stockpiles into the surrounding environment, such as sediment fencing, geofabric liners etc.	EPA	Section 2.3 and Section 6.2

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b) Provide details of waste rock emplacement areas with particular attention to: - The quantity of waste rock likely to be generated; - Proposed strategies for the handling, reuse/recycling and disposal of waste rock; - Identification of the history of the waste rock and whether there is any likelihood of contaminated material, and if so, measures for the management of any contaminated material; and - Designation of transport routes for the transport of waste rock.	EPA	Section 1.2, Section 2.3, Section 2.5 and Section 6.2
Details of procedures for the assessment, handling, storage, transport and disposal of all hazardous waste used, stored, processed or disposed of at the site, in addition to the requirements for liquid and non-liquid wastes.	EPA	Section 2.3 and Section 6.2
Provide detailed water management strategies for all disturbance areas, paying particular attention to the waste rock emplacement areas and potential impacts on groundwater and offsite surface water resources including particular reference to the management of channel and overland flows into arid within the disturbance area.	EPA	Section 2.3 and Section 6.2

2.0 PROJECT GEOLOGY

2.1 Exploration

Since acquiring A287 and A342 in 2010, KEPCO has implemented an appropriate exploration program to further refine and understand the coal resource within these authorisations. A total of 59 cored and open holes have previously been drilled within A287 and A342 by previous owners of the Project (Hansen Bailey, 2014a and b). Further exploration activities have been undertaken to supplement the previous drilling, consisting of:

- Desktop studies of previous exploration work completed within the authorisations;
- Aerial and 2D seismic surveys;
- Mining subsidence study;
- Geotechnical testing;
- Alluvial sediment testing;
- Drilling (large diameter, cored, partially cored and non-cored holes);
- Coal quality tests (including materials handling testing and washability testing); and
- Preliminary hydrogeological studies.

A total of 524 drill holes have been completed by KEPCO throughout A287 and A342 as at 27 July 2014. This correlates to a total of 240 rotary drill holes and 284 cored or partly cored drill holes. Drilling has also included 18 large diameter drill holes to obtain samples for materials handling and washability testing. The coal resource for the Project has been defined and reported in accordance with Australasian Joint Ore Reserves Committee (JORC) requirements.

2.2 Stratigraphy

The Project is located within Bylong Valley, NSW, in the northwest area of the Western Coalfields, which are part of the Sydney Basin. Within this area, a top layer of alluvium sedimentary soil (of Triassic and Jurassic age) overlays the hard Permian bedrock underneath.

Local hingelines and fault structures within the region have shaped the topography of the Bylong area over geological time, allowing the creation of sandstone escarpments and plateaus, as well as basalt-capped hills. The unconsolidated sediments within the low lying valleys of the Bylong area are comprised of an upper clay layer, shale conglomerates, sandstones and silty material, and a basal layer containing gravelly sand and gravel.

A history of igneous activity within the Bylong area is also evident, with examples of both extrusive and intrusive rock formations (e.g. basalt flows and diatremes, plugs, dolerite dykes and sills) scattered across the region and found in both A287 and A342. A series of rivers and creeks also bisect both Authorisations.

Recent geological investigations of the Bylong area have been completed as part of pre-feasibility (Golder Associates, 2012) and feasibility (Parsons Brinckerhoff, 2014a) studies. The latter recognised six coal seams within the Permian strata of the NSW Western Coalfield region, but for the purpose of this RGS report, only the last two in the stratigraphic sequence are of economic and geochemical interest, namely the Ulan and Coggan seams (see **Section 2.4**). In the event that any coal from the thin overlying Goulburn and Glen Davis seams is encountered at the open cut pit areas, this material will generally be recovered during mining and report to the CHPP.

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An indicative Stratigraphic Column of the strata within the Project Boundary is shown in **Figure 4**. The stratigraphy of the area generally includes:

- Triassic Conglomeratic Sandstones;
- Permian Illawarra Coal Measures (including Farmers Creek, State Mine Creek, Goulburn, Glen Davis, Ulan and Coggan seams); and
- Late Permian Shoalhaven Group.

The Late Permian Shoalhaven Group forms the sedimentary basement within the Project Boundary, consisting primarily of shale, conglomerate and sandstone. The formation outcrops along the lower slopes of the Growee River and in the upper reaches of Lee Creek, in the southern and western portions of the Project Boundary.

The Permian Illawarra Coal Measures overlie the Shoalhaven Group and contain the economic seams within the Project Boundary. The dominant lithologies include mudstone, laminated siltstone, medium-grained quartz-lithic sandstone, lenses of polymictic conglomerate, coal, carbonaceous mudstone, rhyolitic tuff and sporadic torbanite. Thickness of sandstone varies across the site from 100 m to 200 m in the Project Boundary, thickening towards the east into the Sydney Basin. The coal measures dip approximately 2° (degrees) to the east.

The Coggan Seam consists predominantly of dull coal with minor bright bands and average ash content ranging from 9 % to 30 %. The depth to the Coggan Seam varies across the lease from the land surface to a depth of 360 m, due largely to the irregular topography. In the valleys around Dry Creek and the Bylong River, the depth to the Coggan Seam is less than 60 m with the average coal seam exceeding 3 m in thickness. The Coggan Seam varies from 2 m on the western margin of the lease to around 5 m near the eastern boundary.

Overlying the Illawarra Coal Measures is a Triassic sequence consisting of the Narrabeen Group and the Hawkesbury Sandstone. The Hawkesbury Sandstone is overburden by the Wianamatta Group to the south, and the Digby and Napperby formations in the north, which are within the Gunnedah Basin. The coal measures are overlain by the Triassic sequence.

Igneous intrusions and volcanic flows have been intersected within the Project Boundary. The largest igneous intrusion in the area is the Coggan Sill, which is located in the west of the Project Boundary.

2.3 Mining and Processing Operations

The Project proposes the extraction of a portion of the known coal reserves within the Project Boundary using both open cut and underground mining methods for a period of approximately 23 years following a construction period of up to 2 years. Decommissioning of Project infrastructure and the final rehabilitation activities may extend beyond the 25 years of the proposed Project.

Due to topographic relief, local geology and current land uses, the majority of the area is suited to underground mining methods. However, there are some areas where the coal is too shallow to enable safe underground mining operations. Two open cut mining areas are therefore proposed for the efficient recovery of coal resources utilising open cut mining methods as part of the Project. The early recovery of coal from the two open cut mining areas within the initial eight years of mining operations is pivotal in securing the economic viability of the Project, whilst also ensuring a suitable facility for the emplacement of fine and coarse reject materials throughout the life of the underground mining operations in the most environmentally acceptable manner.

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2.3.1 Open Cut Mining

Open cut mining operations are proposed within the Eastern Open Cut Mining Area (Eastern Open Cut) and Western Open Cut Mining Area (Western Open Cut). The coal resource within these areas occurs at relatively shallow depths (i.e. between 20 m to 90 m depth of cover), which makes this resource suitable for safe and economic recovery using open cut mining methods only (Parsons Brinckerhoff, 2014b).

Prior to surface disturbance commencing, suitable soil materials will be recovered and stored for use in future rehabilitation activities. The proposed open cut activities will be consistent with conventional open cut mining operations, utilising hydraulic excavators matched with suitably sized haul trucks to facilitate the relocation of overburden to uncover the coal.

Mine plan optimisation studies incorporating environmental and social considerations have indicated that the preferred mining sequence within the Eastern Open Cut entails the commencement of operations as a box cut in the northern portion of the mining area and progressing operations southwards. Within the central parts of the Eastern Open Cut, mining operations will generally develop from west to east, with the most southern extent being mined from north to south. Mining operations will progress with designed laid back advancing faces that will initially extract overburden to uncover the coal. As coal resources are progressively recovered within the open cut mining areas, overburden material will be emplaced behind mining operations and shaped to enable progressive rehabilitation activities.

Overburden extracted from the Eastern Open Cut will initially be placed within the two OEAs (North-Western OEA and South-Western OEA) until the mining area is suitably developed to enable progressive backfilling behind mining operations.

The southern portion of the Eastern Open Cut will remain as an open void at the completion of open cut mining operations. This void area will remain open for the controlled emplacement and storage of coarse and fine reject materials generated during the longer term underground mining operations. The reject materials within this area will be capped and rehabilitated at the end of the mine life, so that no final void remains at the completion of the Project. Overburden material which has been emplaced and temporarily rehabilitated during the operations within the Eastern Open Cut will be rehandled and placed compacted and shaped to cover the reject materials to generate the final landform.

In parallel with the commencement of mining operations in the Eastern Open Cut, extraction will also commence within the Western Open Cut via a box cut in the northern end of the mining area. Operations within the Western Open Cut will advance from the north to south, generally using east to west orientated benches. Overburden material extracted from this mining area will initially be placed within the North-Western and South-Western OEAs until the mining void is suitably developed to enable progressive backfilling.

Once operations within the Eastern Open Cut and Western Open Cut are progressed and the OEAs have been shaped and graded, the soil resources collected in advance of mining will be directly placed onto the shaped OEAs to facilitate rehabilitation activities.

Coal production for the open cut mining operations will progressively increase to approximately 5.5 Mtpa of ROM coal. Open cut mining operations are anticipated to recover approximately 33 Mt of ROM coal over a period of approximately 8 years.

Coal and overburden material from the open cut mining areas will be blasted prior to excavation by excavator and truck fleet. There will be approximately 100 blasts over a year at maximum production (excluding Sundays).

The Project will necessitate two OEAs external to the open cut mining areas, including the:

- North-Western OEA located to the north-west of the Western Open Cut; and

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- South-Western OEA located to the west of the Eastern Open Cut and south of the Western Open Cut.

Each of these OEAs will be developed in conjunction with the initial years of mining operations. Once the mining areas have been fully developed and the coal resource has been recovered, overburden will be used to backfill the previously mined areas. The South-Eastern OEA will be progressively developed within the Eastern Open Cut. The North-Eastern OEA will be developed within the Western Open Cut.

The conceptual design of the OEAs will minimise disturbance to sensitive surface features, whilst blending into the natural topography and mitigating visual impacts where possible. Rehabilitation of these OEAs will occur progressively throughout the mining operations.

At the completion of open cut mining operations in approximately Year 8, sufficient space will be retained within the southern-most portion of the Eastern Open Cut for the storage of coarse and fine reject materials generated from the processing of ROM coal from the underground operations. Once this void has been filled with coarse and fine reject materials, overburden material from the South-Western OEA and/or the OEAs within the Eastern Open Cut will be used to cap and facilitate rehabilitation to achieve the final landform. The remaining areas of the South-Western OEA will be shaped and rehabilitated to complement the surrounding natural topography.

2.3.2 Underground Mine Operation

The proposed conceptual underground mine plan is the most viable option and is located in an area where the geology and sequence of the coal resource allows for safe and efficient recovery via underground mining methods. The proposed underground extraction area for the Project (Underground Extraction Area) occurs in the more elevated terrain in the north-eastern portion of the Project Boundary. Two decline drifts will provide access to the Coggan Seam in the vicinity of the proposed rail loop and Underground Mine Infrastructure Area (MIA) on the northern side of the Sandy Hollow-Gulgong Railway Line. The decline drifts will provide ongoing access to the underground mining operations for coal clearance, materials, ventilation and employees (Parsons Brinckerhoff, 2014c).

The permanent main headings are proposed to be developed in a south-east to north-westerly direction to generally align with the elevated topography leading up from the valley areas (i.e. protection of surface cliffs and steep topography). Development of the permanent main headings will commence within the central portion of the Underground Extraction Area and will be developed progressively to provide access to longwall panels to be recovered in the near future.

The main headings will be constructed utilising continuous miners and will provide permanent roadways for employee access, ventilation and mining services throughout the life of the underground mining activities. The development work for the main headings will also be designed such that there will be no material surface subsidence.

The conceptual longwall panel design generally follows the easterly dip of the geology within the Underground Extraction Area, with each longwall panel being developed to be extracted from the north-east to the south-west where the permanent main headings have been developed.

Underground mining operations are proposed to commence at approximately Year 7 of the Project (around Year 5 of open cut mining operations), with initial longwall panel extraction able to commence approximately two years following the development of the first panel. Longwall operations will commence in the central portion of the Underground Extraction Area with subsequent panels towards the south.

Following completion of the initial southern longwall panels, longwall mining equipment will move to the central area to commence mining the longwall panels which are north-west of the initial longwall panel. Eight longwall panels are proposed within the northern longwall area.

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Underground mining is proposed to occur under a section of the Bylong Valley Way in the northern portion of the Underground Extraction Area. Upon the completion of each longwall panel extraction, the panel will be sealed off.

2.3.3 Coal Handling and Preparation Plant

The Project will include the construction of a CHPP and associated facilities to enable the handling and processing of approximately 6 Mtpa of ROM coal. The CHPP and associated facilities are proposed to be located in a central location of the Project Boundary at the foothill of the natural escarpment to the north-east of the Sandy Hollow-Gulgong Railway Line (Parsons Brinckerhoff, 2014d).

ROM coal from the underground will be delivered by way of conveyor drift to a ROM coal stockpile at the CHPP. The open cut operation will deliver ROM coal by haul trucks to a ROM coal hopper located at the northern extent of the eastern open cut. Open cut coal will be primary crushed and conveyed directly to the CHPP.

The ROM coal will be nominally fed directly to the CHPP, however if required may be stockpiled on the ROM coal stockpiles for subsequent reclaiming and processing. In some instances, the coal quality may be suitable to bypass the CHPP and be sent directly to the product coal stockpile.

All product coal processed through the CHPP will be mechanically dewatered. Fine reject materials will be recovered by a conventional thickener. The thickened material will be dewatered using belt press filters, and then combined with the coarse reject stream from the CHPP process.

The combined reject material will be conveyed to a reject bin and then transported by haul truck to the North-Western OEA during the initial mining years.

When the mining area has been progressed sufficiently, fine and coarse rejects will be transported to the open cut mining areas and co-disposed with overburden. Once completed, these areas will be capped and rehabilitated to integrate with the natural landform.

2.4 Target Coal Resource

The target coal resource for the Project is the Coggan Seam which has a relatively low in-situ ash content and consistent thickness (2-5m) across the seam. The overlying Ulan Seam will also be intercepted and recovered by open cut mining methods within the Eastern (Pit 1) and Western (Pit 5) Open Cut Mining Areas. The Coggan Seam and the overlying Ulan Seam dip to the east, with the Open Cut Mining Areas proposed in the western portions where the resource exists closer to the surface and underground mining areas proposed to be extracted in the eastern areas, where topography provides a greater depth of cover. In the event that any coal from the thin overlying Goulburn and Glen Davis seams is encountered at the open cut pit areas, this material will be generally be recovered during mining and report to the CHPP.

2.4.1 Ulan Seam

Figure 5a provides a typical stratigraphic profile for the Ulan coal seam, which is the upper of the two economic coal seams at the Project. The Ulan seam will only be mined in the Open Cut Mining Areas. The figure illustrates a series of coal plies and two tuff marker bands (labelled CMKR and FMKR), all of which can be correlated across both Authorisations. This seam has a variable thickness of between 4.6 to 14.5 m and includes a number of partings.

2.4.2 Coggan Seam

Figure 5b provides a typical stratigraphic profile for the Coggan coal seam, which is the deeper of the two economic coal seams at the Project. The Coggan seam will be mined in both the Underground and Open Cut Mining Areas. A total of six coal plies (labelled COG-A,B,C,D,E,F) are contained within the Coggan Seam, but only the five middle plies (COG-A,B,C,D,E) are present at both Authorisations.

2.5 Mining Waste Materials

The Project has an identified mineable ROM coal resource of approximately 124 Mt for the 25 years of the mine life. Further coal resources have been identified within the Project Authorities and will be the subject of future exploration and economic feasibility studies. The overburden:coal stripping ratio for the open cut mining areas is on average 4.6 bank cubic metres:ROM tonne of coal recovered.

The open cut mining operations will generate approximately 152 million bank cubic metres (bcm) of overburden material, which will either report to OEA's or be used to progressively backfill the open cut areas. Over the life of mine, approximately 23 million m³ of coal reject materials will be generated from the CHPP and will report to OEAs until storage capacity becomes available in the mined out open pit areas.

2.6 Regional Geochemistry

Existing regional information regarding the likely geochemical characteristics of the coal and mining waste materials expected to be generated by the Project is available for the Moolarben Coal Mine, located approximately 55 km north-west of the Project (EGi, 2006). Similar to the Project, Moolarben Coal Mine is located geographically close to the perimeter of the Goulburn River National Park, and is an open cut and underground coal mine targeting the Ulan Seam. The Moolarben Coal Mine has a similar genesis and stratigraphy to the Project, with a layer of Permian bedrock and fluvial deposits containing an array of sandstone, siltstone, mudstone, tuff and coal, and some alluvial erosion channels which also dissect the Permian sequence.

The geochemical assessment for the Moolarben Coal Mine utilised a series of laboratory tests on representative samples of coal and mining waste materials using a similar methodology to that employed for the Project (see **Section 3.0**, Methodology). The geochemical test program included Acid Base Account (ABA) and multi-element tests on solids and water extracts. The objective was to assess the potential for AMD and any salinity and sodicity issues associated with mining a coal resource. The results indicated that pyrite was not the dominant source of sulfur in some drill core samples, with the presence of organic forms of sulfur found instead, along with siderite (FeCO₃) as the major carbonate/calcite mineral component providing a limited neutralising effect. A possible sodicity/dispersion issue was identified for topsoil, Quaternary/Tertiary alluvials and weathered Permian materials with possible gypsum and/or lime treatment suggested if materials were exposed on dump surfaces or used in engineered structures.

The Moolarben study indicated a moderate risk of acid formation/release associated with coal stockpiles and underground mine samples, especially for coal reject material. In contrast, bulk overburden material was generally found to be non-acid forming (NAF). No significant enrichment or mobilisation of metals into solution was found for all material types however, Kinetic Leach Column (KLC) tests were recommended to confirm the conclusions made using static geochemical results¹.

The option of blending NAF and PAF (potentially acid-forming) materials was suggested as a management option at Moolarben Coal Mine, as was treatment of the PAF mine material with lime to neutralise any acid-generating components. Additional management strategies for the PAF materials suggested by EGi included the option of underwater disposal to prevent sulfide oxidation, as well as monitoring of run-off and seepage from coal stockpiles and any mine waste dumps containing underground reject material, specifically for pH and electrical conductivity (EC).

Another existing mining operation in the region, Wilpinjong Coal Mine, is located approximately 24 km to the west of the Project. The mine has existing approval from the NSW Government and the

¹ In addition to ABA and ME tests, the Moolarben study in 2006 also performed Total C (%), Net Acid Generation (NAG), Acid Buffering Characteristic Curve (ABCC), Effective Cation Exchange Capacity (eCEC), Exchangeable Sodium Percentage (ESP) and Emerson aggregate/dispersive tests as part of the static geochemical assessment process.

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Proponent (Wilpinjong Coal) is currently in the process of preparing an Application for the extension of mining operations for an additional operational life of approximately seven years (Resource Strategies, 2014).

Wilpinjong Coal Mine has similar overburden and interburden rock types to the Project and mines the Ulan seam, as well as the overlying Moolarben Seam M4 ply where it occurs and is economic to do so. Overburden is deposited predominantly within mined-out voids along with co-disposed coarse rejects and tailings. Co-disposed materials are progressively capped with overburden to a minimum depth of cover of 2m prior to final profiling and rehabilitation.

3.0 METHODOLOGY

3.1 *Desktop Review*

In order to develop the sampling and testing strategy, RGS initially completed a desktop review of available geological and water quality data associated with the Project. Relevant Project information was supplied to RGS by Hansen Bailey personnel (GSS, 2011; Golder Associates, 2012). Mine plans and schedules were also taken into account in the development of the sampling strategy and overall design of a geochemical testing program specific to the Project site. Additional information provided to RGS was also considered, namely: coal seam cross-sections, individual drill hole logs, core sample availability, aerial photography, topographical maps, expected material volumes, existing and proposed exploration drilling programs, and a geochemical report on the nearby Moolarben coal mine (EGi, 2006). A sampling and testing protocol was then developed and provided to Hansen Bailey personnel as part of the site visit (RGS, 2012).

Further to the geological summary provided by RGS in this report (**Section 2.0**), detailed information on the exploration history of the Bylong region by different mining companies since the 1980s, adjacent land ownership, use and zoning, is contained in the Project Pre-Feasibility Study (Golder Associates 2012). An Environmental Review of the Project completed in November 2011 (GSS, 2011) and subsequent environmental approval documents (Hansen Bailey, 2014a and 2014b) also provide information on the Project, in addition to the assessment of potential environmental impacts of coal mining in the region.

3.2 *Site Visit*

RGS personnel (Dr. Alan Robertson) completed a site visit to the Project in November 2012, met with key Project geological (exploration) personnel and provided instructions for the supervision of the drill core sampling program. This process enabled RGS to gain an understanding of the Project layout and physical nature of the typical coal and mining waste materials likely to be generated by the proposed Project operations. The site visit also provided additional rigour to the geochemical assessment process to ensure that results, interpretation and final conclusions are robust and based on a sound sampling and testing methodology.

3.3 *Sampling and Geochemical Testing*

3.3.1 *Sampling Strategy*

The sampling (and geochemical testing) program for the Project was developed based on existing technical guidelines for the geochemical assessment of coal and mining waste materials in Australia (ACARP, 2008; and DITR, 2007) and worldwide (INAP, 2009), as previously described in **Section 1.3**. This ensured that the sampling program was risk based and focussed on obtaining fresh representative samples for each of the Project coal and mining waste material types.

The sampling strategy also took into account existing knowledge of the geology and stratigraphy of the site, and the results of ongoing exploration drilling programs. In addition to generic sample representation requirements, the size of the mining operation, expected material volumes, overall cost efficiency and the level of confidence in predictive ability were taken into consideration during the design of the sampling strategy.

Representative sub-samples of drill core (and some drill chips) were collected for the rock types (lithologies) encountered throughout the stratigraphic profile, which included overburden, interburden and uneconomic seam samples, as well as raw coal and coal seam roof, parting and floor materials. Coarse reject and tailing samples were also used as part of the geochemical assessment program and were prepared by a coal quality testing laboratory (ALS Maitland and subsequently SGS Newcastle) to simulate materials that would be generated from the CHPP.

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The sampling program commenced during the site visit in November 2012, and samples were collected from existing drill core (and some drill chips) from the 2012 exploration drilling campaign. The sampling program was continued by site exploration geology personnel through to April 2014 and focused on the collection of fresh drill core samples under instruction from RGS. All drilling and sampling programs were conducted under the supervision of a professional and experienced geologist to ensure accurate sample representation and high quality sample information for each drill hole. Samples were prepared and stored indoors in plastic bags to prevent cross-contamination between sample types and to minimise exposure to potential weathering conditions (oxidation) prior to transfer to ALS Environmental laboratory (ALS) in Brisbane for geochemical testing.

RGS also received additional information on samples such as drill hole logs, photographic drill core records, depth proximities to nearby/adjacent water tables, and a qualitative lithological description for each individual sample. This information was used by RGS to assist in the preparation of the geochemical testing program, interpretation of results, and the development of conclusions and recommendations.

A total of 251 samples were collected from 34 drill holes within the Project Boundary as shown in **Figure 6**. The samples represented eight material types as follows:

1. 48 x Overburden
2. 55 x Interburden
3. 20 x Uneconomic Coal Seam
4. 8 x Overburden Composites from the Ulan seam
5. 73 x Roof/Parting/Floor (42 from the Ulan seam, 31 from the Coggan seam)
6. 16 x Coarse Reject (8 from the Ulan seam, 8 from the Coggan seam)
7. 13 x Fine Reject (Tailings) (6 from the Ulan seam, 7 from the Coggan seam)
8. 18 x Raw Coal and Coal Composites (10 from the Ulan, 8 from the Coggan seam).

The sampling of these eight material types was required to assist RGS in determining the potential for AMD and other salinity and sodicity issues from coal and mining waste materials that could occur within the Project Boundary.

The first four sample types (131 samples) comprised overburden, interburden and uneconomic coal seam and some composite materials associated with the open cut mining method, all of which will most likely report directly to OEAs at the site or be used as backfill. These four sample types have therefore been grouped together for the presentation of geochemical test results in **Section 4.0** and are collectively termed 'overburden'. A number of lithologies in this group were identified and sampled including sandstone, siltstone, carbonaceous shale, mudstone, clay, coal (dull or stony), tuff, and conglomerate.

Similarly, sample types 5 to 8 listed above (roof/parting/floor, coarse reject, fine reject and raw coal) represent materials likely to either report to the ROM and CHPP for processing, or be generated from the CHPP as a mine waste product. These sample types have been grouped together for the presentation of geochemical test results in **Section 4.0**, and are collectively called 'potential coal reject and coal'. Of the 120 potential coal rejects and coal samples, 66 samples were sourced from the Ulan seam and 54 samples from the Coggan seam.

A summarised overview of a typical geochemical assessment program for mining waste materials is provided in **Attachment A**. For further details on individual sample lithological descriptions, refer to **Table B1** (overburden) and **Table B2** (potential coal rejects and coal) in **Attachment B**.

3.3.2 Geochemical Testing - Static Tests

The drill core samples received by ALS Brisbane were prepared (crushed, split, sub-sampled and pulverised) prior to being subjected to a series of geochemical tests. The geochemical test program was designed to assess the degree of risk from oxidation of pyrite, acid generation and the leaching of soluble metals, major ions and salts. The assessment also included characterisation of standard soil parameters including pH, salinity, exchangeable cations and major metal compositions.

All of the 251 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 w:v);
- Total Sulfur [Leco Method];
- Acid Neutralising Capacity (ANC); [AMIRA, 2002] and
- Net Acid Producing Potential (NAPP).

A total of 72 of the 251 samples were also tested for Chromium Reducible Sulfur (Scr) to determine the sulfide sulfur content of the samples using Australian Standard [4969.7-2008 method] (AS, 2008). After the results of the ABA tests were received and reviewed, 24 individual and/or composite samples were selected for multi-element testing on the solid and soluble fractions. The selected samples were typically tested for the following parameters:

- pH and EC (1:5 w:v);
- Alkalinity (1:5 w:v);
- Total metals and metalloids analyses (Al, As, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Mo, Ni, P, Sb, Se, Th, U, Zn) in solids [HCl and HNO₃ acid digest followed by ICP-MS / -AES];
- Total cations (Ca, Mg, Na, K);
- Exchangeable cations (Ca, Mg, Na, K);
- Soluble metals and metalloids (Al, As, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Mo, Ni, P, Sb, Se, Th, U, Zn) in 1:5 water extracts [ICP-AES]; and
- Soluble cations (Ca, Mg, Na, K) and soluble anions (Cl, F, SO₄) in 1:5 w:v water extracts [ICP-AES].

3.3.3 Geochemical Testing - Kinetic Leach Column Tests

A total of nine Kinetic Leach Column (KLC) tests were completed on various composite materials obtained from the project at the RGS in-house laboratory. For drill core samples, the KLC test material comprised crushed material passing a nominal 10mm sieve size. For coarse reject and tailings samples, the KLC test material was used on an 'as received' basis.

The KLC tests were operated at the RGS 'in-house' laboratory in three batches in the sequence that the samples were received. The first batch of four samples representing overburden, interburden, potential coal reject and coal materials from both the Ulan and Coggan seams commenced in December 2012 and was completed in March 2013 (12 weeks). The second batch of three samples representing coarse reject and tailings from the Ulan and Coggan seams commenced in May 2013 and was completed in November 2013 (28 weeks). The third batch of two samples representing coarse reject and tailings from the Coggan seam commenced in April 2014 and was completed in October 2014 (26 weeks). For all sample batches, column leaching with deionised water and KLC leachate collection was undertaken on seven occasions over the respective test periods.

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Approximately 1 to 2 kg dry weight of each sample was accurately weighed and used in the KLC tests (the sample weight was dependent on the density of the sample material). All samples were periodically flushed with one litre of deionised water. Approximately 80 % of the deionised water passed through the column and was collected as leachate. 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. All leachate collected was sent to ALS Brisbane for assay, including the following:

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

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

4.0 GEOCHEMICAL TEST RESULTS

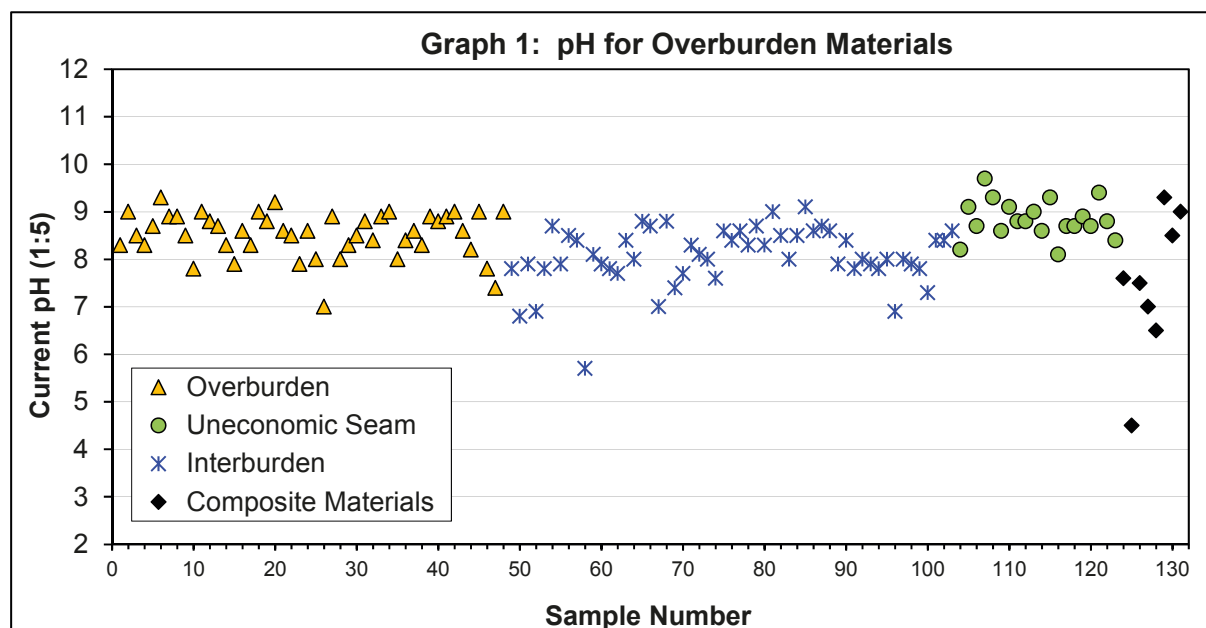
4.1 Acid Base Account (ABA) Results

4.1.1 Overburden

A total of 131 samples representing overburden, interburden, uneconomic coal seam and composite overburden materials were included in the geochemical assessment (collectively termed 'overburden'). These material types are associated with the open cut mining method and will report directly to OEAs at the site or be used as backfill.

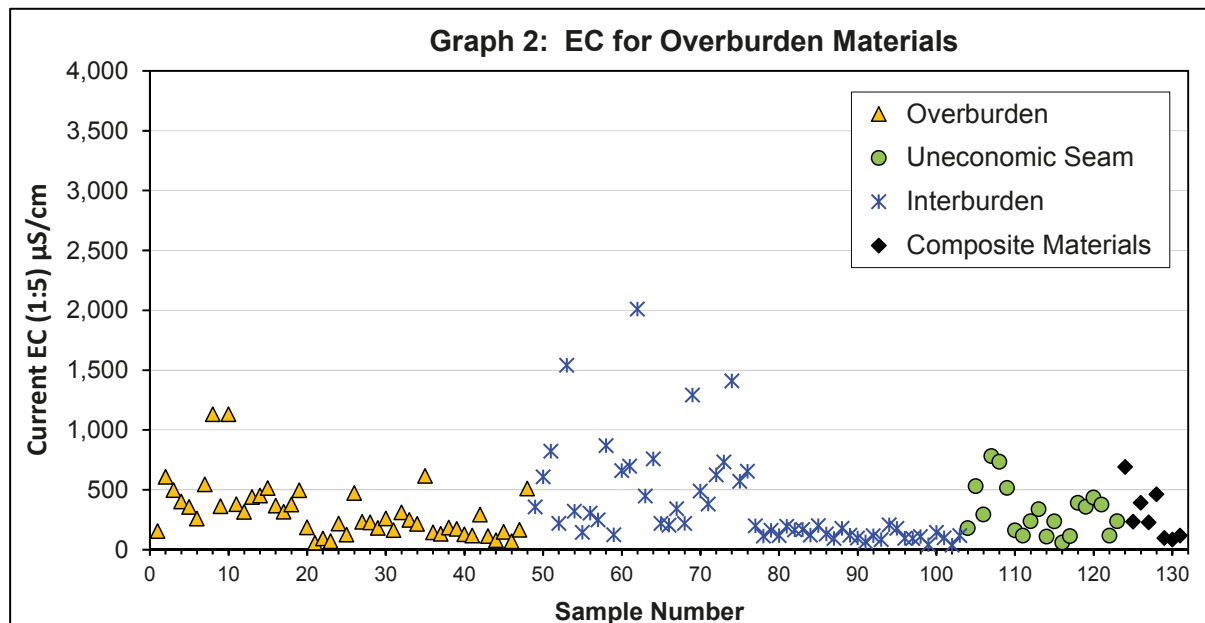
ABA test results for the 131 overburden samples are summarised in this section and are also presented in **Table B1 (Attachment B)** and in **Graphs 1 to 6**.

- pH:** The current pH_{1:5} of the samples ranges from 4.5 to 9.7 but is typically slightly alkaline (median pH 8.5) as illustrated in **Graph 1**. It should be noted that the deionised water used in the pH test is typically in the pH range of 5 to 6.5 and therefore only one of the 131 samples (a mixed coal and overburden composite from the Ulan seam at Pit 1) has a pH value below that of the deionised water. This sample (EB1329921006) comprises carbonaceous shale and tuff and is essentially a parting in the Ulan seam between the ULNJ and ILNL seam plys from Pit 1. This sample was provided to RGS as a composite mixed coal and overburden sample).



- Electrical Conductivity (EC):** The current EC_{1:5} of the 131 overburden samples provides a measure of initial material salinity, and ranges from 37 to 2,010 $\mu\text{S}/\text{cm}$, and is typically low (median 228 $\mu\text{S}/\text{cm}$) as illustrated in **Graph 2** (overleaf). Whilst six of the 131 samples (two overburden and four interburden) have EC values greater than 1,000 $\mu\text{S}/\text{cm}$, the majority of the samples (105 samples or over 80 %) have EC values below 500 $\mu\text{S}/\text{cm}$. There also appears to be no direct correlation between material lithology and/or depth and salinity.

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RGS has utilised existing technical guidelines for mining waste materials as defined in Queensland DME technical guidelines (DME, 1995) to assess the acquired pH and EC data. Whilst these guidelines are not from the NSW jurisdiction, they provide a useful method of placing the pH and EC values for overburden materials into context.

The median pH value (pH 8.5) is regarded as representing materials with 'High' soil pH as illustrated in **Table 4-1**, and it is clear that most samples fall into this range. The median EC of the samples (228 µS/cm) is regarded as representing 'Low' salinity materials, although some samples (primarily interburden samples) fall in higher EC ranges.

Table 4-1: pH and salinity criteria used for assessment of overburden materials

	Very Low	Low	Medium	High	Very High
pH _{1:5} (sample:water)	< 4.5	4.5 – 5.5	5.5 – 7.0	7.0 – 9.0	> 9.0
EC _{1:5} (sample:water) (µS/cm)	< 150	150 - 450	450 - 900	900 – 2,000	> 2,000

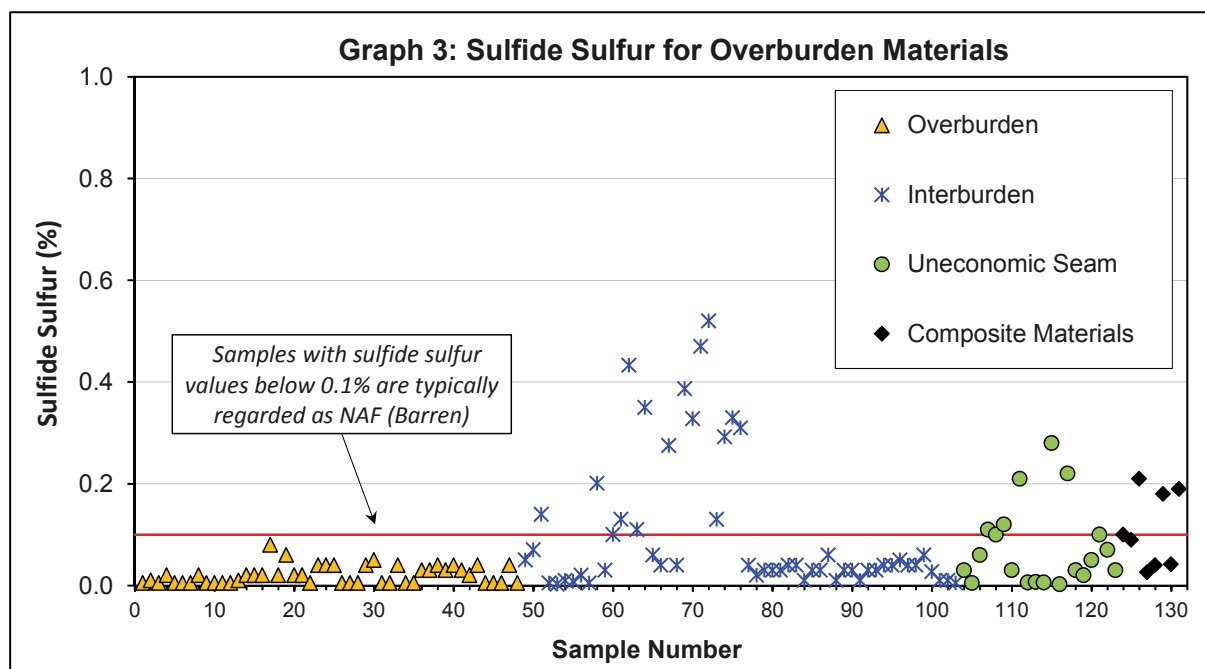
Note: Table reproduced from DME, 1995.

It is important to note that the initial pH and EC screening tests were completed on pulverised samples ($\leq 75 \mu\text{m}$ particle size) with a large surface area in contact with the leaching solution, thereby providing greater potential for dissolution and reaction, and represent an assumed initial 'worst case' scenario at OEAs. However, whilst these results indicate that salinity levels in seepage and runoff from overburden storage areas at the Project site are likely to be low, there may be some merit in avoiding placement of visibly carbonaceous interburden at the final surface of landforms in order to further reduce the risk of any localised areas of elevated salinity runoff and seepage from these materials.

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- **Total Sulfur:** The total sulfur content of the 131 overburden samples ranges from 0.005 %S to 1.49 %S and is typically very low (median 0.04 %S). Mining waste samples with a total sulfur content less than or equal to 0.1 %S are essentially barren of sulfur, generally represent background concentrations, and have negligible capacity to generate acid².
- **Sulfide Sulfur:** A total of 16 of the 131 samples tested had total sulfur values greater than the typical background concentration in soils (0.1 %S) and relatively low ANC values, and these samples were subjected to Scr analysis to confirm their sulfide sulfur content. Most of the samples have Scr values significantly less than the total sulfur values, indicating that most of the sulfur is likely to be present as other forms of sulfur such as organic sulfur and sulfate which, in comparison to a reactive sulfur form such as pyrite, typically have negligible capacity to generate acidity if exposed to oxidising conditions.

Graph 3 shows the sulfide sulfur content of the overburden materials³ and illustrates that these materials typically have low sulfide sulfur content, and 128 of the 131 samples (98 %) have sulfide sulfur content less than 0.4 %S. The three samples with sulfide sulfur content greater than 0.4 %S are interburden samples. Over 82 % of the overburden samples (108 samples) have negligible sulfide sulfur content, less than or equal to the typical background concentration (0.1 %S).

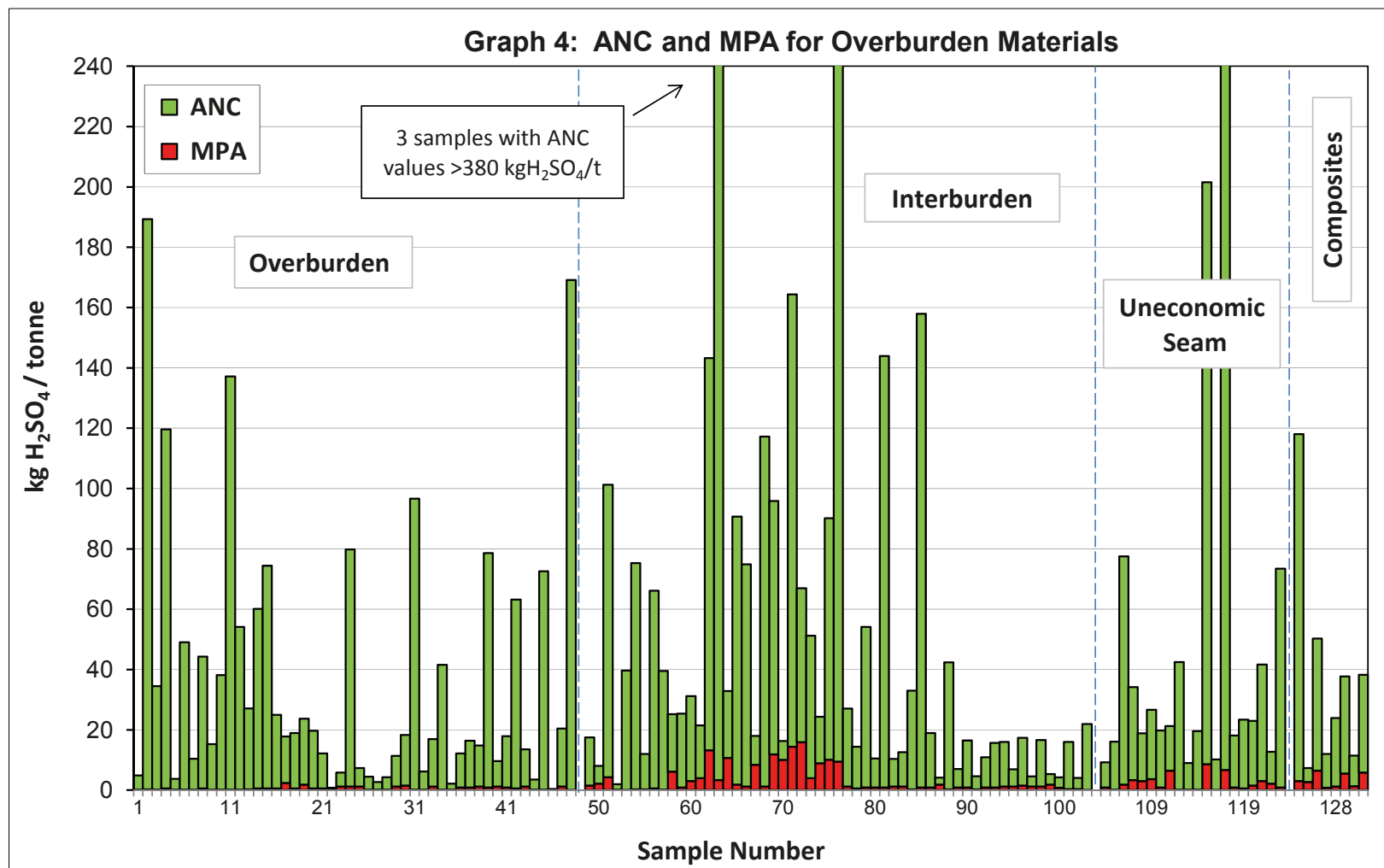


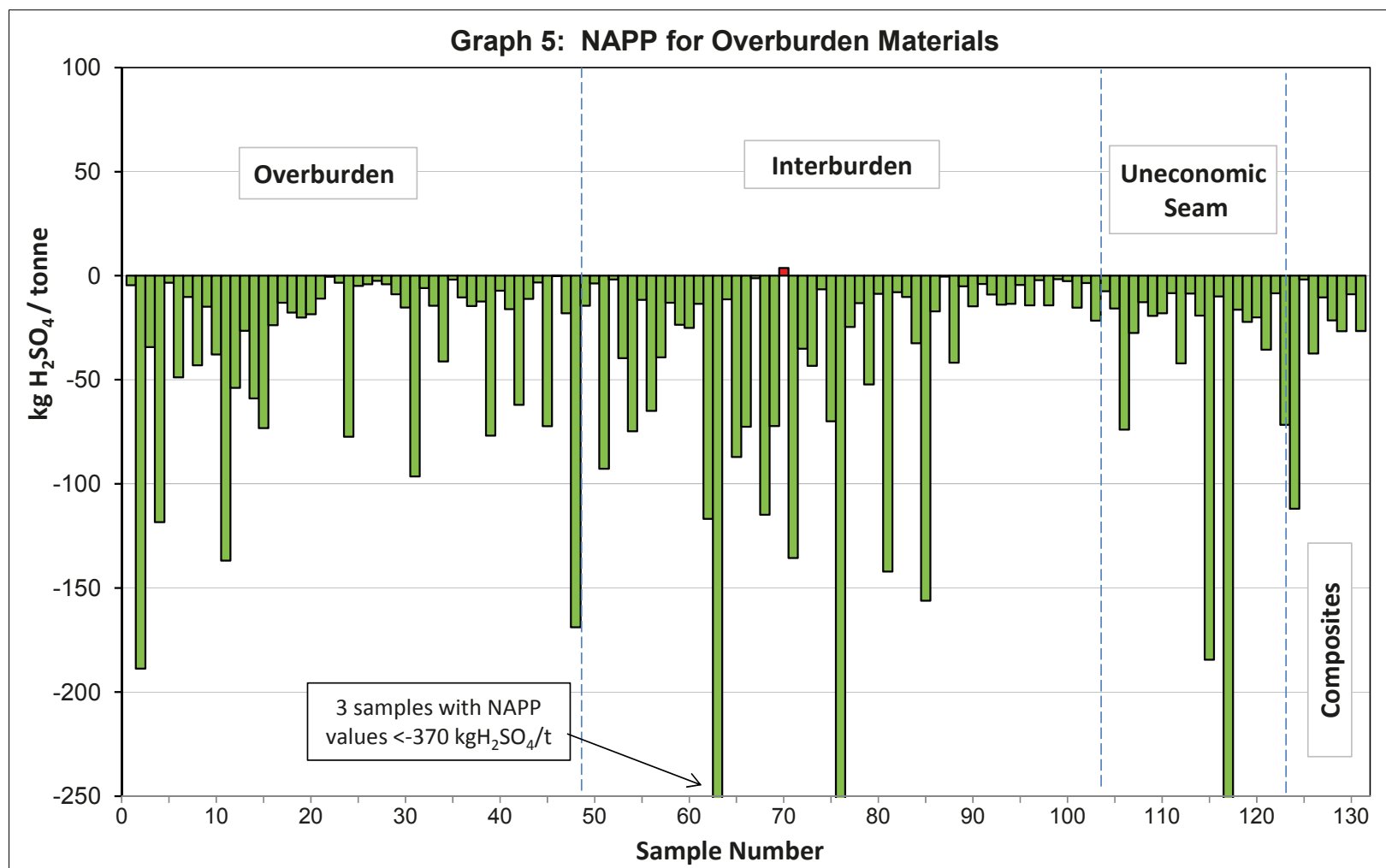
² The average crustal abundance of sulfur is approximately 0.07 % (INAP, 2009).

³ The total sulfur content of the samples was used in the graph when no sulfide sulfur data was available.

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- **Maximum Potential Acidity (MPA):** The MPA that could be generated by the 131 overburden samples was calculated from the sulfide sulfur values (Scr data used in preference to total sulfur data, where available). The MPA is typically low and ranges from 0.08 to 15.9 kg H₂SO₄/t, with a low median value of 0.9 kg H₂SO₄/t (**Graph 4**, overleaf).
- **Acid Neutralizing Capacity (ANC):** The ANC value of the overburden samples ranges from 0.3 to 542 kg H₂SO₄/t, with a moderate median value of 18.9 kg H₂SO₄/t. The results presented in **Graph 4** demonstrate that in most overburden samples, the ANC is significantly higher than the MPA.
- **Net Acid Producing Potential (NAPP):** The calculated NAPP value for the overburden samples ranges from -533 to +3.8 kg H₂SO₄/t, and is typically negative (median -17.1 kg H₂SO₄/t) (**Graph 5**, overleaf). The NAPP is the balance between the capacity of a sample to generate acidity (MPA) minus its capacity to neutralise acidity (ANC). Over 99% of the overburden samples have a negative NAPP value, and given the typically low sulfide sulfur content, the bulk overburden material has negligible risk of generating any significant acidity and/or Neutral Mine Drainage (NMD).





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Graph 6 shows a plot of ANC versus MPA for the 131 overburden samples. ANC/MPA ratio lines have been plotted on the graph to illustrate the factor of safety associated with the samples in terms of potential AMD formation. Generally those samples with an ANC/MPA ratio of greater than 2 are considered to represent material that has a low to negligible risk of AMD formation and a high factor of safety in terms of potential for acid generation (DITR, 2007; INAP, 2009⁴).

The ANC/MPA ratio of the overburden samples ranges from 0.6 to 1,104 and is typically high (median 18.5). The majority of the samples lie within the negligible risk domain in the graph and therefore have a high factor of safety and negligible risk of acid generation.

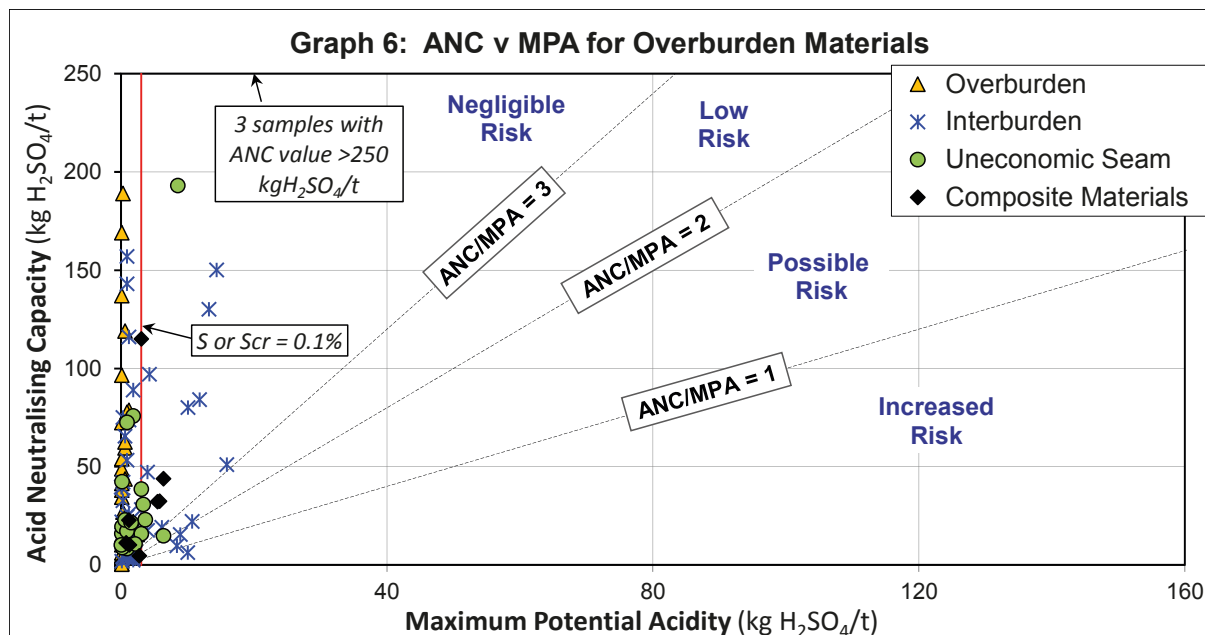


Table 4-2 presents the geochemical criteria used to classify the geochemical nature of the 131 overburden samples included in this study. These criteria generally reflect Australian and International guideline criteria (DITR, 2007; INAP, 2009) for classification of mining waste materials.

Table 4-2: Geochemical Classification Criteria – Overburden Materials

Geochemical Classification	Total or Sulfide Sulfur (%)	NAPP (kg H ₂ SO ₄ /t)	ANC/MPA Ratio	No of Samples	% of Samples
NAF-Barren ²	≤ 0.1	-	-	107	81.7
Non-Acid Forming (NAF)	> 0.1	≤ - 5	≥ 2	22	16.8
Uncertain	> 0.1	> - 5 and ≤ +5	<2	2	1.5
Potentially Acid Forming - Low Capacity	> 0.1	> +5 and ≤ +10	<2	0	0.0
Potentially Acid Forming	> 0.1	> +10	<2	0	0.0

Notes:

1. If total sulfur or sulfide sulfur is less than or equal to 0.1 %, the NAPP and ANC/MPA ratio are not required for material classification as the sample is essentially barren of oxidisable sulfur.
2. A sample classified as NAF can be further described as 'barren' if the total sulfur and/or sulfide sulfur content is less than or equal to 0.1 per cent, as the sample essentially has negligible acid generating capacity.

⁴ INAP (2009) considers that mine materials with an ANC/MPA ratio greater than 2 are likely to be NAF unless significant preferential exposure of sulfides along fracture planes occurs in combination with insufficiently reactive ANC.

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The results in **Table 4-2** indicate that 129 of the 131 overburden samples tested (98.5 %) fall in the NAF (Non-Acid Forming) or NAF-Barren geochemical classification categories, due to the low sulfur content and/or elevated ANC. Two interburden samples (1.5 %) are classified as Uncertain as they have a low ANC/MPA ratio and a NAPP value close to zero. One sample represents carbonaceous shale and the other represents siltstone material. Generally, those samples classified as Uncertain are expected to have a low capacity to generate significant acidity. No overburden samples are classified as Potentially Acid Forming (PAF).

Overall, from an ABA perspective, bulk overburden materials represented by the samples tested are regarded as NAF. Most sample material also has a significant excess ANC at least some of which should be available to more than adequately buffer the negligible amount of acidity that could theoretically be produced from a small amount of overburden materials. Based on the sampling program to date, Uncertain material represents a small fraction of the overburden materials likely to be generated at the project (< 1.5 %) and therefore the risk of acidity generation from the bulk overburden materials is very low.

As a precautionary measure, it is suggested that placement of visibly carbonaceous interburden material at the final outer surfaces of OEA landforms be avoided.

The results of the ABA tests on the overburden materials, and the potential implications for management of these materials at the Project are discussed further in **Section 5.0** of this report.

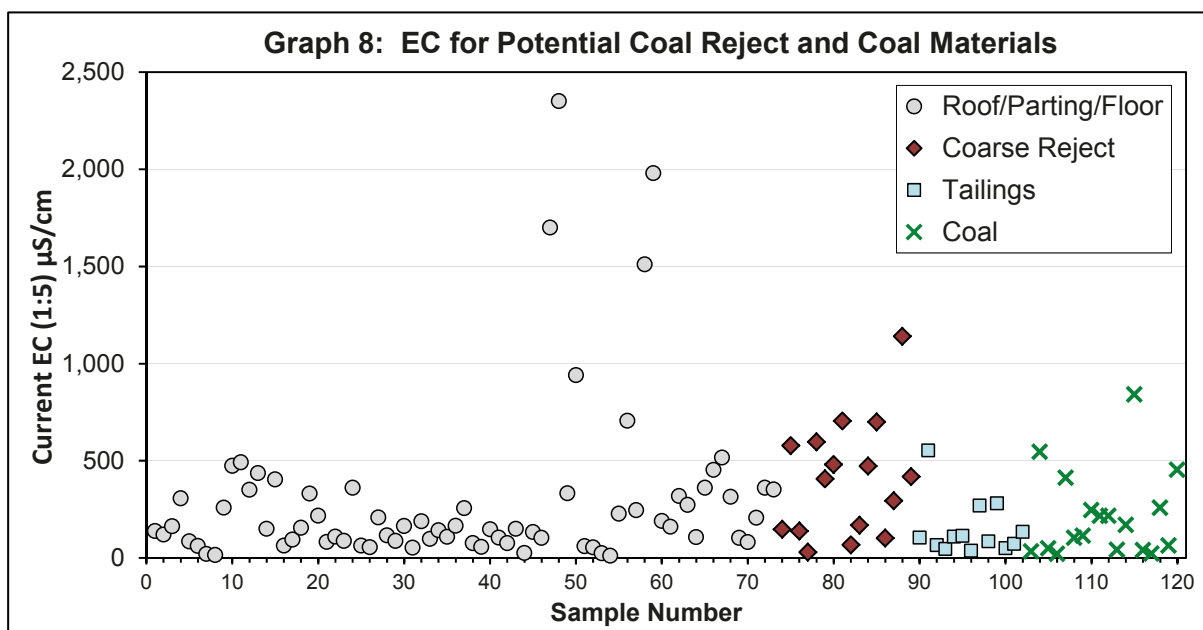
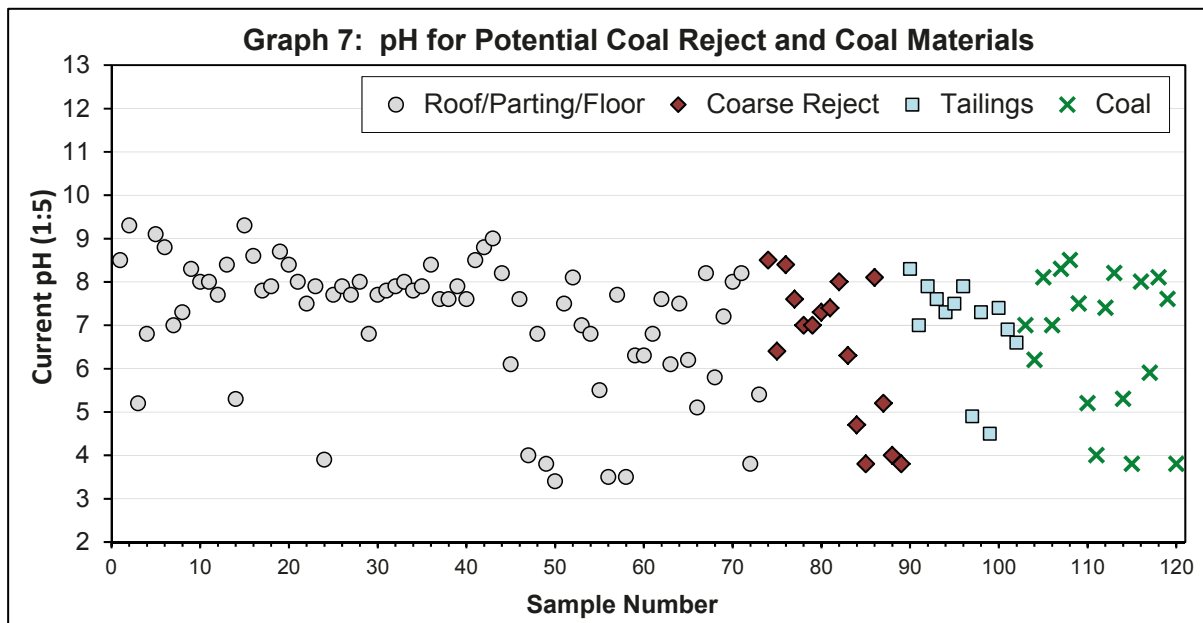
4.1.2 Potential Coal Reject and Coal

A total of 120 samples representing potential coal reject (coal seam roof, parting and floor; coarse reject; and fine reject (tailings)) and raw coal materials from the Ulan and Coggan coal seams were included in the geochemical assessment (collectively termed 'potential coal reject and coal'). These material types are associated with both the open cut and underground mining methods and will either report to the ROM and CHPP for processing, or be generated from the CHPP as a waste product. The coarse and fine reject materials will be co-disposed with overburden at OEAs until capacity is available for in-pit disposal.

ABA test results for the potential coal reject and coal samples are summarised in this section and are also presented in **Table B2 (Attachment B)** and in **Graphs 7 to 12**.

- pH:** The current pH_{1:5} of the samples ranges from 3.4 to 9.3 and is typically pH neutral (median pH 7.5) as illustrated in **Graph 7** (overleaf). It should be noted that the deionised water used in the pH test is typically in the pH range of 5 to 6.5. A total of 104 of the 120 samples (87%) have initial pH values equal to, or greater than, the deionised water. Sixteen (16) of the 120 samples have initial pH values below that of the deionised water (ie. below pH 5). Fourteen (14) of the 16 sample materials with pH values less than 5.0 are derived from the Coggan coal seam. Approximately 30 % of the floor samples tested from the Coggan (COGDE) seam have initial pH values less than 5.0.
- Electrical Conductivity (EC):** The current EC_{1:5} of the 120 potential coal reject and coal samples provides a measure of initial material salinity, ranges from 12 to 2,350 µS/cm, and is typically low (median 153 µS/cm) as illustrated in **Graph 8** (overleaf). Whilst five of the 120 samples (four floor samples from below the Coggan (COGDE) seam and one composite coarse reject sample from the Coggan seam) have EC values greater than 1,000 µS/cm, the majority of the samples (105 samples or 88 %) have EC values below 500 µS/cm.

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Existing technical guidelines have again been utilised to place the pH and EC values for the potential coal reject and coal samples into context (DME, 1995). The median pH value (pH 7.5) is regarded as representing materials with 'High' soil pH as illustrated in **Table 4-3**, and whilst most samples fall into this range, it is clear that some samples (mainly associated with the Coggan seam) fall into lower pH ranges. The median EC of the samples (153 µS/cm) is regarded as representing 'Low' salinity materials. However, some samples (mainly derived from the Coggan coal seam) represent higher salinity ranges.

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Table 4-3: pH and salinity criteria used for assessment of potential coal reject and coal materials

	Very Low	Low	Medium	High	Very High
pH _{1:5} (sample:water)	< 4.5	4.5 – 5.5	5.5 – 7.0	7.0 – 9.0	> 9.0
EC _{1:5} (sample:water) (µS/cm)	< 150	150 - 450	450 - 900	900 – 2,000	> 2,000

Note: Table reproduced from DME, 1995.

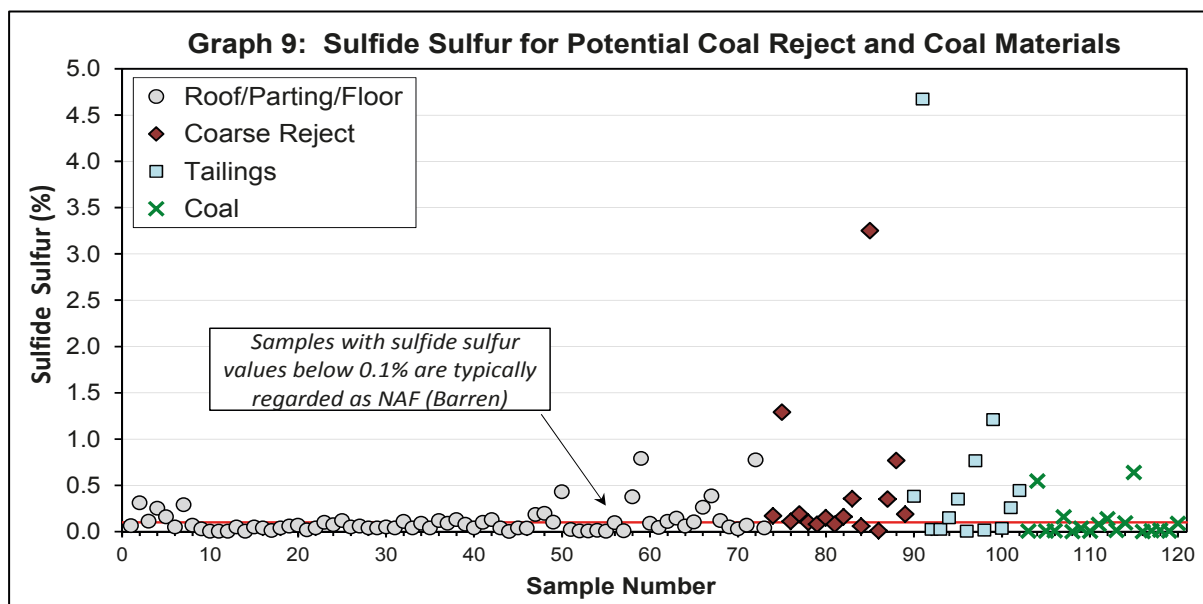
The initial pH and EC screening tests were completed on pulverised samples ($\leq 75 \mu\text{m}$ particle size) with a large surface area in contact with the leaching solution, thereby providing greater potential for dissolution and reaction, and represent an assumed initial 'worst case' scenario at potential coal reject storage areas and raw coal stockpiles. Whilst these results indicate that initial salinity levels in seepage and runoff from these materials are likely to be low, salinity could increase over time for some materials if inherent sulfides are exposed to oxidising conditions, and ongoing monitoring at relevant storage and stockpile areas is recommended in order to verify this finding. The salinity of ongoing leachate from potential coal reject and coal materials has been investigated further using KLC tests (see **Section 4.5**).

- **Total Sulfur:** The total sulfur content of the 120 potential coal reject and coal samples ranges from 0.005 %S to 5.17 %S and is typically low (median 0.16 %S). The median total sulfur content is generally higher in samples derived from the Coggan seam (0.32 %S) compared to the Ulan seam (0.11 %S). Most of the samples (93 %) have total sulfur content less than 1 %S, although nine samples (mainly associated with the Coggan seam) have total sulfur content greater than this value.
- **Sulfide Sulfur:** The sulfide sulfur content of 56 of the 120 samples was measured using the Scr test and focussed on a range of samples with total sulfur concentration greater than the typical background concentration (0.1 %S). For most of the samples with a total sulfur content less than 1 %S, sulfide sulfur values are significantly less than the total sulfur values, indicating that most of the sulfur is likely to be present as other forms of sulfur such as organic sulfur and sulfate which, in comparison to a reactive sulfide sulfur form such as pyrite, have negligible capacity to generate acidity if exposed to oxidising conditions. For the nine samples with total sulfur content greater than 1 %S, most of the total sulfur is present as sulfide sulfur (probably pyrite), rather than other sulfur forms (such as organic sulfur and sulfate), and has the potential to generate acidity if exposed to oxidising conditions.

Graph 9 (overleaf) shows the sulfide sulfur content of the potential coal reject and coal samples⁵ and illustrates that these materials typically have low sulfide sulfur content, and 110 of the 120 samples (92 %) have sulfide sulfur content less than 0.5 %S. Approximately two-thirds (62 %) of the 120 samples (74 samples) have negligible sulfide sulfur content less than or equal to the typical background concentration (0.1 %S). Most of the 46 samples (38 %) with elevated sulfide sulfur content are associated with the Coggan seam.

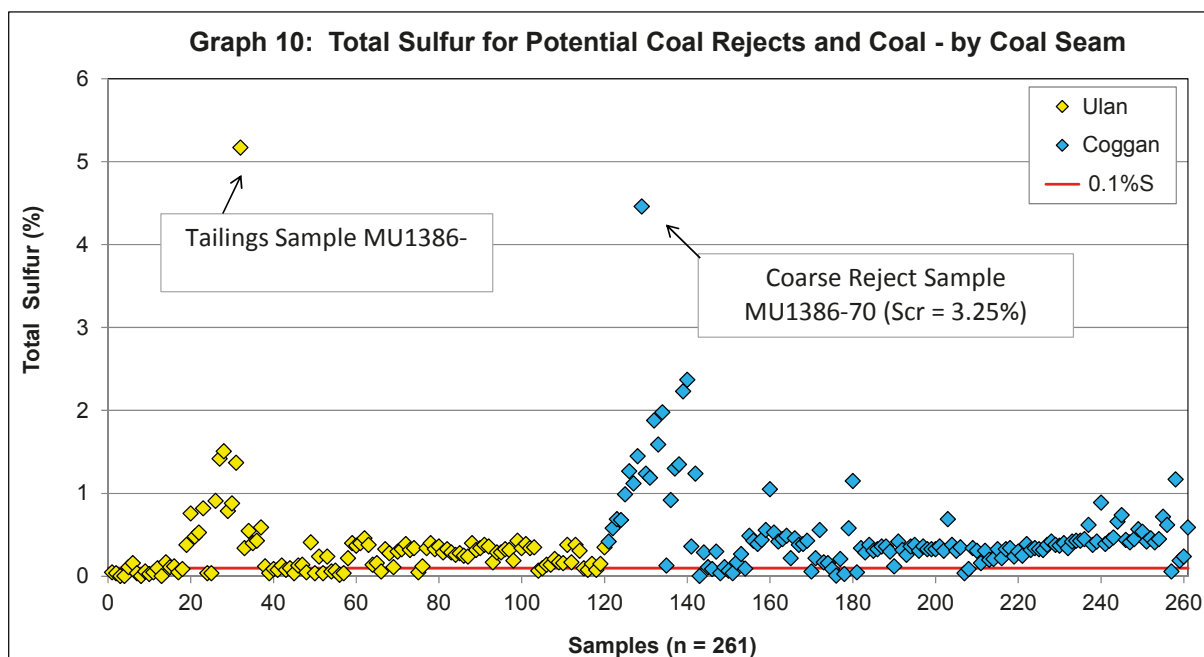
⁵ The total sulfur content of the samples was used in the graph when no sulfide sulfur data was available.

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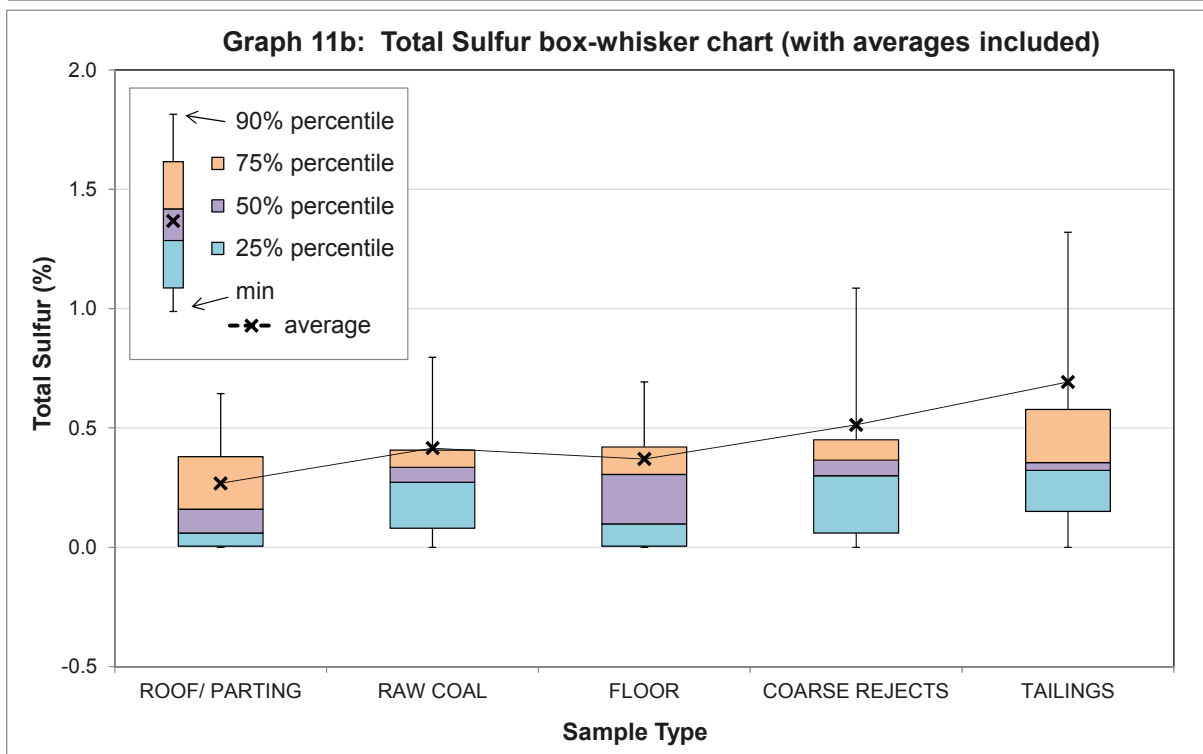
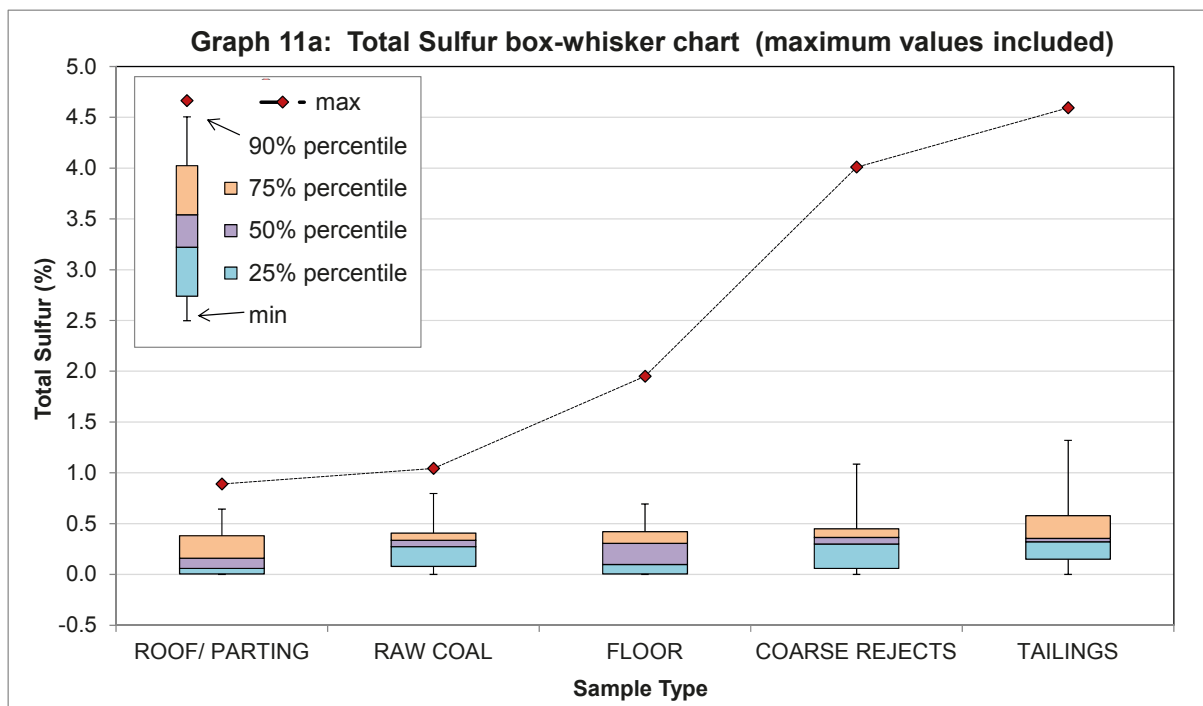
Whilst a relatively large data set for potential coal reject and coal materials (120 samples) has been collected as part of the geochemical impact assessment process, additional total sulfur data (141 sulfur values) from coal quality tests completed at ACIRL laboratory in Maitland, NSW has also been made available to RGS. This latter data set was produced by ACIRL for various samples of raw coal; coal seam roof, parting, and floor; washed coarse reject (+1.8mm); and fine reject (-0.125mm) fractions (tailings). These data provide a larger data set (261 samples in total) to examine the distribution of sulfur within these material types.

Graph 10 presents the total sulfur content of the 261 samples sorted by coal seam and shows that most of the samples (240 samples or 92 %) have total sulfur content less than 1 %S, and 21 of the samples (8 %) have total sulfur content greater than 1 %S. Seventeen (17) of the 21 samples with total sulfur content greater than 1 %S are associated with the Coggan seam.



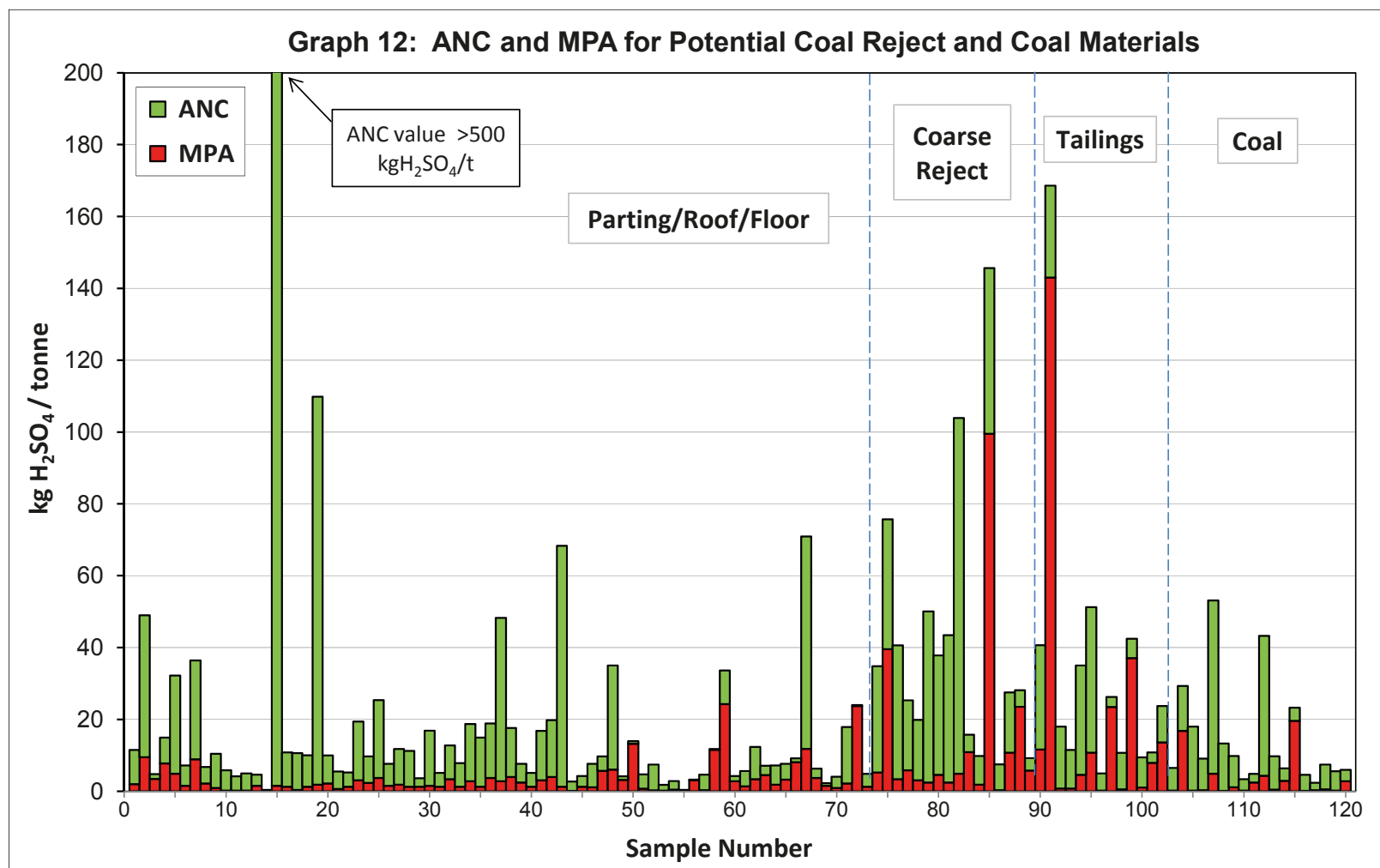
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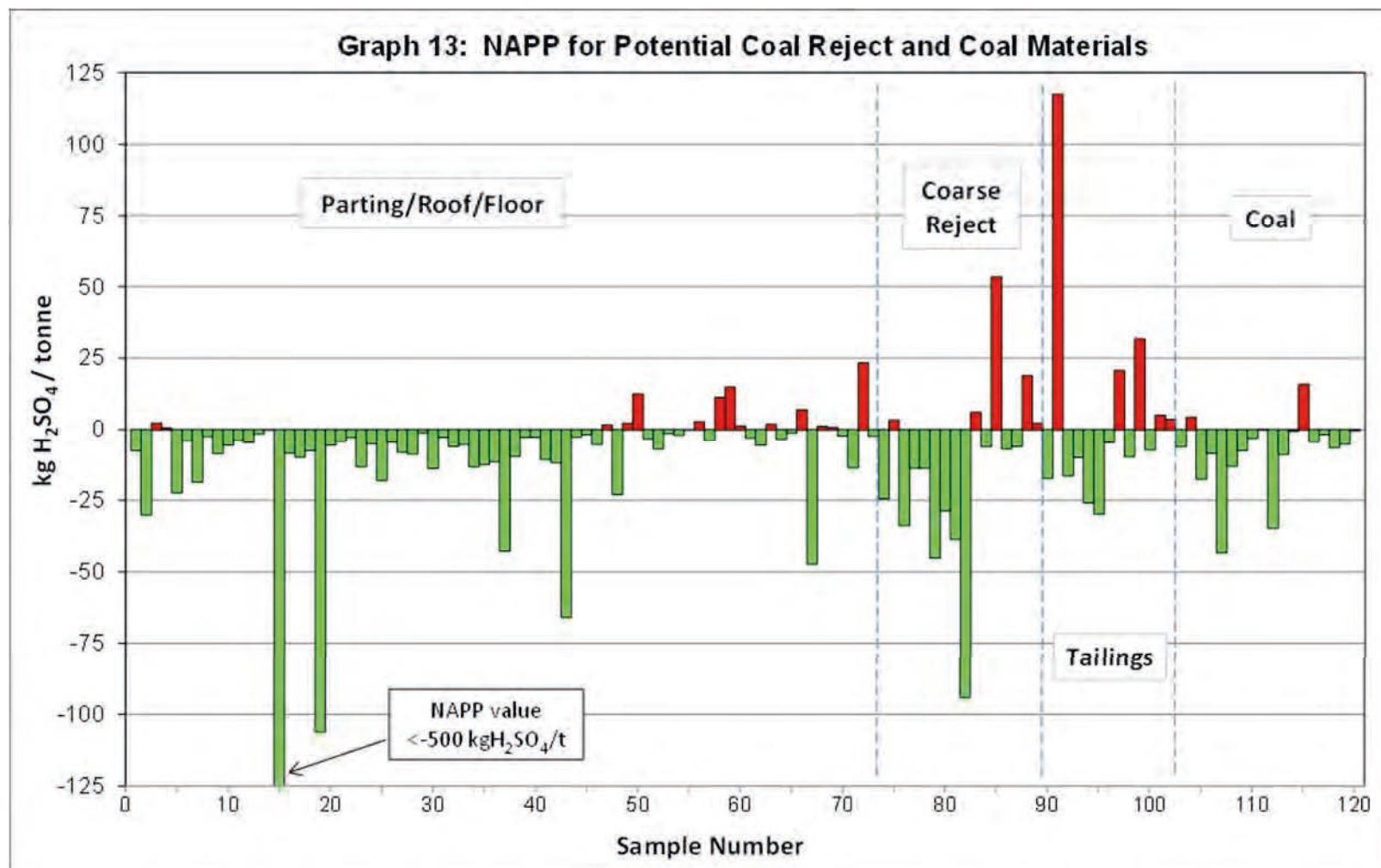
In order to illustrate the sulfur distribution within the potential coal reject and coal categories, box and whisker charts were created so as to statistically display total sulfur data for the 261 samples (**Graphs 11a and 11b**). The results indicate that the majority of the potential coal reject and raw coal samples have slightly elevated total sulfur values, with the 75th and 90th percentile total sulfur values being less than 0.5 % and 1 % respectively, for all but the tailings samples.



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- **MPA:** The MPA that could be generated by the 120 potential coal reject and coal samples included in the RGS geochemical assessment was calculated from the total sulfur data (or sulfide sulfur data, where available). The MPA ranges from 0.1 to 143 kg H₂SO₄/t, and is typically low (median 2.2 kg H₂SO₄/t (**Graph 12**, overleaf). However, eight samples have MPA values greater than 20 kg H₂SO₄/t, and these comprise three coarse reject, three tailings and two floor samples associated with the Coggan (COGDE) seam.
- **ANC:** The ANC for the 120 samples ranges from 0.3 to 518 kg H₂SO₄/t (median 7.3 kg H₂SO₄/t) and is greater than the MPA for most of the samples as illustrated in **Graph 12** (overleaf). However, some of the samples associated with the Coggan seam (ie. some of the coarse reject, tailings and floor samples) have a higher MPA than ANC.
- **NAPP:** The calculated NAPP value for the 120 potential coal reject and coal samples ranges from -517 to +117 kg H₂SO₄/t, and has a slightly negative median value of -5.3 kg H₂SO₄/t. Over 77% of the samples have a negative NAPP value and 23 % have a positive NAPP value as illustrated in **Graph 13** (also overleaf). Ten samples have NAPP values greater than 10 kg H₂SO₄/t and comprise coarse reject, tailings and floor samples associated with the Coggan seam.





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Graph 14 shows a plot of ANC versus MPA for the 120 potential coal reject and coal samples. ANC/MPA ratio lines have been plotted on the graph to illustrate the factor of safety associated with the samples in terms of potential for AMD formation. Generally those samples with an ANC/MPA ratio of greater than 2 are considered to represent material that has a high factor of safety and low to negligible risk of AMD formation (DITR, 2007; INAP, 2009).

The ANC/MPA ratio of the 120 samples ranges from 0.01 to 338 and is typically elevated (median 4.4). The majority of the samples lie within the low to negligible risk domain in the graph and therefore have a high factor of safety with respect to AMD formation. Thirty-four (34) samples lie within the possible to increased risk domains, although only 24 of these samples have sulfide sulfur content greater than background concentrations (0.1 %), and therefore have a reduced factor of safety and potential risk of AMD formation. The 24 samples (20 % of the total number of 120 samples) mainly comprise coal, coarse reject, tailings and floor samples associated with the Coggan seam (20 samples), and four samples (a roof, floor, coarse reject and tailings sample) are associated with the Ulan seam.

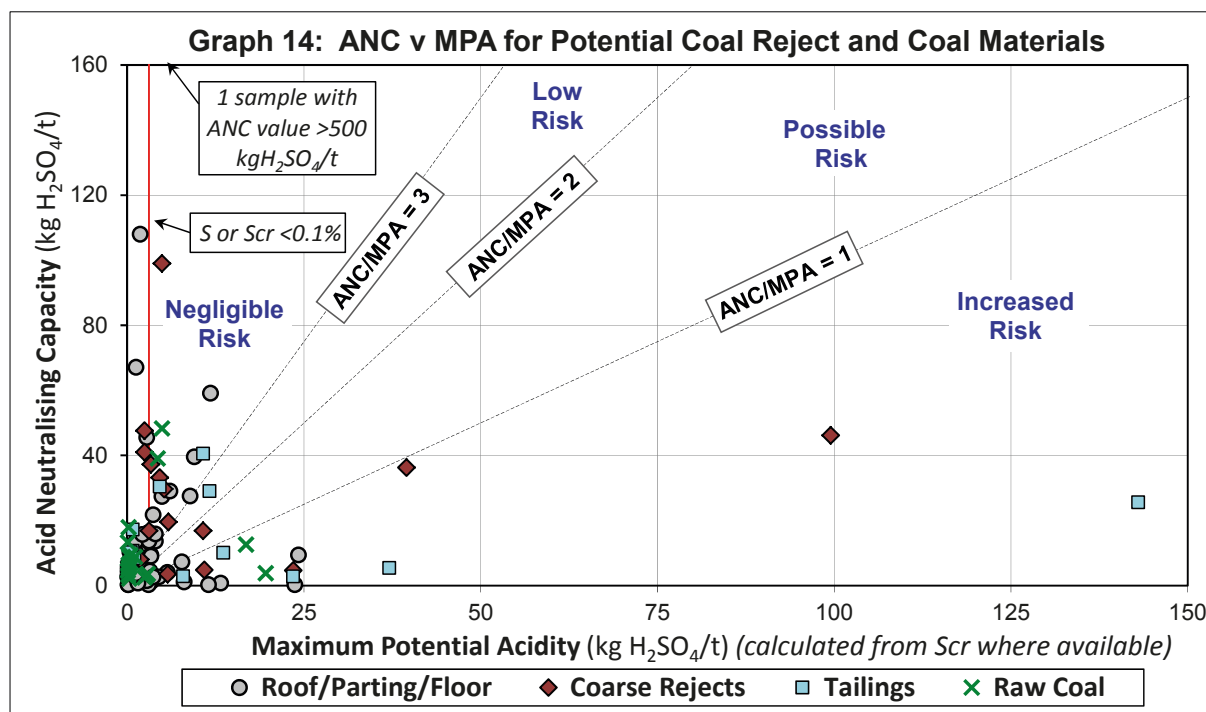


Table 4-4 presents the criteria used to classify the geochemical nature of the 120 potential coal reject and coal samples included in this study, which generally reflect Australian and International guideline criteria for classification of mine waste materials (DITR, 2007; INAP, 2009).

The results indicate that 96 of the 120 samples tested (80 %) fall in the NAF or NAF-Barren geochemical classification categories, due to the low sulfur content and/or elevated ANC. Twelve (12) samples (10.0 %) are classified as Uncertain as they have a low ANC/MPA ratio and a NAPP value close to zero. Generally, those samples classified as Uncertain are expected to have a low capacity to generate significant acidity. Twelve (12) samples (10 %) are classified as PAF, although two of these have a relatively low capacity to generate AMD.

The PAF samples comprise coal (one sample), coarse reject (three samples), tailings (two samples) and floor (five samples) materials associated with the Coggan seam (total of 11 samples), along with a single tailings sample associated with the Ulan seam.

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Table 4-4: Geochemical Classification Criteria – Potential Coal Reject and Coal Materials

Geochemical Classification	Total or Sulfide Sulfur (%)	NAPP (kg H ₂ SO ₄ /t)	ANC/MPA Ratio	No of Samples	% of Samples
NAF-Barren ²	≤ 0.1	-	-	74	61.7
Non-Acid Forming (NAF)	> 0.1	≤ - 5	≥ 2	22	18.3
Uncertain	> 0.1	> - 5 and ≤ +5	<2	12	10.0
Potentially Acid Forming - Low Capacity	> 0.1	> +5 and ≤ +10	<2	2	1.7
Potentially Acid Forming	> 0.1	> +10	<2	10	8.3

Notes:

1. If total sulfur or sulfide sulfur is less than or equal to 0.1 %, the NAPP and ANC/MPA ratio are not required for material classification as the sample is essentially barren of oxidisable sulfur.

2. A sample classified as NAF can be further described as 'barren' if the total sulfur and/or sulfide sulfur content is less than or equal to 0.1 per cent, as the sample essentially has negligible acid generating capacity.

Overall, from an ABA perspective, the majority of potential coal reject and coal materials represented by the samples tested can be regarded as NAF. However, around 20 % of the samples tested were classified as Uncertain or PAF and could be a potential source of acidity and/or NMD. Most of the PAF samples were associated with materials derived from the Coggan seam and were most prevalent in the coarse reject, tailings and floor (COGDE seam) sample types.

The results of the ABA tests on the potential coal reject and coal materials and implications for management of these materials at the Project are discussed further in **Section 5.0** of this report.

4.2 Multi-Element Concentration in Solids

Multi-element scans were undertaken to identify any elements (particularly metals/metalloids) present in the coal and mining waste material solids at concentrations that may be of environmental concern with respect to revegetation and surface water/seepage quality, and/or where the potential exists for human contact (e.g. if the material was to be used off-site).

In NSW, there are no specific guidelines and/or regulatory criteria for total metal/metalloid concentrations in coal and mining waste materials. In the absence of such criteria, and to provide relevant context, the total metal/metalloid results were compared against the average 'background' concentrations in the earth's crust by use of the 'geochemical abundance index' (GAI). The total concentration of each element was also compared to potentially relevant guideline criteria⁶ in order to provide some context and assess the degree of potential risk/environmental concern related to coal and mining waste materials that may warrant further investigation. The applicability of these guidelines stems from the potential final land use of the mine following closure (eg. forestry, ecological values and agricultural activities).

Twenty-four (24) composite samples of the various coal and mining waste materials described in **Sections 4.1** were made up from 99 of the total of 251 samples included in the geochemical impact assessment program. The composite samples were generally grouped according to material type and the detailed composition of each composite sample is provided in **Table B3 (Attachment B)**.

⁶ NEPC (2013). National Environmental Protection Council (NEPC). National Environmental Protection (Assessment of Site Contamination) Measure (NEPM). Guideline on investigation levels for soil and groundwater. Health-Based Investigation Level HIL(C); recreational open spaces.

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4.2.1 Geochemical Abundance Index (GAI)

In order to provide some context for the total metal/metalloid results, the assay results were compared against average background concentrations of those elements in soil and rock. From this comparison, a geochemical abundance index (GAI) was calculated. The GAI quantifies an assay result for a particular element in terms of the average crustal abundance for that element. The index, based on a log scale, is expressed in seven integer increments (0 to 6), which correspond to enrichment factors from 0 to over 96 times the average crustal abundance, as shown in **Table 4-5** (INAP, 2009).

Table 4-5: Geochemical Abundance Index and Enrichment Factor

Geochemical Abundance Index (GAI)	Enrichment Factor	Geochemical Abundance Index (GAI)	Enrichment Factor
-	Less than 3-fold enrichment	4	24 – 48 fold enrichment
1	3 – 6 fold enrichment	5	48 – 96 fold enrichment
2	6 – 12 fold enrichment	6	Greater than 96 fold enrichment
3	12 – 24 fold enrichment	-	-

As a general rule, a GAI greater than or equal to 3 indicates enrichment to a level that may warrant further investigation. This is particularly the case with some environmentally important 'trace' elements such as As, Cd, Cu and Zn. The concentration of these trace elements is more important in terms of potential environmental risk than the major rock-forming elements such as Al, Ca, Mg and Na. Elements identified as enriched may not necessarily be a concern for revegetation, drainage water quality or public health, but their significance should still be evaluated. Similarly, because an element is not enriched does not mean it will never be a concern, because under some conditions (e.g. low pH) the solubility of environmentally important elements such as Al, Cu, Cd, Fe and Zn increases.

The multi-element results for the 24 composite coal and mining waste samples tested are provided in **Table B4 (Attachment B)** and the calculated GAI results are provided in **Table B5 (Attachment B)**. All of the samples returned GAI values less than 3 and therefore, none of the materials represented by these samples are expected to be significantly enriched with metals/metalloids.

4.2.2 Soil Guideline Criteria

The results from multi-element testing (total metals) of the 24 composite samples of coal and mining waste materials samples are presented in **Table B4 (Attachment B)**. The acquired data indicates that materials represented by these samples typically have total metal/metalloid concentrations in solids well within the applied National Environment Protection Council (NEPC) health-based (HIL(C)) guideline criteria for soils (NEPC, 2013).

The potential solubility of these and other metals/metalloids was examined through 1:5 water extract tests as well as KLC tests, the results of which are presented in **Section 4.4** and **4.5**, respectively. The environmental significance of identified metal concentrations in mine waste materials and their water solubility in terms of risk is also discussed further in **Section 5.0**.

4.3 Cation Exchange Capacity and Sodicity

The effective cation exchange capacity (eCEC) and exchangeable sodium percentage (ESP) results for six selected overburden samples (two overburden and four interburden) from the group of 24 composite samples described in **Sections 4.2** are presented in **Table B4 (Attachment B)**. These sample types were selected for testing as they are likely to report towards the outer surfaces of overburden emplacement areas and backfilled pit areas, and could also be used in site infrastructure works.

The exchangeable cation results indicate that the eCEC of the six samples ranges from 3.5 to 27.5 meq/100g, and is typically low (average = 9.1 meq/100g) as shown in **Table 4-6**. For materials with a low eCEC value, some fertiliser addition may be required to provide a reasonable growth medium for vegetation roots.

Table 4-6: Ratings for Effective Cation Exchange Capacity

eCEC Rating	CEC meq/100g
Very Low	<6
Low	6-12
Moderate	12-25
High	25-40
Very High	>40

The ESP results for the six samples range from 0.2 to 1.3 % and are typically very low (average 0.5 %) indicating that materials represented by these samples are likely to be non-sodic. Generally samples with ESP values less than 6 are considered non-sodic; greater than 6 are considered moderately sodic; and greater than 14 are considered strongly sodic and may be susceptible to dispersion and erosion (Isbell, 2002; and Northcote and Skene, 1972).

Overall, the results of the eCEC and ESP tests on the overburden and interburden samples indicate that the materials represented by these samples are likely to have low sodicity levels, and consequently have a low risk of being susceptible to dispersion and erosion. However, fertiliser addition may need to be considered for some materials so as to provide a reasonable growth medium for revegetation and rehabilitation works.

4.4 Multi-Elements in Water Extracts

There are no specific regulatory criteria for metal/metalloid concentrations in leachates derived from coal and mining waste materials generated by coal mining operations in NSW. Hence, RGS has compared the multi-element results in water extracts from the 24 composite samples described in **Section 4.2** and **4.3** with potentially relevant Australian water quality guidelines (ANZECC, 2000), to assess leachate quality and provide some context for discussion of the results.

It is recognised that direct comparison of geochemical data with guideline values can be misleading. For the purpose of this study, guideline values are only provided for broad context and should not be interpreted as arbitrary 'maximum' values or 'trigger' values. Using sample pulps (ground to passing 75 µm) provides a very high surface area to solution ratio, which encourages mineral reaction and dissolution of the solid phase. As such, the results of screening tests on water extract solutions are assumed to represent an assumed 'worst case' scenario for initial leachate from sample materials.

The results from multi-element (soluble metal/metalloid) testing of water extracts (1:5 solid:water) from the 24 composite coal and mining waste samples are presented in **Table B6 (Attachment B)**. The extract pH values range from pH 3.89 to 9.01 and are typically slightly alkaline. The four samples with relatively low pH values (<pH 5.0) represent coal and potential coal reject materials derived from the Coggan seam, and also mixed overburden/interburden containing floor material from the Coggan

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seam. The 24 samples have relatively low EC values ranging from 81 to 569 $\mu\text{S}/\text{cm}$, indicating relatively low salinity levels and low concentrations of dissolved solids.

The dominant major soluble cation is typically sodium, although calcium, magnesium and potassium concentrations are elevated in some water extract samples. The dominant major soluble anions are typically bicarbonate and sulfate. The concentration of soluble sulfate is relatively low (4 to 374 mg/L) compared to the applied ANZECC (2000) livestock drinking water quality guideline of 1,000 mg/L.

The concentration of most trace metals tested in the water extracts is relatively low, predominantly below the laboratory limit of reporting and below the applied water quality guideline criteria for livestock drinking water, where these exist. A minor exception is slightly elevated concentrations of selenium in two of the 24 samples (from uneconomic coal seams) compared to the ANZECC (2000) livestock drinking water guideline of 0.02 mg/L.

It should be noted that the slightly elevated concentrations of selenium represent a “worst case” scenario in that all samples are crushed and pulverised to less than 75 μm before testing at ALS laboratory and as such, have a significantly larger surface area for potential reaction and leaching than for materials in the field situation. It is also noted that selenium is commonly detected in slightly elevated concentrations in leachate from coal and mining waste materials as part of geochemical impact assessments for coal mines in Australia, but typically has a concentration below the laboratory limit of reporting (and relevant guideline concentrations) in the field situation.

The concentrations of iron and manganese are noticeably elevated in the water extracts from two coarse reject samples from the Coggan seam (RGS numbers 12 and 22, **Table B6, Attachment B**). Whilst there are no ANZECC water quality guideline limits for these metals with respect to livestock drinking water, ANZECC guideline limits are available for water intended for irrigation use.

Overall, the water extract results indicate that most elements are sparingly soluble at the current pH of the water extracts and are unlikely to impact upon surface water and/or groundwater quality. Notwithstanding, it is suggested that the concentration of selenium, iron, manganese and other metals/metalloids be monitored in surface runoff and seepage from coal and mining waste storage facilities on an annual basis.

The implications of these results for management of coal and mining waste materials at the Project are discussed further in **Section 5.0**.

4.5 KLC Tests

KLC tests were completed on nine composite samples of coal and mining waste materials using the methodology previously described in **Section 3.3.3**. The geochemical makeup of the nine composite samples is provided in **Table B7 (Attachment B)**. The sample selection is generally skewed towards PAF materials, as only two of the composite samples contain purely NAF materials (KLC2 and KLC4).

The geochemical results and trends obtained for the KLC tests are presented in **Attachment C**. The KLC leachate concentrations are presented alongside ANZECC (2000) guideline values for livestock drinking water quality. These guidelines are provided for context and are not intended to be interpreted as “maximum permissible levels” for site water storage or discharge. It should be noted that the ratio of sample to water in the KLC tests is approximately 2:1 (w/v) (ie. concentrated), whereas the ratio of sample to water generally used in tests where results can (arbitrarily) be compared against guideline concentrations to provide relevant context is more dilute at 1:5 (w/v). Whilst arbitrary comparisons against guideline concentrations can be helpful in some situations, and help to provide relevant context, such comparisons cannot be directly extrapolated to the field situation at the Project.

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The KLC test results obtained for the coal and mining waste samples represented by KLC1 to KLC7 over the relevant test period indicate that:

- The pH of leachate from the KLC tests ranges from 3.32 to 8.29. The two NAF samples (KLC2 and KLC4) generate pH neutral to slightly alkaline leachate over the test period. Of the remaining seven KLC samples, three generate leachate with a pH value less than the deionised water input pH range of 5-6.5 (KLC3, KLC 6 and KLC8). These three samples represent potential coal reject (coal, roof and floor) and coarse reject materials derived from the Coggan seam.
- The EC value of leachate from the KLC tests ranges from 67 to 3,180 $\mu\text{S}/\text{cm}$. Leachate from the purely NAF materials (KLC2 and KLC4) has an EC value less than 250 $\mu\text{S}/\text{cm}$, whereas leachate from the composite samples containing some PAF materials is moderately higher. The only samples where the leachate EC is consistently greater than (or close to) 1,000 $\mu\text{S}/\text{cm}$ are the coarse reject samples derived from the Coggan seam (KLC6 and KLC8).
- The acidity of leachate from the KLC tests is low ($\leq 8 \text{ mg/L}$ as CaCO_3) for five of the composite samples (KLC1, KLC2, KLC4, KLC5 and KLC9) and elevated (up to 335 mg/L as CaCO_3) for four samples (KLC3, KLC6, KLC7 and KLC8). The four samples with elevated acidity levels represent potential coal reject (coal, roof and floor) and coal reject materials from the Coggan seam.
- The alkalinity of leachate from the KLC tests is elevated (up to 107 mg/L as CaCO_3) for five of the composite samples (KLC1, KLC2, KLC4, KLC5 and KLC9) and low (up to 6 mg/L as CaCO_3) in four samples (KLC3, KLC6, KLC7 and KLC8). The four samples with low alkalinity levels represent potential coal reject (coal, roof and floor) and coal reject materials from the Coggan seam.
- The net alkalinity of leachate from the KLC tests is generally positive or close to zero for five of the composite samples (KLC1, KLC2, KLC4, KLC5 and KLC9) and negative for four samples (KLC3, KLC6, KLC7 and KLC8). The four samples with negative alkalinity levels represent potential coal reject (coal, roof and floor) and coal reject materials from the Coggan seam.
- The concentrations of soluble calcium and magnesium in leachate from the KLC tests have been used to calculate the residual ANC in the test materials. The results indicate that at least 90 % of the residual ANC remains in the samples that generate higher pH values (KLC1, KLC2, KLC4, KLC5 and KLC9) whilst the residual ANC is generally being consumed more readily in the lower pH samples (ie. potential coal reject and coal reject samples (KLC3, KLC6, KLC7 and KLC8) derived from the Coggan seam).
- 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 show that at least 82 % of the total sulfur content remains in the samples at the end of the relevant leaching period.
- The concentration of soluble sulfate is typically higher in leachate from the four potential coal reject and coal reject samples (KLC3, KLC6, KLC7 and KLC8) from the Coggan seam compared to the remaining samples. In all cases the soluble sulfate concentration is lower than the applied ANZECC (2000) water quality guideline for this anion (1,000 mg/L).
- The concentration of soluble trace metals/metalloids in leachate from the KLC tests is typically low and within applied (ANZECC, 2000) livestock water quality guidelines⁷. The exceptions are iron (Fe), manganese (Mn), selenium (Se) and zinc (Zn) in KLC leachate from some samples. The elevated iron and manganese concentrations are mainly associated with acidic leachate from the four potential coal reject and coarse reject samples (KLC3, KLC6, KLC7 and KLC8).

⁷ ANZECC Irrigation Water Quality Guideline Levels used for Fe and Mn.

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associated with the Coggan seam. The elevated zinc concentration in leachate is associated with acidic leachate from the coal reject (tailings) sample from the Coggan seam (KLC7).

As noted at the start of this section, the ratio of sample to water in the KLC tests is approximately 2:1 (w/v), whereas the ratio of sample to water used in other tests where comparisons can be made against water quality guideline concentrations is generally 1:5 (w/v). In addition, the KLC tests are performed on sample materials crushed to pass 5 mm (or as received) with a relatively large surface area and are tested under fully oxidised free-draining conditions which typically represent a “worst-case scenario, analogous to near surface materials at an OEA, coal reject storage facility and/or those materials located in preferential pathways.

As previously discussed in **Section 4.4**, metals/metalloids such as selenium (and infrequently other trace metals) are commonly detected in slightly elevated concentrations in pH neutral and slightly alkaline leachate from geochemical impact assessments for coal mines in Australia, and typically have concentrations below the laboratory limit of reporting (and relevant guideline concentrations) in field situations.

Potential implications of these results with respect to the management of coal and mining waste materials at the Project are discussed further in **Section 5.0**.

4.6 Spontaneous Combustion

For spontaneous combustion to occur a heat source and fuel are required. Spontaneous combustion issues primarily relate to pyrite (iron sulphide) oxidising (exothermic reaction) in the presence of combustible material (coal and/or other highly carbonaceous material). Within the overburden/interburden there is very little sulfur (median 0.04%S) and therefore very low probability for spontaneous combustion to occur in-situ or in OEAs. However, some of the coal and potential coal reject materials have elevated pyritic sulfur content and hence there may be some potential risk of spontaneous combustion for these material types.

Results of testing for the propensity of coal materials from the Ulan and Coggan seams at the Project to spontaneously combust have been made available to RGS (CRS, 2013 and Simtars, 2003). Thirteen drill core samples from three drill holes at the Project were subjected to a range of spontaneous combustion tests. Results indicate that coal materials from both the Ulan and Coggan coal seams have a medium to high intrinsic spontaneous combustion reactivity and propensity rating, in line with measured relative ignition temperature data. However, whilst samples from the Ulan and Coggan seams initially self-heat, they gradually lose heat and do not appear to reach thermal runaway in any practical timeframe.

The CRS report evaluated the influences of various coal physical properties and site specific factors, and concluded that the risk of self-heating can be moderated significantly through the identification and implementation of appropriate controls for coal as part of a spontaneous combustion monitoring and management Plan.

Coal reject materials at the Project are likely to be well mixed and hence dilution of the relatively small amount of pyritic coal reject material with low pyrite coal reject material is likely to produce a composite coal reject material with a relatively low propensity to spontaneously combust.

Whilst the propensity of most coal and coal reject materials from the Project can be managed, it is recommended that further testing of a wider range of samples be completed during the operational phase of the Project, to further confirm these findings.

The potential for spontaneous combustion at the underground mining operation has been discussed in some detail in the Feasibility Study for the Project (Parsons Brinckerhoff, 2014c). The authors suggested that remnant coal left in the goaf could present a risk of spontaneous combustion, even though the Coggan and Ulan seam samples did not reach thermal runaway in the test work. It is understood that this potential issue will be managed by:

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- assuming that remnant coal will oxidise during extraction and that subsequent sealing will be necessary to ensure the reduce the risk of spontaneous combustion.
- adopting a mine wide inertisation capability that is ready at all times.
- Allocating sufficient resources to spontaneous combustion management of both the active and sealed goaves, as well the pillars at all times during normal operation.
- Development of appropriate spontaneous combustion mitigation procedures under a properly formulated spontaneous combustion and monitoring management plan (SCMMP).
- Ensuring that the SCMMP collects additional data and that the document is sufficiently dynamic to be adapted as the mine history unfolds and more information is collected and understood.
- Ensuring that the SCMMP monitors any potential for surface cracking through further work and research and implements a suitable ventilation system to control oxygen ingress to the system in the unlikely event that surface cracking occurs.

5.0 DISCUSSION

5.1 *Acid-Base Nature of Coal and Mining Waste Materials*

5.1.1 Overburden Materials

The results of the ABA tests presented in **Section 4.1** indicate that over 98.5 % of overburden materials represented by the samples tested are NAF and have a high factor of safety with respect to potential acid generation. Most of these materials have low total sulfur content ($\leq 0.1\%$) and are therefore classified as NAF-Barren. A small amount of overburden materials (interburden) are classified as Uncertain (1.5 %) but are expected to have a low capacity to generate any significant AMD and/or NMD.

Most materials tested also have a significant acid buffering capacity (moderate ANC value), which is generally more than an order of magnitude greater than the MPA and therefore should be more than sufficient to buffer the small amount of acidity that could theoretically be generated from the small amount of (interburden) materials classified as Uncertain. The Uncertain material represents a small fraction of the overburden materials likely to be generated at the Project ($< 1.5\%$) and therefore the risk of acid generation from these materials is very low. However, as a precautionary measure, it is suggested that placement of visibly carbonaceous interburden material at the final outer surfaces of final landforms (prior to topsoil covering and revegetation) be avoided.

The ABA results are illustrated for overburden materials in the form of a pie chart (**Graph 15**, overleaf). The results provide a useful representation of the relative distribution of the geochemical nature of the types of material likely to report as overburden at the Project.

The geochemical results also indicate that salinity levels in seepage and runoff from OEAs at the Project are likely to be relatively low. Again, however there may be some merit in avoiding placement of visibly carbonaceous interburden materials at the final surface of landforms (prior to topsoil covering and revegetation) as these materials can have slightly higher salinity levels, in order to further reduce the risk of any localised areas of higher salinity runoff and seepage from these materials.

5.1.2 Potential Coal Reject and Coal Materials

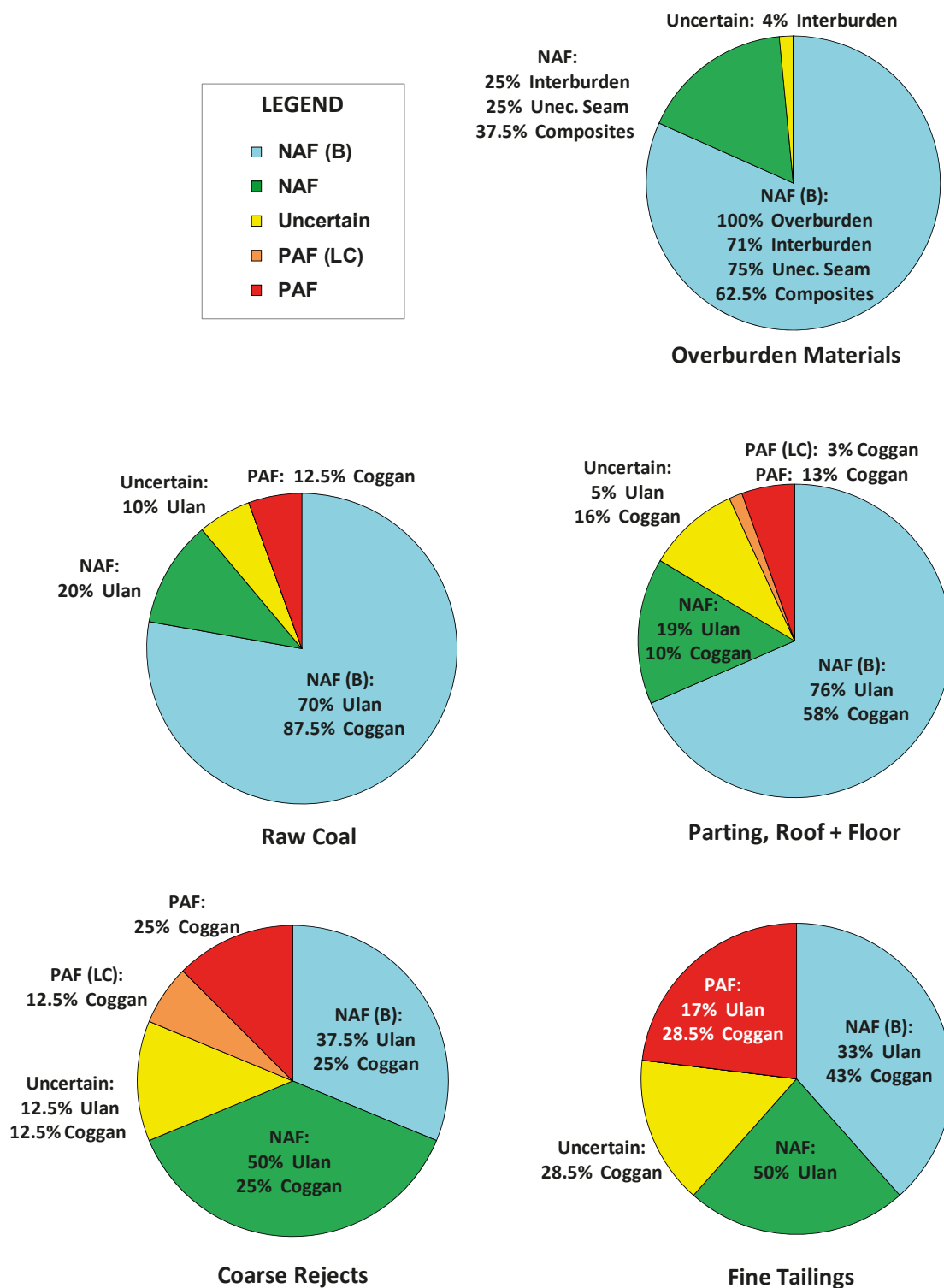
The results of the ABA tests presented in **Section 4.2** indicate that approximately 80 % of the potential coal reject and coal materials represented by the samples tested are NAF and have a high factor of safety with respect to potential acid generation. Most of these NAF materials have low total sulfur content ($\leq 0.1\%$) and are therefore classified as NAF-Barren. About 10 % of the potential coal reject and coal samples are classified as Uncertain and are expected to have a low capacity to generate significant acidity, whilst the remaining 10 % are classified as PAF, and have some capacity to generate acidity and/or NMD. Most of the PAF samples are associated with materials derived from the Coggan seam, and are most prevalent in the coarse reject, tailings and floor (COGDE seam) sample types.

The ABA results are illustrated for potential coal reject and coal materials in the form of a pie chart (**Graph 15**, overleaf). The results provide a useful representation of the relative distribution of the geochemical material types at the Project.

The geochemical results indicate that salinity levels in seepage and runoff from coal reject and coal storage areas at the Project are likely to be low. However, some materials (mainly derived from the Coggan coal seam) may generate higher levels of salinity, especially if these materials are exposed to ongoing oxidising conditions. Consequently, water quality monitoring at relevant storage and stockpile areas is recommended in order to verify this finding during the operational stage of the Project.

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Graph 15: Geochemical Nature of Coal and Mine Waste Materials



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The classification of the geochemical nature of the potential coal reject and coal materials illustrated in **Figure 15** is based upon a data set which is appropriate for the EIS stage of the Project. However, it is clear that management practices adopted for the long term storage of coarse and fine reject materials from the Coggan seam will need to accommodate the potential for AMD, NMD and saline drainage generation from some of these materials. For example, if PAF coal rejects are returned to the open pit for long term storage and covered with NAF overburden, potential connectivity with groundwater resources should be investigated.

At the current time, the data suggests that some of the floor material from the Coggan (COGDE) seam is PAF and therefore there is some potential for parts of the underground mine workings and pit floor at the open cut operation to be a source of acidity. Provision for treatment of in-pit acid water may be required, which could include use of a mobile lime dosing plant and broadcast application of agricultural lime.

After mine closure, no pit floor rocks will be exposed as the open pits will be completely backfilled. The predicted post mining pit water recovery level at the open pits will be higher than the floor of the Coggan seam and therefore saturate and restrict further oxidation of any remnant PAF/Uncertain floor rocks. During operations, pit water will drain to in-pit sumps, and will be monitored, treated and managed according to the Water Management Plan.

A Mine Waste Management Plan should be developed to provide more details on how mine waste materials will be practically managed during operations and water quality monitoring measures should be contained in the Water Management Plan for the Project. The water quality monitoring program should contain geochemical water quality trigger parameters including pH and salinity with management contingency for lime dosing and management review, as required.

Recommended management measures for potential coal reject and coal materials are provided in **Section 6.2**. These management measures will result in a significant reduction in any potential for AMD/NMD and saline drainage generation and associated impacts at the Project.

5.2 Sulfide Oxidation Rate

The sulfate generation rate results obtained in the KLC tests for coal and mining waste samples can be used to determine the rate of sulfide oxidation in materials represented by these samples. Most sulfate salts generated from sulfide reaction involving materials with a relatively low sulfide sulfur concentration are highly soluble, and therefore will be collected in column leachate. The sulfate (and calcium) concentrations in KLC leachate are typically less than the solubility limit of gypsum (CaSO_4) for example, which indicates that sulfate generation is not controlled by gypsum dissolution in the KLC test materials. Therefore, the sulfate concentrations and oxidation rate calculations provide reasonable estimates of these parameters and the results align well with existing static and dynamic geochemical data on a wide range of mine waste materials (AMIRA, 1995).

The concentration of dissolved sulfate in leachate from most of the KLC test samples is quite variable and therefore an average value for sulfate generation rate across the test period has been used for this assessment. The sulfate generation rate for each of the mine materials used in the KLC tests is shown in **Table 5-1**.

The sulfate generation rate from the nine KLC samples ranges from 7.3 to 137.0 mg/kg/week indicating that the rate of sulfide oxidation ranges from low to moderate in these materials (equivalent to an oxidation rate ranging from 7.0×10^{-9} to 1.2×10^{-7} kg $\text{O}_2/\text{m}^3/\text{s}$). Results of previous KLC test work completed as part of a mining industry sponsored study program for mining wastes from a broad range of coal and metalliferous mines (AMIRA, 1995), indicates that mine materials with an oxidation rate of less than 5×10^{-8} kg $\text{O}_2/\text{m}^3/\text{s}$ and low to moderate ANC levels have an increased factor of safety, and are likely to generate leachate that is pH neutral and/or has low levels of acidity. Hence,

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four of the KLC samples (KLC1, KLC2, KLC4 and KLC9) fall into this category and the KLC results reflect the predicted generally NAF outcome from static geochemical test results.

Table 5-1: Sulfate Generation and Oxidation Rates for KLC Test Materials

RGS-KLC Sample No.	Sample Description and Seam Source (in brackets)	Sulfate Generation Rate (mg/kg/week)	Oxidation Rate (kg O ₂ /m ³ /s)
KLC 1	Over/Inter-burden + Floor	44.6	3.9 x 10 ⁻⁸
KLC 2	Overburden + Parting	15.2	1.3 x 10 ⁻⁸
KLC 3	Coal Roof + Floor (Coggan)	50.5	4.4 x 10 ⁻⁸
KLC 4	Coal Parting, Roof + Floor (Ulan)	8.1	7.0 x 10 ⁻⁹
KLC 5	Tailings (Ulan)	87.0	7.4 x 10 ⁻⁸
KLC 6	Coarse Reject (Coggan)	137.0	1.2 x 10 ⁻⁷
KLC 7	Tailings (Coggan)	113.0	9.8 x 10 ⁻⁸
KLC 8	Coarse Reject 2 (Coggan)	37.7	2.3 x 10 ⁻⁸
KLC 9	Tailings 2 (Coggan)	10.6	7.3 x 10 ⁻⁹

The remaining five KLC samples have oxidation rates close to or greater than 5 x 10⁻⁸ kg O₂/m³/s, lower ANC values and contain at least some PAF materials, and therefore would be expected to potentially generate acid during the KLC test period. At the end of the KLC test period, three of the five remaining KLC samples generate leachate with a pH value less than the deionised water input pH range of 5 to 6.5 (KLC 3, KLC 6 and KLC8). These three samples represent potential coal reject (ie. coal, roof and floor) and coarse reject materials derived from the Coggan seam.

As previously discussed, it is expected that addition of alkaline materials (eg. agricultural lime or hydrated lime) would be advantageous as part of the measures adopted to control/neutralise any acidity that could potentially be generated from materials represented by these samples.

5.3 Multi-Element Composition and Water Quality

5.3.1 Multi-element composition

The multi-element composition of coal and mining waste materials are presented in **Section 4.2**, along with a comparison against average crustal abundance and applied (NEPC, 1999) guideline concentrations. The acquired data indicate that these materials are not significantly enriched with metal/metalloids and that most total metal/metalloid concentrations in these materials are below the applied NEPC health-based guideline values, where such guideline values exist. Hence, coal and mining waste materials represented by these samples should not present a significant risk to the environment with respect to total metal concentrations in solids for revegetation and rehabilitation activities.

5.3.2 Water Quality

Static and KLC geochemical test results indicate that initial and ongoing surface run-off/seepage from the majority of coal and mining waste materials is likely to be pH neutral to slightly alkaline. However,

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some of the potential coal reject and actual coal reject materials derived from the Coggan seam has the potential to generate some acidity and lower pH values.

The salinity of surface runoff and seepage from overburden materials (overburden, interburden and uneconomic coal seam materials from open cut mining) is likely to be relatively low. The salinity of surface runoff and seepage from coal reject materials and coal (from both open pit and underground mining) is also likely to be low, but may increase over time if PAF materials are exposed to oxidising conditions (mainly through increased sulfate concentrations caused by sulfide oxidation).

At the OEAs, readily available salts will be flushed from materials located in preferential pathways, through which rainwater infiltration flows and much of the total overburden material mass will have no contact with infiltrating rainwater. The applied leaching methodology of using small grained-crush size for the samples described in **Section 4.1** enhances the surface area to leaching fluid ratio, and combined with the encouraged oxidation in the columns, produces leachate which is reasonably representative of overburden leachate when initially subjected to rainfall infiltration.

A relatively low and consistent salt generation and release rate towards an equilibrium value over time is expected from the bulk low sulfur overburden materials, which are best represented by the composite samples in kinetic leach column tests KLC2 and KLC4 described in **Section 4.5**. Longer term salinity trends in a free draining situation will reflect the availability and solubility of minerals on the material surfaces. Once readily soluble minerals have been flushed from material surfaces these would need to be replaced through further weathering and dissolution.

A different salinity situation is expected for pore water in overburden materials located in any saturated zones at the OEAs and at the backfilled open pits. Groundwater inflow into the mined areas ceases at some time after the open cut mining areas are backfilled, therefore in the longer term all seepage is expected to be a direct combination of rainwater leaching through overburden materials. For rainwater that infiltrates into an OEA and is not released in the short term, chemical processes (such as ion exchange) can occur in the saturated zone. The mineralogy and chemical processes occurring within the saturated zone of an OEA has been reviewed in some detail for several coal mining operations in the Upper Hunter Valley of NSW (Mackie, 2009).

Mackie demonstrated through XRD analyses, a common mineral regime of overburden core samples dominated by quartz with subordinate albite, kaolinite, illite-smectite and dolomite. Batch reaction trials on a range of core samples representing different overburden lithologies indicated leachates exhibiting sodium (Na), magnesium (Mg), calcium (Ca) and bicarbonate (HCO_3), chlorine (Cl) and sulfate (SO_4) ionic species distributions. Salinity levels were observed to be highest during initial saturation and thereafter reduced towards a long term equilibrium value. Salinity projections for long term pore water chemistry from Mackie (projected out to 100 years) predicted a salinity range from 800 $\mu\text{S/cm}$ to more than 8,000 $\mu\text{S/cm}$, with an average of about 3,400 $\mu\text{S/cm}$.

Over the past few years, RGS has utilised cumulative salinity values from KLC tests on representative samples of overburden materials (completed under ideal oxidising/weathering conditions over seven leach events) to extrapolate likely long term salinity values for pore water chemistry at coal mining projects in NSW and other parts of Australia. These values have then been used by others as source terms to evaluate potential impacts to the receiving environment from salinity. The KLC data in **Section 4.5** indicate that the salinity of pore water in saturated overburden materials at Bylong is likely to be in the range 1,500 to 3,000 $\mu\text{S/cm}$. These values are towards the lower end of the range predicted for overburden by Mackie, although it is noted that Mackie predicted 100 years would be required to reach these values in saturated zones. The KLC results also suggest that salinity values from well managed coal reject materials are likely to be in the range 5,000 to 8,000 $\mu\text{S/cm}$, although it should be noted that coal rejects make up only about 11 % of the total mine waste volume at the Project. Using a mass balance approach and assuming a reasonable level of leachate mixing, it is expected that long term pore water salinity values derived from co-disposed overburden and well managed coal rejects at Bylong will be in the range 1,800 to 3,500 $\mu\text{S/cm}$.

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The dominant major soluble cation in surface runoff and seepage from coal and mining waste materials is likely to be sodium, although calcium, magnesium and potassium concentrations may also be elevated compared to typical background concentrations. The dominant major soluble anions are typically bicarbonate and sulfate. The concentration of soluble sulfate is likely to remain below the applied ANZECC (2000) water quality guideline criterion of 1,000 mg/L.

Most trace metals/metalloids in NAF coal and mining waste materials at the Project are likely to be sparingly soluble at the predicted neutral to slightly alkaline pH of surface run-off/seepage and dissolved concentrations are expected to be low compared to the applied livestock drinking water quality guideline criteria (ANZECC, 2000). A minor exception is selenium, although the concentration of this element is not expected to be elevated above the applied guideline criteria under field conditions at the Project. The concentration of iron, manganese and zinc may also be elevated in surface runoff/seepage from PAF coal reject materials derived from the Coggan seam compared to the applied water quality guideline criteria (ANZECC, 2000).

The solubility of most trace metals/metalloids is dependent upon pH, therefore some PAF coal reject materials from the Coggan seam have the potential to generate acid leachate containing elevated concentrations of metals and sulfate salts if exposed to oxidising conditions. Scale-up of leaching tests for PAF materials and alkaline amendment tests are recommended as part of operational planning.

In order to address this potential issue, bulk coal reject materials will be preferentially placed in cells as backfill deep in the open pits, below the level of the predicted post mining groundwater recovery level, and encapsulated with at least 5 m of NAF overburden material, prior to rehabilitation. The emplaced coal reject materials will be a mixture of NAF and PAF materials and should be paddock dumped, dozed, traffic compacted and amended with alkaline material, prior to encapsulation. A conceptual illustration of the backfilled open pits is provided in **Figure 7a**.

In early mine life whilst no storage capacity is available at the open pits, coal reject materials will be encapsulated in cells by at least 5 m of NAF overburden material at the OEAs with operational management methods, such as paddock dumping, dosing, traffic compaction and lime dosing used as described above. A conceptual illustration of the OEAs containing encapsulated coal reject materials is provided at **Figure 7b**.

A similar mine waste encapsulation strategy for coal reject materials has been successfully used at other mining operations in NSW, handling mining waste materials with similar geochemical characteristics to Bylong, including Bengalla Coal Mine, and this has resulted in no significant issues involving acidity or salinity. Overall, the risk of potential impact on the quality of surface and groundwater from the Project should be low for coal and mining waste materials, if the recommended management measures for coal reject materials are adopted. This finding should be verified by the ongoing water quality monitoring program for surface water and groundwater at the Project.

5.4 *Revegetation and Rehabilitation*

The following discussion provides some context to the soil chemistry of overburden materials likely to be generated at the Project. From a soil chemistry viewpoint, most overburden materials are likely to be pH neutral to slightly alkaline and have a relatively low level of salinity.

Overburden materials are likely to have low sodicity levels and therefore have a low risk of being susceptible to dispersion and erosion. However, fertiliser addition may need to be considered for some overburden materials, in order to provide a reasonable growth medium for revegetation and rehabilitation.

Additional testing, including field trials, may be needed when the mine is operational and bulk overburden materials become available, so as to determine the best management option for rehabilitation of these materials progressively and during mine closure.

6.0 CONCLUSIONS AND POTENTIAL MANAGEMENT MEASURES

6.1 Conclusions

RGS has completed a geochemical impact assessment of representative samples of coal and mining waste materials for the Project. It is concluded that:

- The majority of coal and mining waste materials are expected to have a low sulfur content, excess ANC, and be classified as NAF;
- The majority of coal and mining waste materials are likely to have a high factor of safety with respect to potential acid generation;
- Some of the coal reject material generated from processing coal from the Ulan and Coggan seams is likely to be PAF. This material will need to be well managed at the Project to reduce the risk of AMD, NMD and saline drainage;
- Some of the floor material from the Coggan seam is likely to be PAF and therefore there is some potential for parts of the final pit floor at the proposed open cut operation to be a source of AMD;
- The concentration of total metals/metalloids in coal and mining waste materials is typically low and below the applied guideline criteria for soils, and is therefore unlikely to present any environmental issues associated with revegetation and rehabilitation;
- Most NAF coal and mining waste materials reporting to stockpile and storage areas should generate pH neutral to slightly alkaline run-off/seepage with low salinity values, following surface exposure. The salinity of run-off/seepage from these materials is expected to remain low even with extended exposure to oxidising conditions;
- The concentration of trace metals/metalloids in surface run-off and seepage from most NAF coal and mining waste materials in the field situation is likely to be low;
- Overall, the risk of potentially significant water quality impacts from NAF coal and mining waste material is low;
- Some coal materials could have a medium to high propensity to spontaneously combust, however the risk of self-heating can be significantly moderated, with appropriate controls being identified and implemented as part of a SCMMP; and
- Coal reject materials at the project are likely to be well mixed and hence dilution of the relatively small amount of pyritic coal reject material with low pyrite coal reject material is likely to produce a composite coal reject material with a lower propensity to spontaneously combust.

6.2 Potential Management Measures

The ongoing management of coal and mining waste materials at the Project 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 suggested that the Proponent considers:

- Pre-stripping topsoil from any areas to be used for stockpiling of coal or surface storage of coal reject materials for use in final rehabilitation activities (surface cover or vegetation growth medium).
- Further delineation of the occurrence and distribution of PAF potential coal reject and actual coal reject materials during the operational phase of the Project through geochemical testing of a broader range of representative samples of these materials.

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- Development of a calibrated total sulfur grid/layer geological/geochemical model consistent with the current geochemical impact assessment and subsequent management plans (e.g. Mine Waste Management Plan).
- Scale-up of leaching tests for PAF materials and alkaline amendment tests as part of operational planning.
- Preferential placement of coal reject materials as backfill deep in the open pits, below the level of the predicted post mining groundwater recovery level, and encapsulation with at least 5 m of benign NAF overburden material, prior to rehabilitation. The emplaced coal reject materials will be a mixture of NAF and PAF materials and should be paddock dumped, dozed, traffic compacted and amended with alkaline material, prior to encapsulation.
- In early mine life whilst no storage capacity is available at the open pits, coal reject materials should be encapsulated in cells by at least 5 m of benign NAF overburden material at the OEAs with operational management methods, such as paddock dumping, dosing, traffic compaction and lime dosing used as described above.
- Provision for treatment of acid water in underground workings (or for water pumped to surface from underground workings) or in the open cut pit may be required, which could include use of a mobile lime dosing plant and/or broadcast application of agricultural lime.
- Development of a Mine Waste Management Plan to provide more details on how mine waste materials will be practically managed during operations.
- Development of a Water Management Plan to include water quality monitoring measures for the Project. The water quality monitoring program should contain geochemical water quality trigger parameters for surface run-off and seepage from the coal stockpile and mine waste storage areas, including pH and salinity with management contingency for lime dosing and management review, as required. Major anions (sulfate, chloride) and cations (calcium, magnesium, sodium and potassium), acidity/alkalinity and the range of soluble metals/metalloids described in this report at **Table B5 (Attachment B)** should also be included in the range of parameters tested in these water samples, initially on a quarterly basis (for 12 months), and then on an annual basis throughout the life of mine.
- Additional overburden testing, including field trials, when the mine is operational and bulk overburden materials become available, so as to determine the best management option for rehabilitation of these materials progressively and during mine closure.
- Whilst the propensity of most coal and coal reject materials from the Project can be managed through the development of a SCMMP, it is recommended that further testing of a wider range of samples be completed during the operational phase of the Project, to further confirm these findings.

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8.0 LIMITATIONS

RGS Environmental Pty Ltd (RGS) has prepared this report for the use of Hansen Bailey and KEPCO as part of the Bylong Coal Project. 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 agreed scope of work described in **Section 1.4**.

This report was prepared from November 2012 to April 2015 and is based on the information provided by Hansen Bailey and KEPCO 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 provide 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 (+61) 7 3344 1222 or (+61) 431 620 623.

Yours sincerely,

RGS ENVIRONMENTAL PTY LTD



Dr. Alan M. Robertson
Principal Geochemist/Director

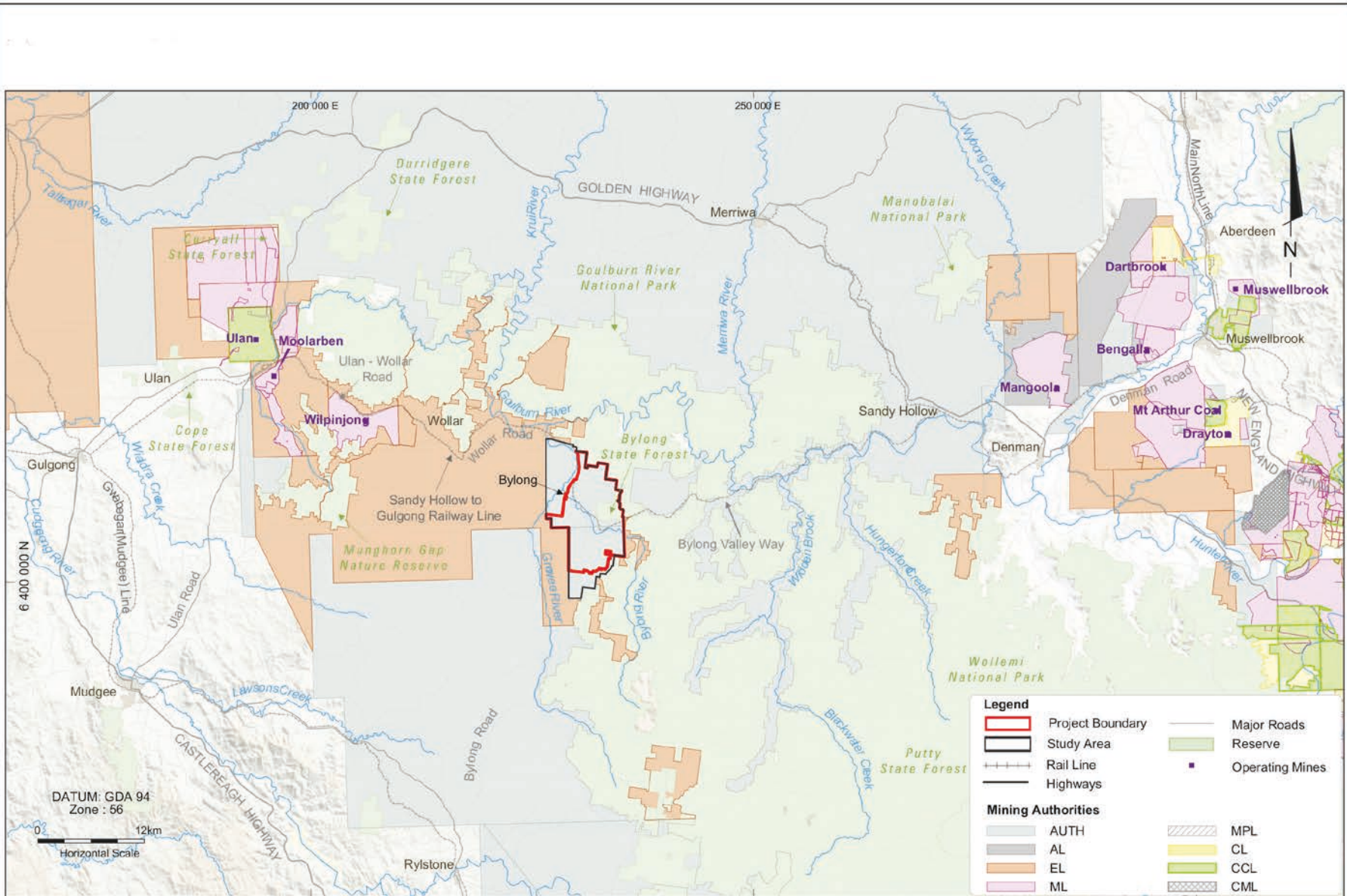
Bylong Coal Project: Geochemical Impact Assessment for Coal and Mining Waste Materials

FIGURES

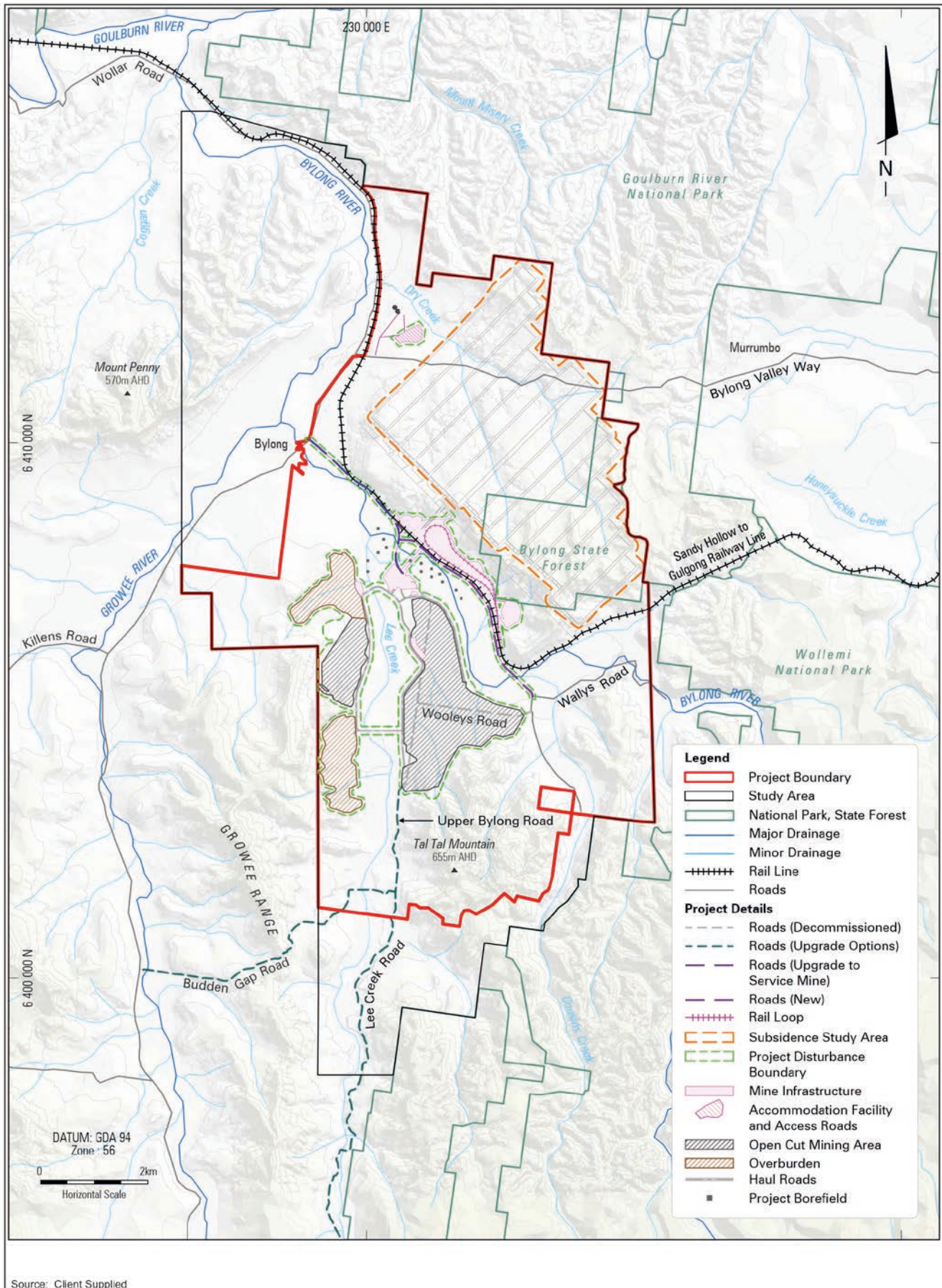
- Figure 1:** Locality Plan
- Figure 2:** Regional Locality
- Figure 3:** Conceptual Project Layout
- Figure 4:** Indicative Stratigraphic Column
- Figure 5a:** Typical Stratigraphic Column - Ulan Seam
- Figure 5b:** Typical Stratigraphic Column - Coggan Seam
- Figure 6:** Drill Holes used in the Geochemical Assessment
- Figure 7a:** Conceptual OEA Design for Storage of Coal Reject Materials
- Figure 7b:** Conceptual In-Pit Design for Storage of Coal Reject Materials

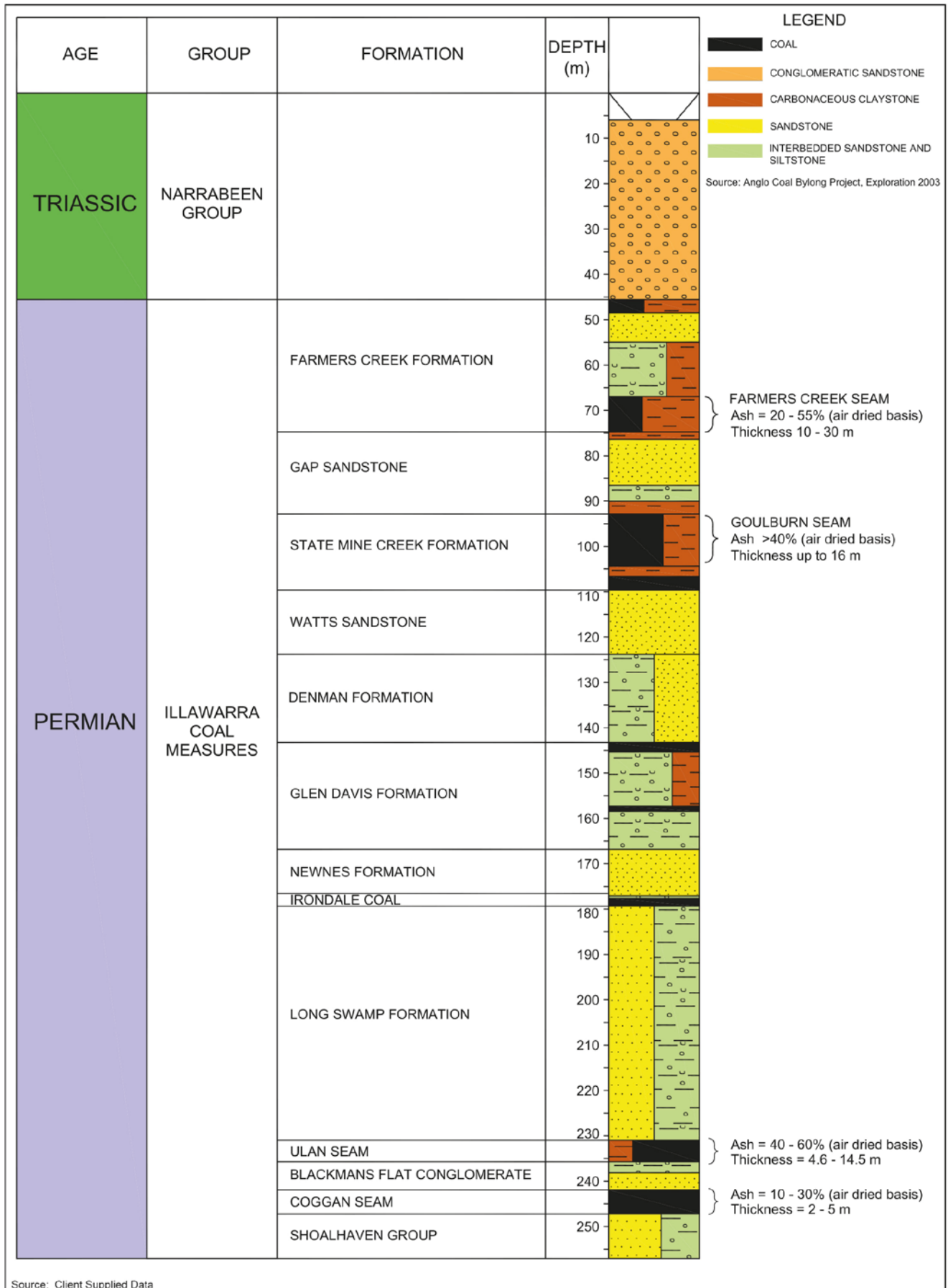


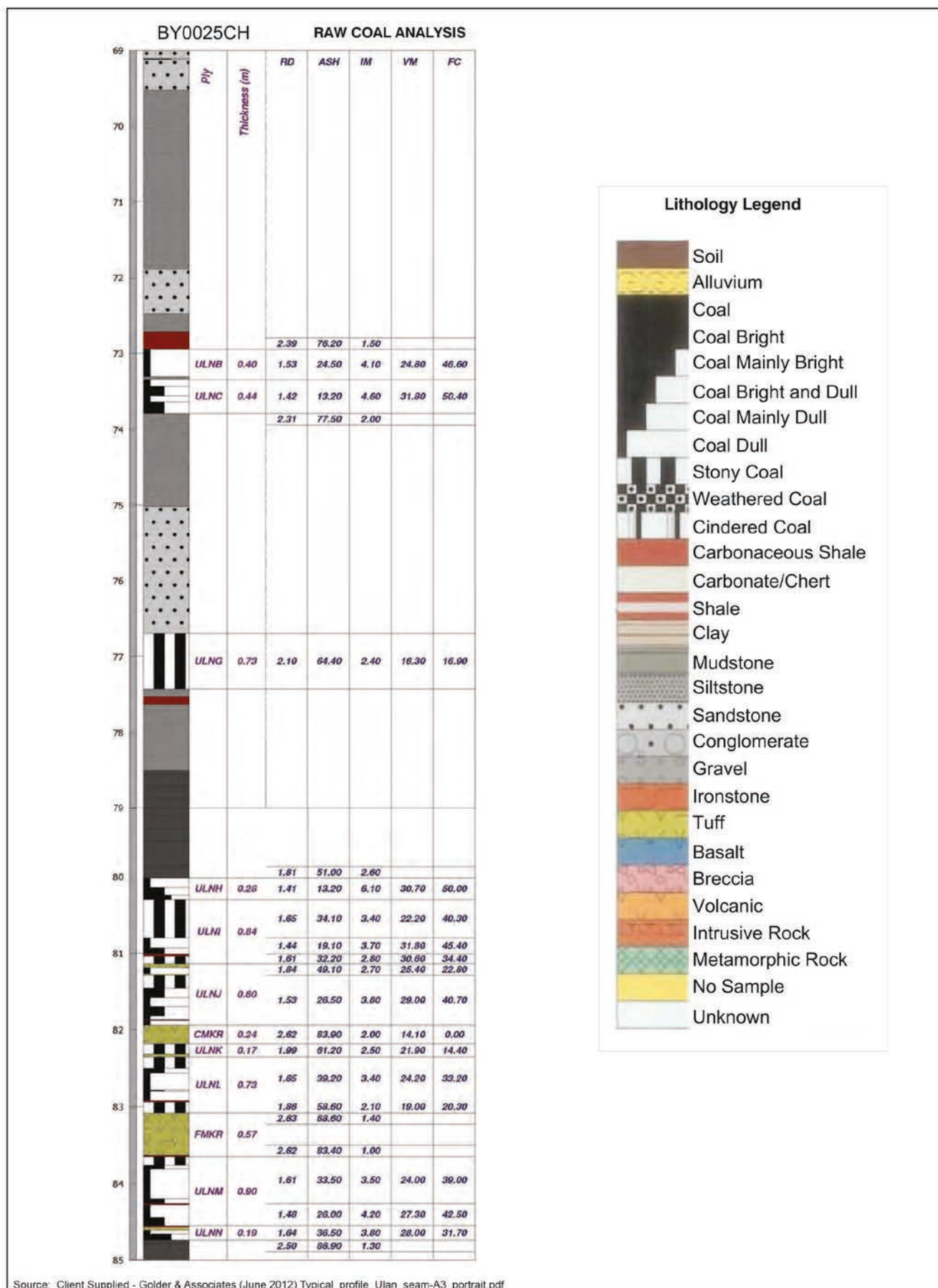
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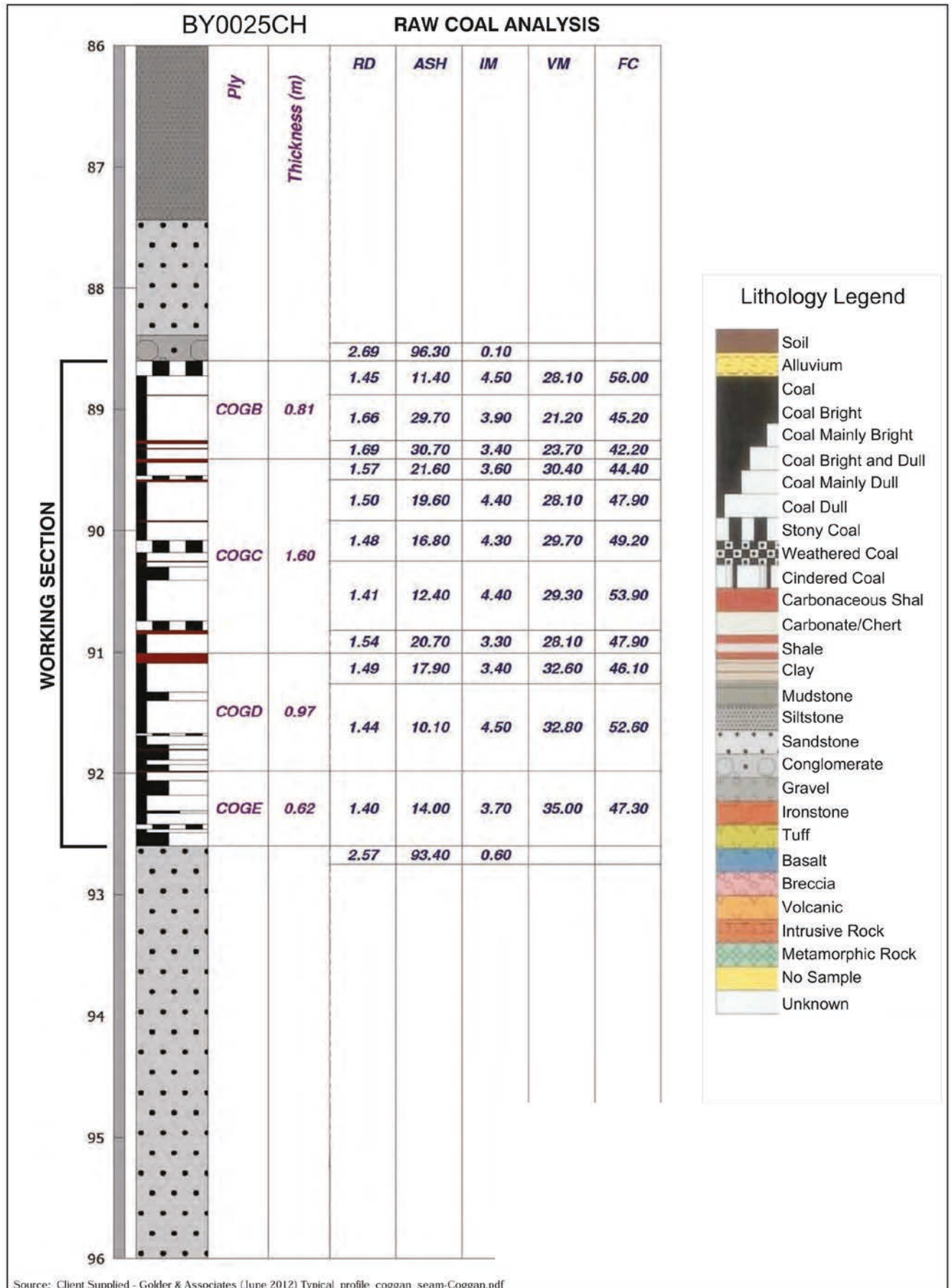


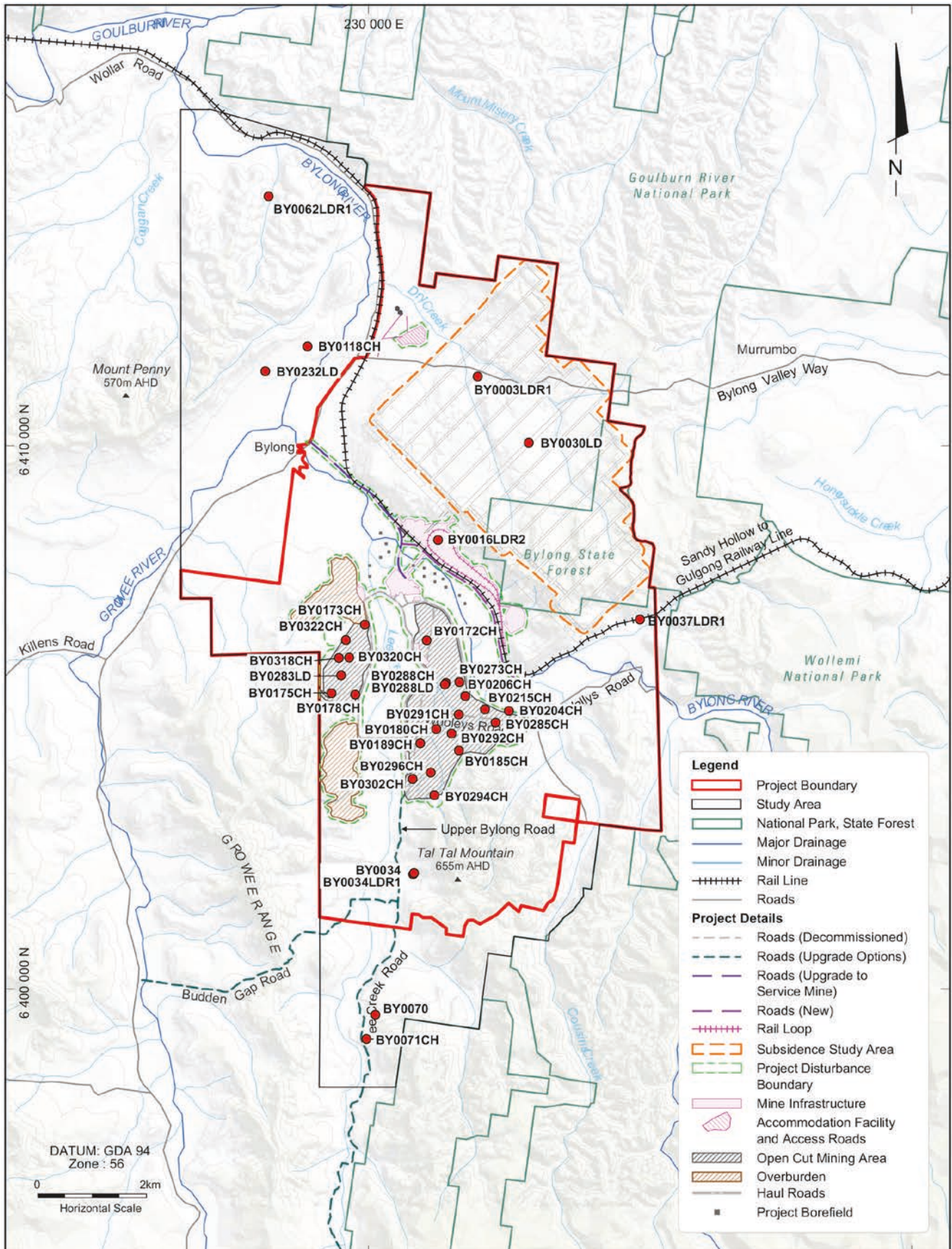
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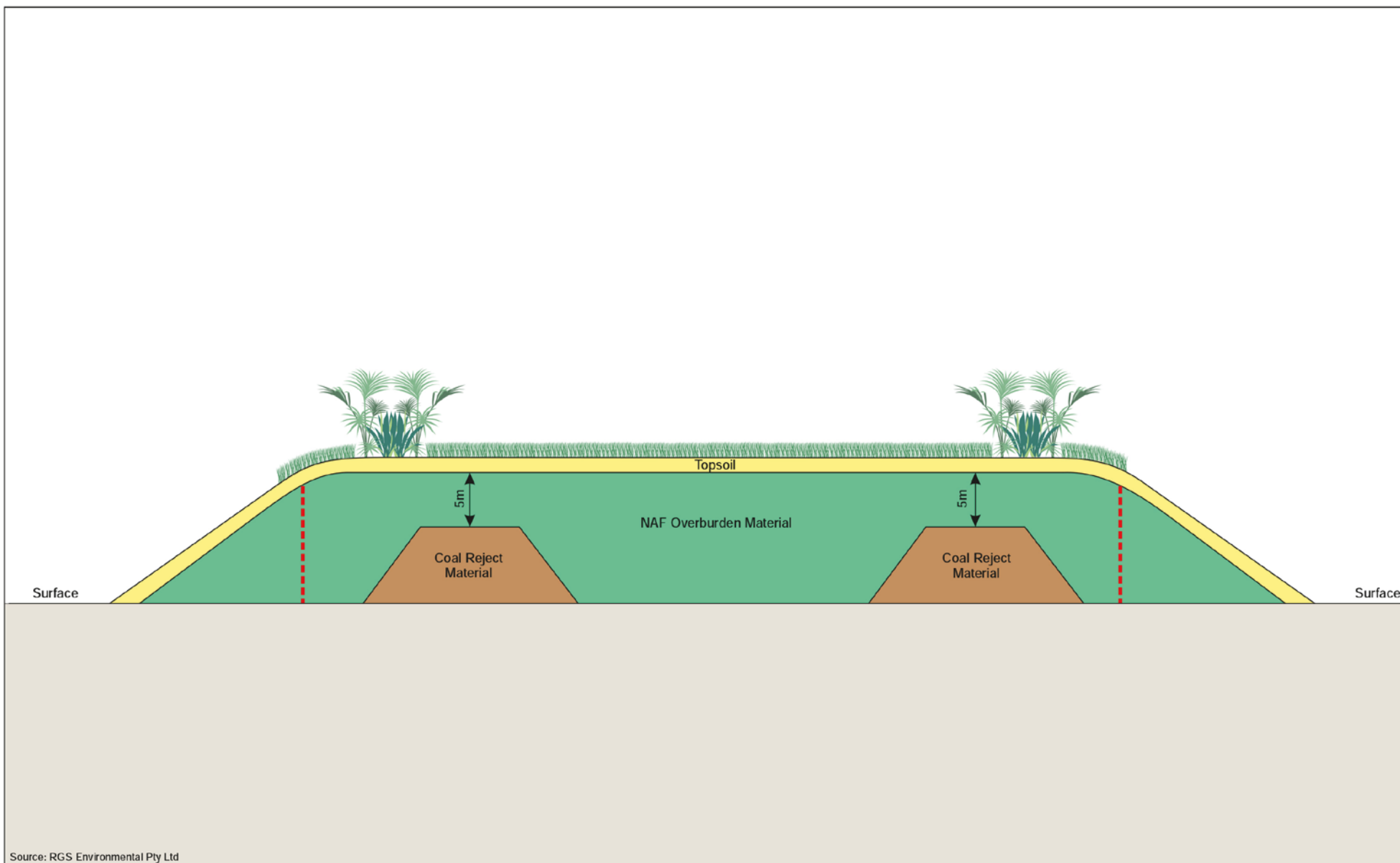








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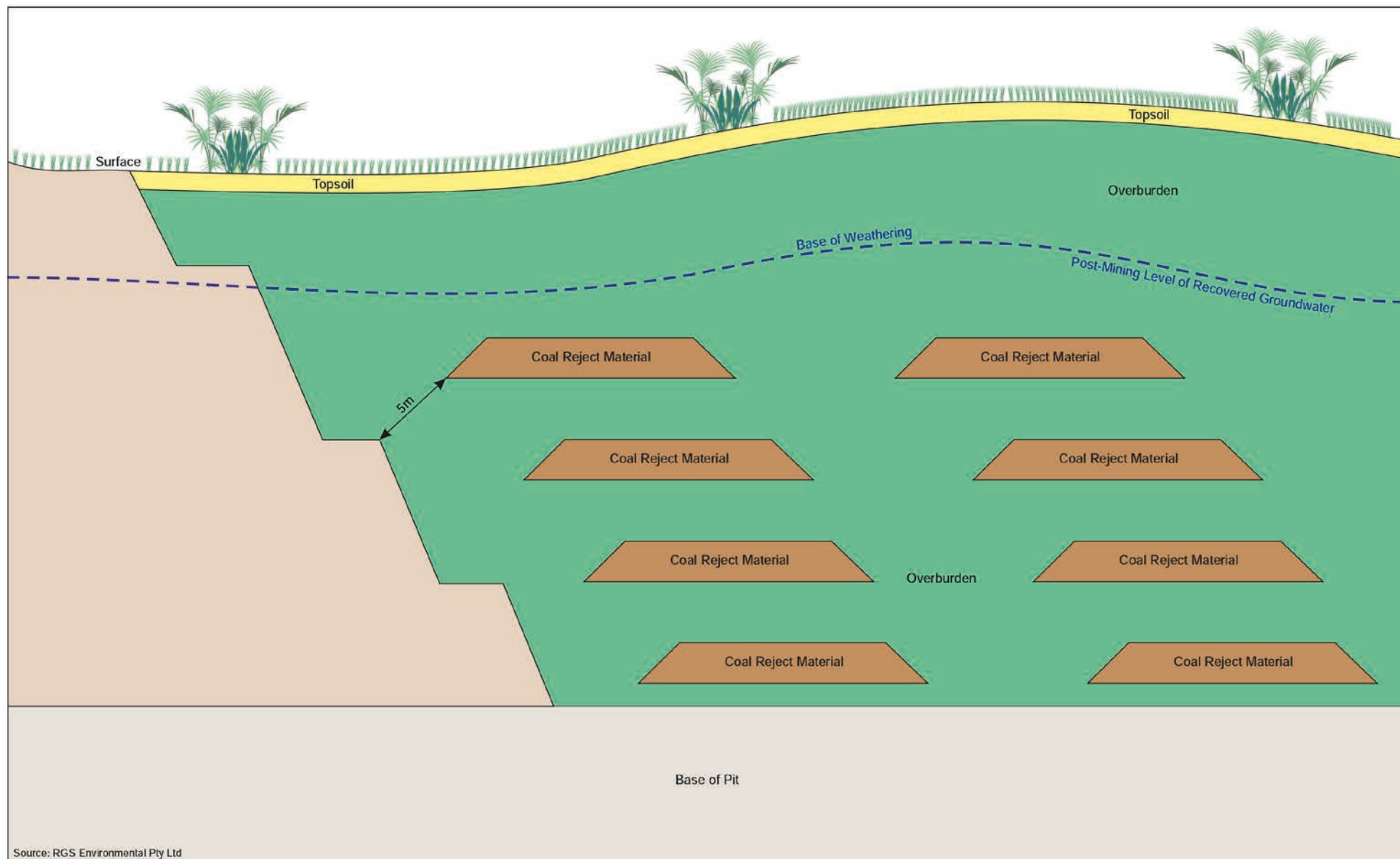
Source: RGS Environmental Pty Ltd

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HANSEN BAILEY
GEOCHEMICAL IMPACT ASSESSMENT
FOR BYLONG COAL PROJECT

Figure: 7a
CONCEPTUAL OEA
DESIGN FOR STORAGE OF
COAL REJECT MATERIALS



Source: RGS Environmental Pty Ltd

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HANSEN BAILEY
 GEOCHEMICAL IMPACT ASSESSMENT
 FOR BYLONG COAL PROJECT

Figure: 7b
 CONCEPTUAL IN-PIT
 DESIGN FOR STORAGE OF
 COAL REJECT MATERIALS

Bylong Coal Project: Geochemical Impact Assessment for Coal and Mining Waste Materials

ATTACHMENT A

Geochemical Assessment of Mining Waste Materials

ATTACHMENT A

GEOCHEMICAL ASSESSMENT OF MINING WASTE MATERIALS

ACID GENERATION AND PREDICTION

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



According to this reaction, the maximum potential acidity (MPA) of a sample containing 1%S as pyrite would be 30.6 kg $\text{H}_2\text{SO}_4/\text{t}$. The chemical components of the acid generation process consist of the above sulfide oxidation reaction, in addition to acid neutralization reactions that also occur, which are mainly provided by inherent carbonates and to a lesser extent silicate materials. The amount and rate of acid generation is determined by the interaction and overall balance of the acid generation and neutralisation components.

Net Acid Producing Potential

The net acid producing potential (NAPP) is used as an indicator of materials that may be of concern with respect to acid generation. The NAPP calculation represents the balance between the maximum potential acidity (MPA) of a sample, which is derived from the sulfide sulfur content, and the acid neutralising capacity (ANC) of the material, which is determined experimentally. By convention, the NAPP result is expressed in units of kg $\text{H}_2\text{SO}_4/\text{t}$ 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, then 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 to atmospheric conditions within a waste emplacement area.

Total Sulfur content and Maximum Potential Acidity (MPA)

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

Acid Neutralising Capacity (ANC)

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

Bylong Coal Project: Geochemical Impact Assessment for Coal and Mining Waste Materials

Net Acid Producing Potential (NAPP)

The NAPP represents the balance between a sample's inherent capacities to generate and neutralise acid, and is calculated using the MPA and ANC results. If the MPA is greater than the ANC then the NAPP is positive. If the MPA is less than the ANC 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 sulfide, followed by the measurement of the pH of the solution, 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 $\text{NAG}_{\text{pH}} < 4.5$) indicates that the sample is potentially acid forming (PAF), whereas a $\text{NAG}_{\text{pH}} > 4.5$ indicates that the sample is non-acid forming (NAF). The NAG 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, and can therefore be used as a direct assessment tool in determining 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 sometimes be used as a stand-alone test at some hard rock mines, but it is recommended that this only be considered after site-specific calibration work has been carried out. The NAG test can generate false positive results for waste materials from coal mines containing elevated organic carbon and is currently not used by RGS for coal mine wastes.

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.

The multi-element composition of solid samples is 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).

The multi-element composition of water extracts from solid samples is also 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.

Bylong Coal Project: Geochemical Impact Assessment for Coal and Mining Waste Materials

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 the addition of alkaline materials.

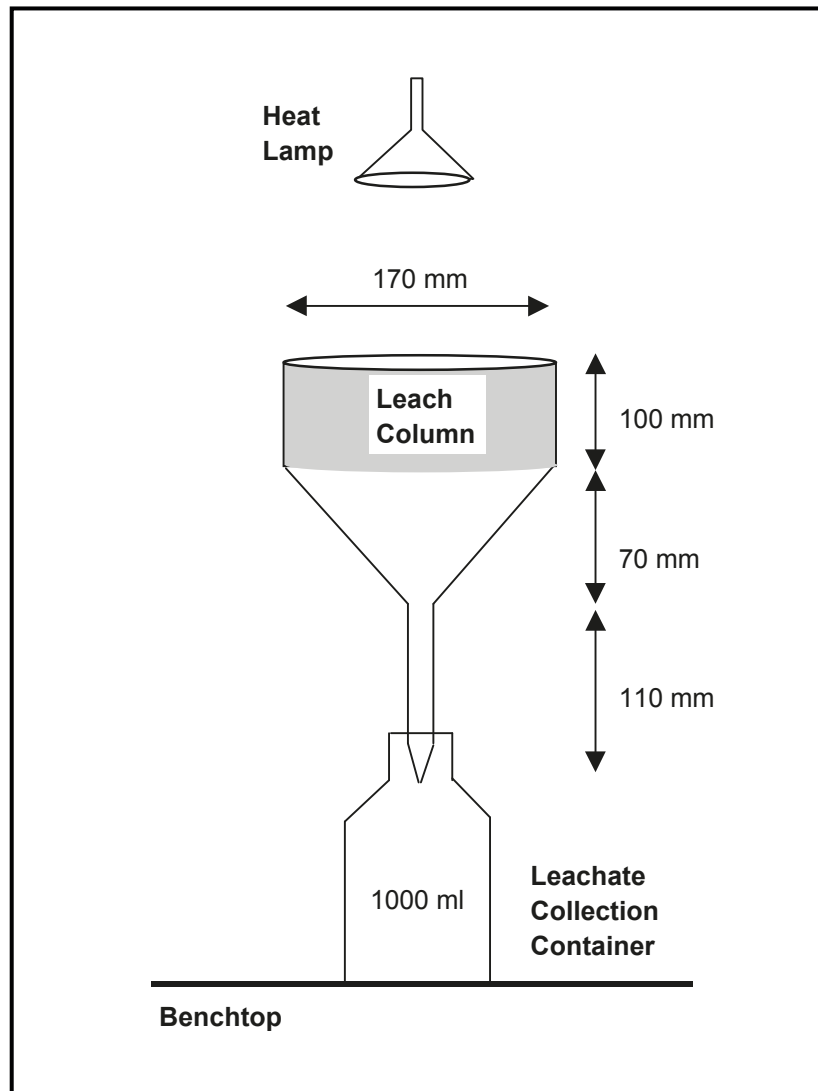
The kinetic tests simulate the weathering process that leads to acid and base generation and reaction under laboratory controlled or site conditions. The kinetic tests allow an assessment of the acid forming characteristics and indicate the rate of acid generation, over what period it will occur, and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

In kinetic column leach tests, water is added to a sample and the mixture allowed to leach the products and by-products of the 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 A1 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, and to ensure adequate oxygen ingress into the sample material. Approximately 2 kg of sample is generally used in the leach columns, and depending on the physical nature of the material, the as-received particle size can be used (*i.e.* no crushing as with process residues), or the sample is crushed to nominal 5-10 mm particle size (as with overburden/interburden).

The sample in the column is initially leached with deionised water at a rate of about 500ml/kg of sample and the initial leachate from the columns collected and analysed. Subsequent column leaching is carried out at a rate of about 500 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°C.

Figure A1
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 B

Tables of Results – Static Geochemical Tests

Table B1:	Acid-Base Account Results for Overburden Materials
Table B2:	Acid-Base Account Results for Potential Coal Reject and Coal Materials
Table B3:	Composite Samples Selected for Static Multi-Element Tests
Table B4:	Multi-Element Results for Selected Composite Samples
Table B5:	Geochemical Abundance Index Results for Selected Composite Samples
Table B6:	Multi-Element Results for Water Extracts from Selected Composite Samples
Table B7:	Composite Samples Selected for Kinetic Leach Column Tests

Table B1: Acid Base Account Results for Overburden Materials

RGS sample No.	ALS Laboratory Number	Client Sample ID	Drill Hole Number	Depth Interval (m)			Lithological Description	Sample Type & Seam Code	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³
				from	to	range				µS/cm	%	kg H2SO4/t					
Overburden																	
1	EB1230893022	00922	BY0034	1.00	13.00	12.00	Gravel, Sandy Clay	Overburden	8.3	155	0.01		0.15	4.7	-4.55	30.69	NAF (Barren)
2	EB1230893016	00916	BY0070	3.00	9.00	6.00	Clay, Mudstone	Overburden	9.0	607	0.01		0.31	189.0	-188.69	617.14	NAF (Barren)
3	EB1230893017	00917	BY0070	10.00	16.00	6.00	Mudstone (70%), Dull Coal (15%), Carbonaceous shale+Tuff (15%)	Overburden + Coal/Tuff (Ulan - ULNG, ULNH, ULNI, ULNJ, CMKR)	8.5	498	0.01		0.15	34.4	-34.25	224.65	NAF (Barren)
4	EB1230893015	00915	BY0071CH	2.00	6.00	4.00	Clay, Siltstone	Overburden	8.3	401	0.02		0.61	119.0	-118.39	194.29	NAF (Barren)
5	EB1230893001	00901	BY0071CH	6.40	6.70	0.30	Sandstone	Overburden	8.7	356	0.01		0.15	3.6	-3.45	23.51	NAF (Barren)
6	EB1230893002	00902	BY0071CH	9.20	9.50	0.30	Sandstone	Overburden	9.3	259	0.01		0.15	48.9	-48.75	319.35	NAF (Barren)
7	EB1230893003	00903	BY0071CH	10.08	10.42	0.34	Siltstone, Carbonaceous shale	Overburden	8.9	545	0.01		0.15	10.3	-10.15	67.27	NAF (Barren)
8	EB1230893004	00904	BY0071CH	11.02	11.32	0.30	Carbonaceous shale	Overburden	8.9	1,130	0.02		0.61	43.7	-43.09	71.35	NAF (Barren)
9	EB1230893005	00905	BY0071CH	14.58	14.98	0.40	Siltstone, Sandstone	Overburden	8.5	363	0.01		0.15	15.1	-14.95	98.61	NAF (Barren)
10	EB1230893027	00927	BY0118CH	1.00	3.00	2.00	Clay	Overburden	7.8	1,130	0.01		0.15	38.0	-37.85	248.16	NAF (Barren)
11	EB1230893028	00928	BY0118CH	4.00	9.00	5.00	Sandstone	Overburden	9.0	379	0.01		0.15	137.0	-136.85	894.69	NAF (Barren)
12	EB1230893029	00929	BY0118CH	10.00	18.00	8.00	Sandstone, Siltstone	Overburden	8.8	315	0.01		0.15	54.0	-53.85	352.65	NAF (Barren)
13	EB1230893030	00930	BY0118CH	19.98	20.47	0.49	Siltstone, Sandstone	Overburden	8.7	439	0.01		0.31	26.8	-26.49	87.51	NAF (Barren)
14	EB1230893031	00931	BY0118CH	22.86	23.16	0.30	Sandstone	Overburden	8.3	452	0.02		0.61	59.5	-58.89	97.14	NAF (Barren)
15	EB1230893032	00932	BY0118CH	27.22	27.59	0.37	Sandstone	Overburden	7.9	513	0.02		0.61	73.8	-73.19	120.49	NAF (Barren)
16	EB1230893033	00933	BY0118CH	30.06	30.43	0.37	Siltstone	Overburden	8.6	366	0.02		0.61	24.4	-23.79	39.84	NAF (Barren)
17	EB1230893034	00934	BY0118CH	32.86	33.23	0.37	Mudstone, Carbonaceous shale	Overburden	8.3	316	0.08		2.45	15.4	-12.95	6.29	NAF (Barren)
18	EB1230893041	00941	BY0118CH	40.58	40.91	0.33	Siltstone	Overburden	9.0	376	0.02		0.61	18.3	-17.69	29.88	NAF (Barren)
19	EB1230893045	00945	BY0118CH	45.11	45.40	0.29	Siltstone	Overburden	8.8	496	0.06		1.84	21.9	-20.06	11.92	NAF (Barren)
20	EB1230893050	00950	BY0118CH	51.54	51.88	0.34	Siltstone	Overburden	9.2	186	0.02		0.61	19.1	-18.49	31.18	NAF (Barren)
21	EB1230893057	00507	BY0118CH	58.72	58.94	0.22	Siltstone	Overburden	8.6	57	0.02		0.61	11.6	-10.99	18.94	NAF (Barren)
22	EB1312228001	GC_001	BY0172CH	2.30	2.54	0.24	Sandstone	Overburden	8.5	92	0.01		0.15	0.7	-0.55	4.57	NAF (Barren)
23	EB1312228002	GC_002	BY0172CH	6.17	6.45	0.28	Siltstone	Overburden	7.9	69	0.04		1.23	4.6	-3.38	3.76	NAF (Barren)
24	EB1312228003	GC_003	BY0172CH	8.61	8.84	0.23	Sandstone	Overburden	8.6	217	0.04		1.23	78.6	-77.38	64.16	NAF (Barren)
25	EB1312228018	GC_0001	BY0175CH	11.67	11.91	0.24	Siltstone	Overburden	8.0	125	0.04		1.23	6.1	-4.88	4.98	NAF (Barren)
26	EB1312228026	GC_001	BY0180CH	5.44	5.76	0.32	Clay, Sandstone	Overburden	7.0	472	0.01		0.15	4.3	-4.15	28.08	NAF (Barren)
27	EB1312228027	GC_002	BY0180CH	7.72	8.01	0.29	Sandstone	Overburden	8.9	232	0.01		0.15	2.6	-2.45	16.98	NAF (Barren)
28	EB1312228028	GC_003	BY0180CH	11.63	11.89	0.26	Siltstone	Overburden	8.0	228	0.01		0.15	4.2	-4.05	27.43	NAF (Barren)
29	EB1312228029	GC_004	BY0180CH	13.99	14.30	0.31	Siltstone	Overburden	8.3	182	0.04		1.23	10.2	-8.98	8.33	NAF (Barren)
30	EB1312228053	GC_001	BY0215CH	19.37	19.57	0.20	Siltstone	Overburden	8.5	260	0.05		1.53	16.8	-15.27	10.97	NAF (Barren)

Table B1: Acid Base Account Results for Overburden Materials

RGS sample No.	ALS Laboratory Number	Client Sample ID	Drill Hole Number	Depth Interval (m)			Lithological Description	Sample Type & Seam Code	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³
				from	to	range				µS/cm	%	kg H2SO4/t					
31	EB1326314001	GC_001	BY0273CH	6.56	6.91	0.35	Sandstone	Overburden	8.8	163	0.01		0.15	96.5	-96.35	630.20	NAF (Barren)
32	EB1326314009	GC_001	BY0291BH	7.84	8.36	0.52	Mudstone	Overburden	8.4	311	0.01		0.15	6.1	-5.95	39.84	NAF (Barren)
33	EB1326314010	GC_002	BY0291BH	15.30	15.99	0.69	Siltstone	Overburden	8.9	247	0.04		1.23	15.7	-14.48	12.82	NAF (Barren)
34	EB1326314011	GC_003	BY0291BH	20.75	21.11	0.36	Sandstone	Overburden	9.0	214	0.01		0.15	41.4	-41.25	270.37	NAF (Barren)
35	EB1326314017	GC_001	BY0292CH	17.45	17.71	0.26	Sandstone	Overburden	8.0	616	0.01		0.15	2.0	-1.85	13.06	NAF (Barren)
36	EB1326314018	GC_002	BY0292CH	28.86	29.25	0.39	Sandstone	Overburden	8.4	145	0.03		0.92	11.3	-10.38	12.30	NAF (Barren)
37	EB1326314019	GC_003	BY0292CH	32.83	33.07	0.24	Sandstone	Overburden	8.6	132	0.03		0.92	15.5	-14.58	16.87	NAF (Barren)
38	EB1326314022	GC_001	BY0294CH	15.91	16.17	0.26	Sandstone	Overburden	8.3	184	0.04		1.23	13.6	-12.38	11.10	NAF (Barren)
39	EB1326314023	GC_002	BY0294CH	26.17	26.38	0.21	Sandstone	Overburden	8.9	173	0.03		0.92	77.7	-76.78	84.57	NAF (Barren)
40	EB1326314024	GC_003	BY0294CH	37.34	37.57	0.23	Siltstone	Overburden	8.8	128	0.04		1.23	8.4	-7.18	6.86	NAF (Barren)
41	EB1326314025	GC_004	BY0294CH	51.13	51.32	0.19	Siltstone	Overburden	8.9	118	0.03		0.92	17.0	-16.08	18.50	NAF (Barren)
42	EB1326314029	GC_001	BY0296CH	22.45	22.60	0.15	Sandstone	Overburden	9.0	291	0.02		0.61	62.6	-61.99	102.20	NAF (Barren)
43	EB1326314030	GC_002	BY0296CH	34.74	34.97	0.23	Mudstone	Overburden	8.6	113	0.04		1.23	12.3	-11.08	10.04	NAF (Barren)
44	EB1326314031	GC_003	BY0296CH	40.81	41.14	0.33	Sandstone	Overburden	8.2	78	0.01		0.15	3.4	-3.25	22.20	NAF (Barren)
45	EB1326314032	GC_004	BY0296CH	49.89	50.06	0.17	Sandstone	Overburden	9.0	148	0.01		0.15	72.4	-72.25	472.82	NAF (Barren)
46	EB1326314035	GC_001	BY0302CH	8.26	8.60	0.34	Sandstone	Overburden	7.8	70	0.01		0.15	0.3	-0.10	1.63	NAF (Barren)
47	EB1329006001	GC_001	BY0318CH	12.20	12.38	0.18	Sandstone	Overburden	7.4	165	0.04		1.23	19.2	-17.98	15.67	NAF (Barren)
48	EB1329006009	GC_001	BY0322CH	11.53	11.85	0.32	Sandstone	Overburden	9.0	509	0.23	0.005	0.15	169.0	-168.85	1103.7	NAF (Barren)
Interburden																	
49	EB1230893023	00923	BY0034	14.00	20.00	6.00	Siltstone, Dull Coal, Tuff	Interburden	7.8	355	0.05		1.53	16.0	-14.47	10.45	NAF (Barren)
50	EB1230893024	00924	BY0034	21.00	24.00	3.00	Sandstone, Dull Coal	Interburden	6.8	608	0.07		2.14	5.9	-3.76	2.75	NAF (Barren)
51	EB1230893021	00921	BY0070	27.00	33.00	6.00	Sandstone, Siltstone	Interburden	7.9	822	0.14		4.29	97.0	-92.71	22.62	NAF
52	EB1230893011	00911	BY0071CH	25.92	26.23	0.31	Sandstone	Interburden	6.9	219	0.01		0.15	1.9	-1.75	12.41	NAF (Barren)
53	EB1230893014	00914	BY0071CH	32.54	33.00	0.46	Sandstone	Interburden	7.8	1,540	0.22	0.003	0.08	39.6	-39.52	517.22	NAF (Barren)
54	EB1230893061	00511	BY0118CH	63.38	63.68	0.30	Sandstone	Interburden	8.7	321	0.01		0.31	75.0	-74.69	244.90	NAF (Barren)
55	EB1230893062	00512	BY0118CH	64.30	64.50	0.20	Carbonaceous shale	Interburden	7.9	145	0.21	0.008	0.25	11.8	-11.56	48.16	NAF (Barren)
56	EB1230893063	00513	BY0118CH	65.52	65.87	0.35	Siltstone, Sandstone	Interburden	8.5	305	0.02		0.61	65.5	-64.89	106.94	NAF (Barren)
57	EB1230893071	00521	BY0118CH	75.50	75.86	0.36	Sandstone	Interburden	8.4	248	0.01		0.15	39.4	-39.25	257.31	NAF (Barren)
58	EB1312228004	GC_004	BY0172CH	14.76	15.00	0.24	Mudstone	Interburden	5.7	868	0.51	0.201	6.16	19.1	-12.94	3.10	NAF
59	EB1312228005	GC_005	BY0172CH	18.54	18.86	0.32	Sandstone	Interburden	8.1	123	0.03		0.92	24.5	-23.58	26.67	NAF (Barren)
60	EB1312228011	GC_011	BY0172CH	38.99	39.27	0.28	Sandstone	Interburden	7.9	660	0.10		3.06	28.1	-25.04	9.18	NAF (Barren)
61	EB1312228012	GC_012	BY0172CH	46.57	46.91	0.34	Siltstone	Interburden	7.8	697	0.13		3.98	17.5	-13.52	4.40	NAF
62	EB1312228013	GC_013	BY0172CH	51.34	51.62	0.28	Sandstone	Interburden	7.7	2,010	1.49	0.433	13.26	130.0	-116.74	9.80	NAF
63	EB1312228014	GC_014	BY0172CH	53.65	54.94	1.29	Sandstone, Siltstone	Interburden	8.4	448	0.11		3.37	418.0	-414.63	124.08	NAF
64	EB1312228015	GC_015	BY0172CH	58.52	58.86	0.34	Siltstone	Interburden	8.0	756	0.35		10.72	22.1	-11.38	2.06	NAF
65	EB1312228016	GC_0001	BY0173CH	23.46	23.78	0.32	Sandstone	Interburden	8.8	218	0.06		1.84	88.9	-87.06	48.38	NAF (Barren)

Table B1: Acid Base Account Results for Overburden Materials

RGS sample No.	ALS Laboratory Number	Client Sample ID	Drill Hole Number	Depth Interval (m)			Lithological Description	Sample Type & Seam Code	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³
				from	to	range				µS/cm	%	kg H2SO4/t					
66	EB1312228033	GC_008	BY0180CH	21.31	21.54	0.23	Sandstone	Interburden	8.7	204	0.04		1.23	73.7	-72.48	60.16	NAF (Barren)
67	EB1312228034	GC_009	BY0180CH	23.43	23.72	0.29	Carbonaceous shale	Interburden	7.0	341	0.49	0.275	8.42	9.6	-1.18	1.14	Uncertain
68	EB1312228035	GC_010	BY0180CH	25.88	26.18	0.30	Sandstone	Interburden	8.8	218	0.04		1.23	116.0	-114.78	94.69	NAF (Barren)
69	EB1312228045	GC_020	BY0180CH	45.91	46.25	0.34	Sandstone	Interburden	7.4	1,290	0.63	0.387	11.85	84.0	-72.15	7.09	NAF
70	EB1312228046	GC_021	BY0180CH	48.53	48.81	0.28	Siltstone	Interburden	7.7	489	0.47	0.328	10.05	6.3	3.75	0.63	Uncertain
71	EB1312228047	GC_022	BY0180CH	51.49	51.80	0.31	Sandstone	Interburden	8.3	380	0.47		14.39	150.0	-135.61	10.42	NAF
72	EB1312228048	GC_023	BY0180CH	54.59	54.87	0.28	Sandstone	Interburden	8.1	623	0.52		15.93	51.0	-35.08	3.20	NAF
73	EB1312228049	GC_024	BY0180CH	56.04	56.37	0.33	Siltstone, Sandstone	Interburden	8.0	732	0.13		3.98	47.2	-43.22	11.86	NAF
74	EB1312228050	GC_025	BY0180CH	60.69	60.98	0.29	Siltstone	Interburden	7.6	1,410	0.53	0.292	8.94	15.4	-6.46	1.72	NAF
75	EB1312228051	GC_026	BY0180CH	64.17	64.42	0.25	Sandstone	Interburden	8.6	570	0.33		10.11	80.0	-69.89	7.92	NAF
76	EB1312228052	GC_027	BY0180CH	68.83	69.09	0.26	Siltstone	Interburden	8.4	656	0.31		9.49	542.0	-532.51	57.09	NAF
77	EB1312228054	GC_002	BY0215CH	26.34	26.56	0.22	Sandstone	Interburden	8.6	198	0.04		1.23	25.8	-24.58	21.06	NAF (Barren)
78	EB1326314002	GC_002	BY0273CH	17.02	17.35	0.33	Sandstone	Interburden	8.3	114	0.02		0.61	13.8	-13.19	22.53	NAF (Barren)
79	EB1326314003	GC_004	BY0273CH	22.25	22.53	0.28	Sandstone	Interburden	8.7	161	0.03		0.92	53.2	-52.28	57.90	NAF (Barren)
80	EB1326314004	GC_005	BY0273CH	34.77	35.08	0.31	Sandstone	Interburden	8.3	118	0.03		0.92	9.6	-8.68	10.45	NAF (Barren)
81	EB1326314006	GC_001	BY0288CH	12.79	13.16	0.37	Sandstone	Interburden	9.0	193	0.03		0.92	143.0	-142.08	155.65	NAF (Barren)
82	EB1326314007	GC_002	BY0288CH	18.05	18.38	0.33	Sandstone	Interburden	8.5	165	0.04		1.23	9.1	-7.88	7.43	NAF (Barren)
83	EB1326314008	GC_003	BY0288CH	29.17	29.48	0.31	Sandstone	Interburden	8.0	167	0.04		1.23	11.4	-10.18	9.31	NAF (Barren)
84	EB1326314012	GC_004	BY0291BH	28.92	29.35	0.43	Siltstone	Interburden	8.5	121	0.01		0.31	32.7	-32.39	106.78	NAF (Barren)
85	EB1326314013	GC_005	BY0291BH	32.97	33.47	0.50	Sandstone	Interburden	9.1	200	0.03		0.92	157.0	-156.08	170.88	NAF (Barren)
86	EB1326314014	GC_006	BY0291BH	38.91	39.24	0.33	Siltstone	Interburden	8.6	129	0.03		0.92	18.0	-17.08	19.59	NAF (Barren)
87	EB1326314015	GC_007	BY0291BH	47.49	47.86	0.37	Conglomerate	Interburden	8.7	93	0.06		1.84	2.3	-0.46	1.25	NAF (Barren)
88	EB1326314020	GC_004	BY0292CH	40.45	40.72	0.27	Sandstone	Interburden	8.6	178	0.01		0.31	42.1	-41.79	137.47	NAF (Barren)
89	EB1326314021	GC_005	BY0292CH	57.85	58.19	0.34	Sandstone	Interburden	7.9	119	0.03		0.92	6.1	-5.18	6.64	NAF (Barren)
90	EB1326314026	GC_005	BY0294CH	70.01	70.30	0.29	Sandstone	Interburden	8.4	96	0.03		0.92	15.6	-14.68	16.98	NAF (Barren)
91	EB1326314027	GC_006	BY0294CH	83.92	84.09	0.17	Sandstone	Interburden	7.8	65	0.01		0.31	4.3	-3.99	14.04	NAF (Barren)
92	EB1326314033	GC_005	BY0296CH	66.25	66.47	0.22	Sandstone	Interburden	8.0	116	0.03		0.92	10.0	-9.08	10.88	NAF (Barren)
93	EB1326314036	GC_002	BY0302CH	19.38	19.74	0.36	Sandstone	Interburden	7.9	83	0.03		0.92	14.8	-13.88	16.11	NAF (Barren)
94	EB1326314037	GC_003	BY0302CH	22.60	22.91	0.31	Siltstone	Interburden	7.8	206	0.04		1.23	14.8	-13.58	12.08	NAF (Barren)
95	EB1326314038	GC_004	BY0302CH	30.27	30.61	0.34	Siltstone	Interburden	8.0	178	0.04		1.23	5.7	-4.48	4.65	NAF (Barren)
96	EB1329006002	GC_002	BY0318CH	14.40	14.63	0.23	Sandstone	Interburden	6.9	94	0.05		1.53	15.8	-14.27	10.32	NAF (Barren)
97	EB1329006003	GC_003	BY0318CH	20.61	20.89	0.28	Sandstone	Interburden	8.0	93	0.04		1.23	3.3	-2.08	2.69	NAF (Barren)
98	EB1329006005	GC_001	BY0320CH	10.76	10.98	0.22	Sandstone	Interburden	7.9	108	0.04		1.23	15.4	-14.18	12.57	NAF (Barren)
99	EB1329006006	GC_002	BY0320CH	17.61	17.81	0.20	Sandstone	Interburden	7.8	40	0.06		1.84	3.5	-1.66	1.90	NAF (Barren)
100	EB1329006007	GC_003	BY0320CH	19.42	19.61	0.19	Sandstone	Interburden	7.3	145	0.14	0.027	0.83	3.4	-2.57	4.11	NAF

Table B1: Acid Base Account Results for Overburden Materials

RGS sample No.	ALS Laboratory Number	Client Sample ID	Drill Hole Number	Depth Interval (m)			Lithological Description	Sample Type & Seam Code	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³
				from	to	range				µS/cm	%	kg H2SO4/t					
101	EB1329006010	GC_002	BY0322CH	17.63	17.92	0.29	Siltstone	Interburden	8.4	99	0.01		0.31	15.7	-15.39	51.27	NAF (Barren)
102	EB1329006011	GC_003	BY0322CH	23.84	24.08	0.24	Siltstone	Interburden	8.4	37	0.01		0.31	3.8	-3.49	12.41	NAF (Barren)
103	EB1329006012	GC_004	BY0322CH	26.38	26.76	0.38	Siltstone	Interburden	8.6	117	0.01		0.15	21.8	-21.65	142.37	NAF (Barren)
Uneconomic Seam - Coal + Roof + Floor																	
104	EB1312228030	GC_005	BY0180CH	15.63	16.01	0.38	Sandstone, Siltstone	Roof (Unec. Seam) - GDI	8.2	180	0.03		0.92	8.3	-7.38	9.03	NAF (Barren)
105	EB1230893035	00935	BY0118CH	34.45	34.85	0.40	Siltstone	Roof (Unec. Seam) - GDA	9.1	531	0.01		0.15	15.9	-15.75	103.84	NAF (Barren)
106	EB1230893038	00938	BY0118CH	36.00	36.32	0.32	Siltstone, Carbonaceous shale	Roof (Unec. Seam) - GDB	8.7	294	0.06		1.84	75.7	-73.86	41.20	NAF (Barren)
107	EB1230893042	00942	BY0118CH	43.18	43.54	0.36	Tuff, Carbonaceous Mudstone	Roof (Unec. Seam) - GDD	9.7	781	0.11		3.37	30.8	-27.43	9.14	NAF
108	EB1230893046	00946	BY0118CH	46.60	46.94	0.34	Mudstone, Tuff	Roof (Unec. Seam) - GDE	9.3	733	0.10		3.06	15.8	-12.74	5.16	NAF (Barren)
109	EB1230893049	00949	BY0118CH	49.10	49.40	0.30	Carbonaceous shale, Mudstone	Roof (Unec. Seam) - GDF	8.6	516	0.12		3.68	23.0	-19.33	6.26	NAF
110	EB1230893051	00501	BY0118CH	53.17	53.47	0.30	Siltstone	Roof (Unec. Seam) - GDG	9.1	161	0.03		0.92	18.9	-17.98	20.57	NAF (Barren)
111	EB1230893054	00504	BY0118CH	54.43	54.81	0.38	Carbonaceous shale, Siltstone	Roof (Unec. Seam) - GDJ	8.8	118	0.21		6.43	14.8	-8.37	2.30	NAF
112	EB1230893036	00936	BY0118CH	35.09	35.35	0.26	Coal, Carbonaceous shale	Coal (Unec. Seam) - GDA	8.8	238	0.37	0.006	0.18	42.3	-42.12	230.20	NAF (Barren)
113	EB1230893039	00939	BY0118CH	36.52	36.90	0.38	Coal, Tuff, Carbonaceous shale	Coal (Unec. Seam) - GDB	9.0	338	0.26	0.007	0.21	8.8	-8.59	41.05	NAF (Barren)
114	EB1230893043	00943	BY0118CH	43.54	44.16	0.62	Coal, Carbonaceous shale	Coal (Unec. Seam) - GDD	8.6	108	0.34	0.006	0.18	19.4	-19.22	105.58	NAF (Barren)
115	EB1230893047	00947	BY0118CH	46.94	47.30	0.36	Coal, Siltstone	Coal (Unec. Seam) - GDE	9.3	235	0.28		8.58	193.0	-184.43	22.51	NAF
116	EB1230893052	00502	BY0118CH	53.47	53.96	0.49	Coal, Carbonaceous shale	Coal (Unec. Seam) - GDG	8.1	60	0.27	0.003	0.08	10.1	-10.02	131.92	NAF (Barren)
117	EB1230893055	00505	BY0118CH	54.81	55.12	0.31	Coal (Stony)	Coal (Unec. Seam) - GDJ	8.7	114	0.22		6.74	385.0	-378.26	57.14	NAF
118	EB1230893037	00937	BY0118CH	35.35	35.65	0.30	Siltstone	Floor (Unec. Seam) - GDA	8.7	392	0.03		0.92	17.2	-16.28	18.72	NAF (Barren)
119	EB1230893040	00940	BY0118CH	37.20	37.50	0.30	Siltstone	Floor (Unec. Seam) - GDB	8.9	359	0.02		0.61	22.8	-22.19	37.22	NAF (Barren)
120	EB1230893044	00944	BY0118CH	44.16	44.56	0.40	Siltstone	Floor (Unec. Seam) - GDD	8.7	435	0.05		1.53	21.5	-19.97	14.04	NAF (Barren)

Table B1: Acid Base Account Results for Overburden Materials

RGS sample No.	ALS Laboratory Number	Client Sample ID	Drill Hole Number	Depth Interval (m)			Lithological Description	Sample Type & Seam Code	pH ¹	EC ¹ µS/cm	Total S %	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³
				from	to	range											
121	EB1230893048	00948	BY0118CH	47.30	47.72	0.42	Carbonaceous shale, Siltstone	Floor (Unec. Seam) - GDE	9.4	376	0.10		3.06	38.6	-35.54	12.60	NAF (Barren)
122	EB1230893053	00503	BY0118CH	53.96	54.28	0.32	Siltstone	Floor (Unec. Seam) - GDE	8.8	117	0.07		2.14	10.6	-8.46	4.94	NAF (Barren)
123	EB1230893056	00506	BY0118CH	55.12	55.36	0.24	Siltstone	Floor (Unec. Seam) - GDJ	8.4	238	0.03		0.92	72.5	-71.58	78.91	NAF (Barren)
Spoil Composites - Ulan Seam																	
124	EB1329921004	W_0014_16	BY0172CH	23.44	23.71	0.27	mixed coal (Ulan seam) + spoil	composite	7.6	690	0.10		3.06	115.0	-111.94	37.55	NAF (Barren)
125	EB1329921006	W_0019_20	BY0172CH	24.90	25.18	0.28	mixed coal (Ulan seam) + spoil	composite	4.5	234	0.09		2.76	4.6	-1.84	1.67	NAF (Barren)
126	EB1329921007	W_0012_15	BY0175CH	29.50	30.81	1.31	mixed coal (Ulan seam) + spoil	composite	7.5	392	0.21		6.43	43.8	-37.37	6.81	NAF
127	EB1329921010	W_0008_11	BY0178CH	10.59	11.79	1.20	mixed coal (Ulan seam) + spoil	composite	7.0	228	0.23	0.026	0.80	11.2	-10.40	14.07	NAF (Barren)
128	EB1329921001	W_0009_17	BY0180CH	31.37	34.29	2.92	mixed coal (Ulan seam) + spoil	composite	6.5	462	0.04		1.23	22.7	-21.48	18.53	NAF (Barren)
129	EB1330966001	21 to 33	BY0185CH	67.66	72.04	4.38	mixed coal (Ulan seam) + spoil	composite	9.3	96	0.18		5.51	32.2	-26.69	5.84	NAF
130	EB1330966002	1 to 12	BY0189CH	16.24	23.99	7.75	mixed coal (Ulan seam) + spoil	composite	8.5	83	0.26	0.042	1.29	10.2	-8.91	7.93	NAF (Barren)
131	EB1330966003	14 to 25	BY0206CH	32.07	34.86	2.79	mixed coal (Ulan seam) + spoil	composite	9.0	117	0.19		5.82	32.4	-26.58	5.57	NAF

Notes:

1. Current pH and electrical conductivity (EC) provided for 1:5 sample:water extracts
2. Scr = Chromium reducible sulfur; MPA = Maximum potential acidity; ANC = Acid neutralising capacity; NAPP = Net acid producing potential
3. Sample classification based on total sulfur, Scr, NAPP, ANC:MPA ratio data as described in the report text

Table B2: Acid Base Account Results for Potential Coal Reject and Coal Materials

RGS sample No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification
						from	to	range				µS/cm	%	kg H2SO4/t					
ULAN SEAM																			
Roof/Parting/Floor																			
1	EB1306433002	2001259202	MU1386-46	BY0003LDR1	RC1305-9101	composite			ULNBC-RF + ULN-RF + ULMN-RF	Roof Composite (Ulan)	8.5	139	0.16	0.065	1.99	9.5	-7.51	4.77	NAF (Barren)
2	EB1306433003	2001259202	MU1386-47	BY0003LDR1	RC1305-9102	composite			ULNBC-FLR + ULNJ-01 + ULMN-FLR	Floor Composite (Ulan)	9.3	120	0.31		9.49	39.5	-30.01	4.16	NAF
3	EB1302369002	2001294402	MU1386-10	BY0016LDR2	N/A	27.45	28.01	0.56	ULNH-01	Roof (Ulan)	5.2	163	0.38	0.113	3.46	1.3	2.16	0.38	Uncertain
4	EB1302369003	2001294402	MU1386-11	BY0016LDR2	N/A	29.39	30.14	0.75	ULNJ-01	Floor (Ulan)	6.8	307	0.34	0.252	7.72	7.2	0.52	0.93	Uncertain
5	EB1306433012	2001259302	MU1386-58	BY0037LDR1	RC1305-4138	109.14	109.24	0.10	ULNM-RF	Roof (Ulan)	9.1	86	0.16		4.90	27.3	-22.40	5.57	NAF
6	EB1306433013	2001259302	MU1386-59	BY0037LDR1	RC1305-4153	110.57	110.67	0.10	ULNN-FLR	Floor (Ulan)	8.8	62	0.05		1.53	5.6	-4.07	3.66	NAF (Barren)
7	EB1306744002	2001279002	MU1386-73	BY0062LDR1	RC1306-2011	127.39	127.49	0.10	ULNM-RF	Roof (Ulan)	7.0	21	0.29		8.88	27.5	-18.62	3.10	NAF
8	EB1306744003	2001279002	MU1386-74	BY0062LDR1	RC1306-2012	128.50	128.91	0.41	ULNN-01	Floor (Ulan)	7.3	16	0.07		2.14	4.6	-2.46	2.15	NAF (Barren)
9	EB1230893019	- N/A -	00919	BY0070	- N/A -	20.00	23.00	3.00	Sandstone (60%), Siltstone (25%), Dull Coal (15%)	Parting (Ulan: UCSIL, UCSAN) + Roof (COGB)	8.3	259	0.03		0.92	9.5	-8.58	10.34	NAF (Barren)
10	EB1230893006	- N/A -	00906	BY0071CH	- N/A -	15.20	15.50	0.30	Siltstone (70%), Coal (30%)	Roof (Ulan: ULNG)	8.0	474	0.005		0.15	5.7	-5.55	37.22	NAF (Barren)
11	EB1230893007	- N/A -	00907	BY0071CH	- N/A -	15.71	16.01	0.30	Siltstone (70%), Sandstone (30%)	Floor (Ulan: ULNG)	8.0	492	0.005		0.15	4.0	-3.85	26.12	NAF (Barren)
12	EB1230893008	- N/A -	00908	BY0071CH	- N/A -	18.20	18.50	0.30	Coal+Mudstone (50%), Siltstone (35%), Sandstone (15%)	Roof (Ulan: ULHJ)	7.7	351	0.005		0.15	4.8	-4.65	31.35	NAF (Barren)
13	EB1230893009	- N/A -	00909	BY0071CH	- N/A -	20.70	21.02	0.32	Tuff (100%)	Parting (Ulan - FMKR ply)	8.4	437	0.05		1.53	3.1	-1.57	2.02	NAF (Barren)
14	EB1230893010	- N/A -	00910	BY0071CH	- N/A -	22.96	23.26	0.30	Siltstone (100%)	Floor (Ulan: ULNN)	5.3	150	0.005		0.15	0.3	-0.10	1.63	NAF (Barren)
15	EB1230893058	- N/A -	00508	BY0118CH	- N/A -	60.00	60.26	0.26	Tuff (100%)	Roof (Ulan: ULNB)	9.3	404	0.05		1.53	518.0	-516.47	338.29	NAF (Barren)
16	EB1230893060	- N/A -	00510	BY0118CH	- N/A -	60.95	61.27	0.32	Siltstone (50%), Sandstone (30%), Carbonaceous shale (20%)	Floor (Ulan: ULNC)	8.6	63	0.04		1.23	9.6	-8.38	7.84	NAF (Barren)

Table B2: Acid Base Account Results for Potential Coal Reject and Coal Materials

RGS sample No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹ µS/cm	Total S %	Scr ² %	MPA ² kg H2SO4/t	ANC ² kg H2SO4/t	NAPP ² kg H2SO4/t	ANC: MPA Ratio	Sample Classification ³
						from	to	range											
17	EB1230893064	- N/A -	00514	BY0118CH	- N/A -	67.00	67.38	0.38	Carbonaceous shale (100%)	Roof (ULNG)	7.8	94	0.24	0.013	0.40	10.2	-9.80	25.62	NAF (Barren)
18	EB1230893065	- N/A -	00515	BY0118CH	- N/A -	68.67	69.00	0.33	Siltstone, Carbonaceous shale (50%)	Roof (Ulan: ULNH)	7.9	156	0.04		1.23	8.8	-7.58	7.18	NAF (Barren)
19	EB1230893067	- N/A -	00517	BY0118CH	- N/A -	70.56	70.80	0.24	Tuff (100%)	Parting (Ulan - CMKR ply)	8.7	331	0.06		1.84	108.0	-106.16	58.78	NAF (Barren)
20	EB1230893068	- N/A -	00518	BY0118CH	- N/A -	71.65	72.00	0.35	Tuff (100%)	Parting (Ulan - FMKR ply)	8.4	218	0.07		2.14	7.8	-5.66	3.64	NAF (Barren)
21	EB1230893069	- N/A -	00519	BY0118CH	- N/A -	74.25	74.50	0.25	Siltstone, Sandstone (50%)	Floor (Ulan: ULNN)	8.0	83	0.02		0.61	4.9	-4.29	8.00	NAF (Barren)
22	EB1230893070	- N/A -	00520	BY0118CH	- N/A -	74.60	74.94	0.34	Siltstone, Sandstone (50%)	Parting (Ulan - UCSIL ply)	7.5	110	0.04		1.23	4.0	-2.78	3.27	NAF (Barren)
23	EB1312228006	- N/A -	GC_006	BY0172CH	- N/A -	21.68	21.89	0.21	Mudstone, Carbonaceous shale (50%)	Roof (Ulan: ULNHU)	7.9	88	0.10		3.063	16.3	-13.24	5.32	NAF (Barren)
24	EB1329921003	- N/A -	W_0012	BY0172CH	- N/A -	22.99	23.31	0.32	Carbonaceous Shale, Stony Coal	Parting (Ulan: ULNH)	3.9	361	0.17	0.074	2.27	7.4	-5.13	3.27	NAF (Barren)
25	EB1312228007	- N/A -	GC_007	BY0172CH	- N/A -	24.66	24.90	0.24	Tuff, Carbonaceous shale (50%)	Parting (Ulan: CMKR ply)	7.7	64	0.12		3.675	21.7	-18.03	5.91	NAF
26	EB1312228008	- N/A -	GC_008	BY0172CH	- N/A -	26.14	26.41	0.27	Siltstone (90%), Sandstone (10%)	Floor (Ulan: ULNN)	7.9	55	0.05		1.531	6.1	-4.57	3.98	NAF (Barren)
27	EB1312228019	- N/A -	GC_0002	BY0175CH	- N/A -	19.82	20.06	0.24	Siltstone, Sandstone (50%)	Floor (Ulan: ULNC)	7.7	208	0.06		1.838	9.9	-8.06	5.39	NAF (Barren)
28	EB1312228020	- N/A -	GC_0003	BY0175CH	- N/A -	27.67	27.96	0.29	Siltstone (70%), Sandstone (30%)	Floor (Ulan: ULNG)	8.0	116	0.04		1.225	10.0	-8.78	8.16	NAF (Barren)
29	EB1312228021	- N/A -	GC_0004	BY0175CH	- N/A -	33.78	34.12	0.34	Siltstone, Sandstone (50%)	Floor (Ulan: ULNN)	6.8	88	0.04		1.225	2.4	-1.18	1.96	NAF (Barren)
30	EB1312228023	- N/A -	GC_0001	BY0178CH	- N/A -	8.23	8.58	0.35	Siltstone (90%), Sandstone (10%)	Floor (Ulan: ULNG)	7.7	164	0.05		1.531	15.3	-13.77	9.99	NAF (Barren)
31	EB1312228024	- N/A -	GC_0002	BY0178CH	- N/A -	14.93	15.20	0.27	Siltstone (80%), Sandstone (20%)	Floor (Ulan: ULNN)	7.8	53	0.04		1.225	3.9	-2.68	3.18	NAF (Barren)
32	EB1312228031	- N/A -	GC_006	BY0180CH	- N/A -	16.54	16.91	0.37	Tuff (100%)	Roof (Ulan: ULNB)	7.9	189	0.11		3.369	9.4	-6.03	2.79	NAF (Barren)
33	EB1312228032	- N/A -	GC_007	BY0180CH	- N/A -	17.84	18.13	0.29	Siltstone (90%), Sandstone (10%)	Floor (Ulan: ULNC)	8.0	98	0.04		1.225	6.6	-5.38	5.39	NAF

Table B2: Acid Base Account Results for Potential Coal Reject and Coal Materials

RGS sample No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹ µS/cm	Total S %	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³
						from	to	range											
34	EB1312228036	- N/A -	GC_011	BY0180CH	- N/A -	26.93	27.19	0.26	Mudstone (60%), Siltstone (40%)	Roof (Ulan: ULNG)	7.8	142	0.09		2.756	16.0	-13.24	5.81	NAF (Barren)
35	EB1312228037	N/A	GC_012	BY0180CH	N/A	27.56	27.89	0.33	Siltstone (90%), Sandstone (10%)	Floor (Ulan: ULNG)	7.9	109	0.04		1.225	13.7	-12.48	11.18	NAF (Barren)
36	EB1312228038	- N/A -	GC_013	BY0180CH	- N/A -	32.56	32.85	0.29	Mudstone (60%), Carbonaceous shale (40%)	Roof (Ulan: ULNHL)	8.4	166	0.12		3.675	15.2	-11.53	4.14	NAF
37	EB1312228039	- N/A -	GC_014	BY0180CH	- N/A -	34.33	34.56	0.23	Tuff (100%)	Parting (Ulan: CMKR ply)	7.6	256	0.09		2.756	45.5	-42.74	16.51	NAF (Barren)
38	EB1312228040	- N/A -	GC_015	BY0180CH	- N/A -	35.05	35.38	0.33	Tuff (100%)	Parting (Ulan: FMKR ply)	7.6	76	0.13		3.981	13.6	-9.62	3.42	NAF
39	EB1312228041	- N/A -	GC_016	BY0180CH	- N/A -	36.04	36.25	0.21	Siltstone (95%), Carbonaceous shale (5%)	Floor (Ulan: ULMN)	7.9	57	0.08		2.450	5.2	-2.75	2.12	NAF (Barren)
40	EB1312228042	- N/A -	GC_017	BY0180CH	- N/A -	38.03	38.36	0.33	Sandstone (100%)	Parting (Ulan: UCGRD+UCSAN plies)	7.6	148	0.04		1.225	3.9	-2.68	3.18	NAF (Barren)
41	EB1312228055	- N/A -	GC_003	BY0215CH	- N/A -	38.00	38.20	0.20	Siltstone (90%), Tuff (10%)	Floor (Ulan: ULNHU)	8.5	105	0.10		3.063	13.7	-10.64	4.47	NAF (Barren)
42	EB1330966004	N/A	0018	BY0285LD	N/A	49.44	49.57	0.13	Mudstone (95%), Very Fine Sandstone (5%)	Roof (Ulan: ULNH)	8.8	77	0.13		3.98	15.8	-11.82	3.97	NAF
Coarse Reject																			
74	EB1306433004	2001259202	MU1386-48	BY0003LDR1	RC1305-4132	Composite			ULNBC-1/2 + ULNHI-1/2 + ULMN-1/2	S1.80 Composite (Ulan) - Coarse Reject	8.5	147	0.17		5.21	29.6	-24.39	5.69	NAF
75	EB1302369004	2001294402	MU1386-12	BY0016LDR2	N/A	28.01	29.39	1.38	ULN-1/2/3	S1.80 Composite (Ulan) - Coarse Reject	6.4	578	1.51	1.290	39.5	36.2	3.31	0.92	Uncertain
76	EB1306433014	2001259302	MU1386-60	BY0037LDR1	RC1305-4152	109.24	110.57	1.33	ULNM-01 + ULNN-01	S1.80 Composite (Ulan) - Coarse Reject	8.4	139	0.11		3.37	37.2	-33.83	11.04	NAF
77	EB1306744004	2001279002	MU1386-75	BY0062LDR1	RC1306-2013	127.49	128.50	1.01	ULNM-1/2	S1.80 Composite (Ulan) - Coarse Reject	7.6	30	0.19		5.82	19.5	-13.68	3.35	NAF
78	EB1404773004	N/A	N/A	BY0173CH	N/A	Composite			CHPP reject - Ulan Seam		7.0	597	0.10		3.06	16.8	-13.74	5.49	NAF (Barren)
79	EB1404773001	N/A	N/A	BY0204CH	N/A	Composite			CHPP reject - Ulan Seam		7.0	407	0.08		2.45	47.6	-45.15	19.43	NAF (Barren)
80	EB1404773005	N/A	N/A	BY0283LD	N/A	Composite			CHPP reject - Ulan Seam		7.3	480	0.15		4.59	33.2	-28.61	7.23	NAF
81	EB1404773002	N/A	N/A	BY0285LD	N/A	Composite			CHPP reject - Ulan Seam		7.4	705	0.08		2.45	41	-38.55	16.73	NAF (Barren)

Table B2: Acid Base Account Results for Potential Coal Reject and Coal Materials

RGS sample No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification
						from	to	range				µS/cm	%	kg H2SO4/t					
Tailings																			
90	EB1306433005	2001259202	MU1386-49	BY0003LDR1	RC1305-4133	Composite			ULNBC-1/2 + ULNHI-1/2 + ULMN-1/2	-0.125 Composite (Ulan) - Tailings	8.3	105	0.38		11.6	29.0	-17.4	2.49	NAF
91	EB1302369005	2001294402	MU1386-13	BY0016LDR2	N/A	28.01	29.39	1.38	ULN-1/2/3	-0.125 Composite (Ulan) - Tailings	7.0	553	5.17	4.670	143.0	25.6	117.4	0.18	PAF
92	EB1306433015	2001259302	MU1386-61	BY0037LDR1	RC1305-4151	109.24	110.57	1.33	ULNM-01 + ULNN-01	-0.125 Composite (Ulan) - Tailings	7.9	66	0.32	0.025	0.77	17.2	-16.43	22.47	NAF (Barren)
93	EB1306744005	2001279002	MU1386-76	BY0062LDR1	RC1306-2014	127.49	128.50	1.01	ULNM-1/2	-0.125 Composite (Ulan) - Tailings	7.6	47	0.34	0.025	0.77	10.7	-9.93	13.98	NAF (Barren)
94	EB1407953001	N/A	N/A	BY0232LD	N/A	Composite			Tailings Composite - Ulan Seam		7.3	110	0.15		4.6	30.4	-25.8	6.62	NAF
95	EB1407953004	N/A	N/A	BY0283LD, BY0285LD + BY0288LD	N/A	Composite			Tailings Composite - Ulan Seam		7.5	114	0.35		10.7	40.5	-29.8	3.78	NAF
Coal																			
103	EB1306433001	2001259202	MU1386-45	BY0003LDR1	RC1305-4131	composite			ULNBC-1/2 + ULNHI-1/2 + ULMN-1/2	Coal Composite (Ulan)	7.0	34	0.38	0.006	0.18	6.3	-6.12	34.29	NAF (Barren)
104	EB1302369001	2001294402	MU1386-09	BY0016LDR2	N/A	28.01	29.39	1.38	ULNI-1/2/3	Coal (Ulan)	6.2	545	0.91	0.548	16.78	12.5	4.28	0.75	Uncertain
105	EB1306433011	2001259302	MU1386-57	BY0037LDR1	RC1305-4139	109.24	110.57	1.33	ULNM-01 + ULNN-01	Coal Composite (Ulan)	8.1	49	0.33	0.006	0.18	17.8	-17.62	96.87	NAF (Barren)
106	EB1306744001	2001279002	MU1386-72	BY0062LDR1	RC1306-2001	127.49	128.50	1.01	ULNM-1/2	Coal (Ulan)	7.0	21	0.33	0.009	0.28	8.8	-8.52	31.93	NAF (Barren)
107	EB1230893018	- N/A -	00918	BY0070	- N/A -	17.00	19.00	2.00	Dull Coal (75%), Siltstone + Mudstone (25%)	Coal Composite (Ulan: ULMN, ULNN) + Floor (ULNN)	8.3	412	0.16		4.90	48.2	-43.30	9.84	NAF
108	EB1230893059	- N/A -	00509	BY0118CH	- N/A -	60.43	60.95	0.52	Dull & Stony Coal (100%)	Coal Composite (Ulan: ULNB, ULNC)	8.5	103	0.41	0.003	0.08	13.2	-13.12	172.41	NAF (Barren)
109	EB1230893066	- N/A -	00516	BY0118CH	- N/A -	69.50	69.85	0.35	Dull Coal (100%)	Coal Composite (Ulan: ULNH, ULIP)	7.5	114	0.24	0.036	1.10	8.7	-7.60	7.89	NAF (Barren)
110	EB1329921005	NC00675-005	W_0018	BY0172CH	- N/A -	24.10	24.63	0.53	Stony & Dull Coal	Coal (Ulan - ULNJ)	5.2	246	0.11	0.005	0.15	3.2	-3.05	20.90	NAF (Barren)
111	EB1329921002	NC00675-002	W_0018	BY0180CH	- N/A -	34.56	34.95	0.39	Stony Coal (100%)	Coal (Ulan: ULNHL)	4.0	216	0.08		2.45	2.4	0.05	0.98	NAF (Barren)
112	EB1329921008	NCC13-00001-002	W_0024_26	BY0204CH	- N/A -	50.37	51.22	0.85	Stony Coal (95%) + Shale/Tuff (5%)	Coal composite (Ulan: ULNIU, ULNIL + ULNJ)	7.4	216	0.14		4.29	39	-34.71	9.10	NAF

Table B2: Acid Base Account Results for Potential Coal Reject and Coal Materials

RGS sample No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³
						from	to	range				µS/cm	%	kg H2SO4/t					
COGGAN SEAM																			
Roof + Floor																			
43	EB1306433007	2001259202	MU1386-51	BY0003LDR1	RC1305-4137	121.95	122.09	0.14	COG-RF	Roof (Coggan)	9.0	150	0.04		1.23	67.1	-65.88	54.78	NAF (Barren)
44	EB1306433008	2001259202	MU1386-52	BY0003LDR1	RC1305-4154	125.70	126.3	0.56	COGE-01	Floor (Coggan)	8.2	26	0.38	0.003	0.08	2.6	-2.52	33.96	NAF (Barren)
45	EB1302369007	2001294402	MU1386-15	BY0016LDR2	N/A	37.64	37.74	0.10	COGB-RF	Roof (Coggan)	6.1	134	0.04		1.23	3.0	-1.78	2.45	NAF (Barren)
46	EB1302369008	2001294402	MU1386-16	BY0016LDR2	N/A	39.70	40.45	0.75	COGD-01	Floor (Coggan)	7.6	104	0.22	0.037	1.13	6.5	-5.37	5.74	NAF (Barren)
47	EB1230893025	N/A	00925	BY0034	N/A	25.00	27.00	2.00	Sandstone	Floor (Coggan: COGDE)	4.0	1700	0.36	0.185	5.67	4.0	1.67	0.71	Uncertain
48	EB1230893026	N/A	00926	BY0034	N/A	28.00	33.00	5.00	Sandstone	3m below Floor (Coggan: COGDE)	6.8	2350	0.29	0.197	6.03	29.0	-22.97	4.81	NAF
49	EB1306433022	2001319202	MU1386-68	BY0034LDR1	RC1305-4155	22.10	22.70	0.60	COGB-01	Roof (Coggan)	3.8	333	0.58	0.103	3.15	1.0	2.15	0.32	Uncertain
50	EB1306433023	2001319202	MU1386-69	BY0034LDR1	RC1305-4172	24.04	24.89	0.85	COGD-01	Floor (Coggan)	3.4	940	0.92	0.432	13.23	0.7	12.53	0.05	PAF
51	EB1306433017	2001259302	MU1386-63	BY0037LDR1	RC1305-4159	116.19	116.89	0.70	COGA-01	Roof (Coggan)	7.5	61	0.34	0.022	0.67	4.0	-3.33	5.94	NAF (Barren)
52	EB1306433018	2001259302	MU1386-64	BY0037LDR1	RC1305-4171	120.77	121.6	0.78	COGD-01	Floor (Coggan)	8.1	54	0.36	0.008	0.25	7.2	-6.96	29.39	NAF (Barren)
53	EB1306744007	2001279002	MU1386-78	BY0062LDR1	RC1306-2016	133.19	133.44	0.25	COGB-01	Roof (Coggan)	7.0	25	0.42	0.006	0.18	1.6	-1.42	8.71	NAF (Barren)
54	EB1306744008	2001279002	MU1386-79	BY0062LDR1	RC1306-2017	135.83	136.2	0.41	COGE-01	Floor (Coggan)	6.8	12	0.42	0.015	0.46	2.4	-1.94	5.22	NAF (Barren)
55	EB1230893012	- N/A -	00912	BY0071CH	- N/A -	27.41	27.91	0.50	Sandstone (100%)	Roof (Coggan: COGB)	5.5	228	0.005		0.15	0.3	-0.10	1.63	NAF (Barren)
56	EB1230893013	- N/A -	00913	BY0071CH	- N/A -	30.53	30.83	0.30	Sandstone (100%)	Floor (Coggan: COGDE)	3.5	706	0.30	0.098	3.00	0.3	2.75	0.08	NAF (Barren)
57	EB1230893072	- N/A -	00522	BY0118CH	- N/A -	76.39	76.81	0.42	Sandstone, Conglomerate (50%)	Roof (Coggan: COGB)	7.7	246	0.01		0.31	4.3	-3.99	14.04	NAF (Barren)
58	EB1230893074	- N/A -	00524	BY0118CH	- N/A -	79.98	80.32	0.34	Sandstone (80%), Siltstone (20%)	Floor (Coggan: COGDE)	3.5	1510	0.58	0.376	11.52	0.3	11.27	0.02	PAF
59	EB1230893075	- N/A -	00525	BY0118CH	- N/A -	81.48	81.79	0.31	Sandstone (90%), Siltstone (10%)	1.5m below Floor (Coggan: COGDE)	6.3	1980	1.15	0.791	24.22	9.4	14.82	0.39	PAF
60	EB1312228009	- N/A -	GC_009	BY0172CH	- N/A -	30.44	30.68	0.24	Conglomerate (60%), Sandstone (40%)	Roof (Coggan: COGB)	6.3	191	0.09		2.76	1.5	1.26	0.54	NAF (Barren)
61	EB1312228010	- N/A -	GC_010	BY0172CH	- N/A -	34.23	34.50	0.27	Sandstone (65%), Carbonaceous shale (20%), Siltstone (15%)	Floor (Coggan: COGDE)	6.8	160	0.11	0.044	1.35	4.3	-2.95	3.19	NAF (Barren)
62	EB1312228017	- N/A -	GC_0002	BY0173CH	- N/A -	28.28	29.00	0.72	Sandstone (100%)	Floor (Coggan: COGDE)	7.6	318	0.11		3.37	9.0	-5.63	2.67	NAF
63	EB1312228022	- N/A -	GC_0005	BY0175CH	N/A	40.78	41.06	0.28	Sandstone (90%), Siltstone (10%)	Floor (Coggan: COGDE)	6.1	273	0.22	0.146	4.47	2.6	1.87	0.58	Uncertain

Table B2: Acid Base Account Results for Potential Coal Reject and Coal Materials

RGS sample No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹ µS/cm	Total S %	Scr ² %	MPA ² kg H2SO4/t	ANC ² kg H2SO4/t	NAPP ² kg H2SO4/t	ANC: MPA Ratio	Sample Classification ³
						from	to	range											
64	EB1312228043	- N/A -	GC_018	BY0180CH	N/A	40.24	40.52	0.28	Sandstone (90%), Conglomerate (10%)	Roof (Coggan: COGB)	7.5	107	0.06		1.84	5.3	-3.46	2.88	NAF (Barren)
65	EB1312228044	- N/A -	GC_019	BY0180CH	N/A	44.47	44.72	0.25	Sandstone (100%)	Floor (Coggan: COGDE)	6.2	361	0.17	0.105	3.22	4.4	-1.18	1.37	Uncertain
66	EB1312228025	N/A	GC_0003	BY0178CH	N/A	21.78	24.08	2.30	Sandstone	1.5m below Floor (Coggan: COGDE)	5.1	453	0.42	0.263	8.05	1.1	6.95	0.14	PAF (LC)
67	EB1326314005	N/A	GC_006	BY0273CH	N/A	41.49	41.82	0.33	Sandstone	Floor (Coggan: COGDE)	8.2	517	0.56	0.385	11.79	59.1	-47.31	5.01	NAF
68	EB1326314016	N/A	GC_008	BY0291CH	N/A	55.85	56.25	0.40	Sandstone	Floor (Coggan: COGDE)	5.8	315	0.16	0.120	3.68	2.6	1.08	0.71	Uncertain
69	EB1326314028	N/A	GC_007	BY0294CH	N/A	91.54	91.69	0.15	Sandstone	Floor (Coggan: COGDE)	7.2	103	0.05		1.53	0.7	0.83	0.46	NAF (Barren)
70	EB1326314034	N/A	GC_006	BY0296CH	N/A	79.65	79.90	0.25	Sandstone	Floor (Coggan: COGDE)	8.0	82	0.03		0.92	3.1	-2.18	3.37	NAF (Barren)
71	EB1326314039	N/A	GC_005	BY0302CH	N/A	35.41	35.74	0.33	Sandstone	Floor (Coggan: COGDE)	8.2	207	0.07		2.14	15.7	-13.56	7.32	NAF (Barren)
72	EB1329006004	N/A	GC_004	BY0318CH	N/A	27.24	27.38	0.14	Sandstone	Floor (Coggan: COGDE)	3.8	362	1.24	0.774	23.70	0.3	23.45	0.01	PAF
73	EB1329006013	N/A	GC_005	BY0322CH	N/A	30.69	30.96	0.27	Sandstone	Floor (Coggan: COGDE)	5.4	352	0.04		1.23	3.6	-2.38	2.94	NAF (Barren)
Coarse Reject																			
82	EB1306433009	2001259202	MU1386-53	BY0003LDR1	RC1305-4135	122.09	125.70	3.61	COGB-1/2 + COGC-1/2 + COGD-1/2	S1.80 Composite (Coggan) - Coarse Reject	8.0	67	0.16		4.90	99.0	-94.10	20.20	NAF
83	EB1302369009	2001294402	MU1386-17	BY0016LDR2	N/A	37.74	39.70	1.96	COGB-1/2 + COGC-1/2	S1.80 Composite (Coggan) - Coarse Reject	6.3	168	0.43	0.356	10.90	4.8	6.10	0.44	PAF (LC)
84	EB1404773007	N/A	N/A	BY0030LD	N/A	Composite			CHPP reject - Coggan Seam		4.7	473	0.06		1.84	8	-6.16	4.35	NAF (Barren)
85	EB1306433024	2001319202	MU1386-70	BY0034LDR1	RC1305-4174	22.70	24.04	1.34	COGC-1/2	S1.80 Composite (Coggan) - Coarse Reject	3.8	700	4.46	3.250	99.53	46.1	53.43	0.46	PAF
86	EB1306433019	2001259302	MU1386-65	BY0037LDR1	RC1305-4157	116.89	120.77	3.88	COGB-1/2/3 + COGC-1/2	S1.80 Composite (Coggan) - Coarse Reject	8.1	102	0.12	0.009	0.28	7.2	-6.92	26.12	NAF (Barren)
87	EB1306744009	2001279002	MU1386-80	BY0062LDR1	RC1306-2018	133.44	135.83	2.39	COGC-1/2 + COGD-1/2	S1.80 Composite (Coggan) - Coarse Reject	5.2	294	0.89	0.350	10.72	16.8	-6.08	1.57	NAF
88	EB1404773006	N/A	N/A	BY0283LD	N/A	Composite			CHPP reject - Coggan Seam		4.0	1140	1.17	0.767	23.49	4.6	18.89	0.20	PAF
89	EB1404773003	N/A	N/A	BY0288LD	N/A	Composite			CHPP reject - Coggan Seam		3.8	419	0.19	0.187	5.73	3.5	2.23	0.61	Uncertain

Table B2: Acid Base Account Results for Potential Coal Reject and Coal Materials

RGS sample No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³	
						from	to	range				µS/cm	%	kg H2SO4/t						
Tailings																				
96	EB1306433010	2001259202	MU1386-54	BY0003LDR1	RC1305-4136	122.09	125.70	3.61	COGB-1/2 + COGC-1/2 + COGD-1/2	-0.125 Composite (Coggan) - Tailings	7.9	37	0.33	0.005	0.15	4.8	-4.65	31.35	NAF (Barren)	
97	EB1302369010	2001294402	MU1386-18	BY0016LDR2	N/A	37.74	39.70	1.96	COGB-1/2 + COGC-1/2	-0.125 Composite (Coggan) - Tailings	4.9	270	1.05	0.766	23.46	2.8	20.66	0.12	PAF	
98	EB1407953002	N/A	N/A	BY0030LD	N/A	Composite			Tailings Composite - Coggan Seam		7.3	85	0.24	0.016	0.49	10.2	-9.71	20.82	NAF (Barren)	
99	EB1306433025	2001319202	MU1386-71	BY0034LDR1	RC1305-4175	22.70	24.04	1.34	COGC-1/2	-0.125 Composite (Coggan) - Tailings	4.5	281	1.59	1.210	37.06	5.4	31.66	0.15	PAF	
100	EB1306433020	2001259302	MU1386-66	BY0037LDR1	RC1305-4158	116.89	120.77	3.88	COGB-1/2/3 + COGC-1/2	-0.125 Composite (Coggan) - Tailings	7.4	51	0.36	0.034	1.04	8.4	-7.36	8.07	NAF (Barren)	
101	EB1306744010	2001279002	MU1386-81	BY0062LDR1	RC1306-2019	133.44	135.83	2.39	COGC-1/2 + COGD-1/2	-0.125 Composite (Coggan) - Tailings	6.9	73	0.66	0.258	7.90	2.9	5.00	0.37	Uncertain	
102	EB1407953003	N/A	N/A	BY0283LD, BY0285LD + BY0288LD	N/A	Composite			Tailings Composite - Coggan Seam (Open Cut area)		6.6	135	0.59	0.444	13.60	10.1	3.50	0.74	Uncertain	
Coal																				
113	EB1306433006	2001259202	MU1386-50	BY0003LDR1	RC1305-4134	122.09	125.70	3.61	COGB-1/2 + COGC-1/2 + COGD-1/2	Coal Composite (Coggan)	8.2	41	0.34	0.014	0.43	9.3	-8.87	21.69	NAF (Barren)	
114	EB1302369006	2001294402	MU1386-14	BY0016LDR2	N/A	37.74	39.70	1.96	COGB-1/2 + COGC-1/2	Coal Composite (Coggan)	5.3	170	0.27	0.094	2.88	3.5	-0.62	1.22	NAF (Barren)	
115	EB1306433021	2001319202	MU1386-67	BY0034LDR1	RC1305-4173	22.70	24.04	1.34	COGC-1/2	Coal (Coggan)	3.8	841	1.12	0.639	19.57	3.7	15.87	0.19	PAF	
116	EB1306433016	2001259302	MU1386-62	BY0037LDR1	RC1305-4156	116.89	120.77	3.88	COGB-1/2/3 + COGC-1/2	Coal Composite (Coggan)	8.0	40	0.36	0.003	0.08	4.5	-4.42	58.78	NAF (Barren)	
117	EB1306744006	2001279002	MU1386-77	BY0062LDR1	RC1306-2015	133.44	135.83	2.39	COGC-1/2 + COGD-1/2	Coal Composite (Coggan)	5.9	22	0.38	0.009	0.28	2.1	-1.82	7.62	NAF (Barren)	
118	EB1230893020	- N/A -	00920	BY0070CH	- N/A -	24.00	26.00	2.00	Dull Coal (80%), Siltstone (20%)	Coal Composite (Coggan: COGC, COGDE) + Floor (COGDE)	8.1	258	0.13	0.016	0.49	6.9	-6.41	14.08	NAF (Barren)	
119	EB1230893073	- N/A -	00523	BY0118CH	- N/A -	77.00	77.30	0.30	Stony Coal (100%)	Coal (Coggan: COGB)	7.6	64	0.21	0.006	0.18	5.4	-5.22	29.39	NAF (Barren)	
120	EB1329921009	NCC13-00001-003	W_0035	BY0204CH	N/A	55.99	56.52	0.53	Stony Coal (100%)	Coal (Coggan: COGB)	3.8	453	0.09		2.76	3.2	-0.44	1.16	NAF (Barren)	

Notes:

1. Current pH and electrical conductivity (EC) provided for 1:5 sample:water extracts
2. Scr = Chromium reducible sulfur; MPA = Maximum potential acidity; ANC = Acid neutralising capacity; NAPP = Net acid producing potential
3. Sample classification based on total sulfur, Scr, NAPP, ANC:MPA ratio data as described in the report text

Table B3: Composite Samples Selected for Static Multi-Element Tests

RGS ME No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification
						from	to	range				µS/cm	%	kg H2SO4/t					
Overburden																			
4	EB1230893001	- N/A -	00901	BY0071CH	- N/A -	6.40	6.70	0.30	Sandstone	Overburden	8.7	356	0.01		0.15	3.6	-3.45	23.51	NAF (Barren)
	EB1230893002	- N/A -	00902	BY0071CH	- N/A -	9.20	9.50	0.30	Sandstone	Overburden	9.3	259	0.01		0.15	48.9	-48.75	319.35	NAF (Barren)
	EB1230893005	- N/A -	00905	BY0071CH	- N/A -	14.58	14.98	0.40	Siltstone, Sandstone	Overburden	8.5	363	0.01		0.15	15.1	-14.95	98.61	NAF (Barren)
Overburden + Coal (Ulan)																			
5	EB1230893017	- N/A -	00917	BY0070	- N/A -	10.00	16.00	6.00	Mudstone (70%), Dull Coal (15%), Carbonaceous shale+Tuff (15%)	Overburden + Coal/Tuff (Ulan - ULNG, ULNH, ULNI, ULNJ, CMKR)	8.5	498	0.01		0.15	34.4	-34.25	224.65	NAF (Barren)
	EB1230893003	- N/A -	00903	BY0071CH	- N/A -	10.08	10.42	0.34	Siltstone, Carbonaceous shale	Overburden	8.9	545	0.01		0.15	10.3	-10.15	67.27	NAF (Barren)
Interburden																			
15	EB1326314002	- N/A -	GC_002	BY0273CH	- N/A -	17.02	17.35	0.33	Sandstone	Interburden	8.3	114	0.02		0.61	13.8	-13.19	22.53	NAF (Barren)
	EB1326314003	- N/A -	GC_004	BY0273CH	- N/A -	22.25	22.53	0.28	Sandstone	Interburden	8.7	161	0.03		0.92	53.2	-52.28	57.90	NAF (Barren)
	EB1326314004	- N/A -	GC_005	BY0273CH	- N/A -	34.77	35.08	0.31	Sandstone	Interburden	8.3	118	0.03		0.92	9.6	-8.68	10.45	NAF (Barren)
16	EB1326314026	- N/A -	GC_005	BY0294CH	- N/A -	70.01	70.30	0.29	Sandstone	Interburden	8.4	96	0.03		0.92	15.6	-14.68	16.98	NAF (Barren)
	EB1326314027	- N/A -	GC_006	BY0294CH	- N/A -	83.92	84.09	0.17	Sandstone	Interburden	7.8	65	0.01		0.31	4.3	-3.99	14.04	NAF (Barren)
19	EB1329006005	- N/A -	GC_001	BY0320CH	- N/A -	10.76	10.98	0.22	Sandstone	Interburden	7.9	108	0.04		1.23	15.4	-14.18	12.57	NAF (Barren)
	EB1329006006	- N/A -	GC_002	BY0320CH	- N/A -	17.61	17.81	0.20	Sandstone	Interburden	7.8	40	0.06		1.84	3.5	-1.66	1.90	NAF (Barren)
	EB1329006007	- N/A -	GC_003	BY0320CH	- N/A -	19.42	19.61	0.19	Sandstone	Interburden	7.3	145	0.14	0.027	0.83	3.4	-2.57	4.11	NAF
20	EB1329006010	- N/A -	GC_002	BY0322CH	- N/A -	17.63	17.92	0.29	Siltstone	Interburden	8.4	99	0.01		0.31	15.7	-15.39	51.27	NAF (Barren)
	EB1329006011	- N/A -	GC_003	BY0322CH	- N/A -	23.84	24.08	0.24	Siltstone	Interburden	8.4	37	0.01		0.31	3.8	-3.49	12.41	NAF (Barren)
	EB1329006012	- N/A -	GC_004	BY0322CH	- N/A -	26.38	26.76	0.38	Siltstone	Interburden	8.6	117	0.01		0.15	21.8	-21.65	142.37	NAF (Barren)
Interburden + Roof																			
1	EB1230893062	- N/A -	00512	BY0118CH	- N/A -	64.30	64.50	0.20	Carbonaceous shale	Interburden	7.9	145	0.21	0.008	0.25	11.8	-11.56	48.16	NAF (Barren)
	EB1230893049	- N/A -	00949	BY0118CH	- N/A -	49.10	49.40	0.30	Carbonaceous shale, Mudstone	Roof (Unec. Seam) - GDF	8.6	516	0.12		3.68	23.0	-19.33	6.26	NAF
	EB1230893064	- N/A -	00514	BY0118CH	- N/A -	67.00	67.38	0.38	Carbonaceous shale (100%)	Roof (ULNG)	7.8	94	0.24	0.013	0.40	10.2	-9.80	25.62	NAF (Barren)
Overburden + Interburden + Parting (Ulan)																			
3	EB1230893045	- N/A -	00945	BY0118CH	- N/A -	45.11	45.40	0.29	Siltstone	Overburden	8.8	496	0.06		1.84	21.9	-20.06	11.92	NAF (Barren)
	EB1230893057	- N/A -	00507	BY0118CH	- N/A -	58.72	58.94	0.22	Siltstone	Overburden	8.6	57	0.02		0.61	11.6	-10.99	18.94	NAF (Barren)
	EB1230893021	- N/A -	00921	BY0070	- N/A -	27.00	33.00	6.00	Sandstone, Siltstone	Interburden	7.9	822	0.14		4.29	97.0	-92.71	22.62	NAF
	EB1230893019	- N/A -	00919	BY0070	- N/A -	20.00	23.00	3.00	Sandstone (60%), Siltstone (25%), Dull	Parting (Ulan: UCSIL, UCSAN) +	8.3	259	0.03		0.92	9.5	-8.58	10.34	NAF (Barren)
	EB1230893070	- N/A -	00520	BY0118CH	- N/A -	74.60	74.94	0.34	Siltstone, Sandstone (50%)	Parting (Ulan - UCSIL ply)	7.5	110	0.04		1.23	4.0	-2.78	3.27	NAF (Barren)

Table B3: Composite Samples Selected for Static Multi-Element Tests

RGS ME No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification
						from	to	range				µS/cm	%	kg H2SO4/t					
Overburden + Interburden + Floor (Coggan)																			
2	EB1230893041	- N/A -	00941	BY0118CH	- N/A -	40.58	40.91	0.33	Siltstone	Overburden	9.0	376	0.02		0.61	18.3	-17.69	29.88	NAF (Barren)
	EB1230893050	- N/A -	00950	BY0118CH	- N/A -	51.54	51.88	0.34	Siltstone	Overburden	9.2	186	0.02		0.61	19.1	-18.49	31.18	NAF (Barren)
	EB1230893061	- N/A -	00511	BY0118CH	- N/A -	63.38	63.68	0.30	Sandstone	Interburden	8.7	321	0.01		0.31	75.0	-74.69	244.90	NAF (Barren)
	EB1230893063	- N/A -	00513	BY0118CH	- N/A -	65.52	65.87	0.35	Siltstone, Sandstone	Interburden	8.5	305	0.02		0.61	65.5	-64.89	106.94	NAF (Barren)
	EB1230893071	- N/A -	00521	BY0118CH	- N/A -	75.50	75.86	0.36	Sandstone	Interburden	8.4	248	0.01		0.15	39.4	-39.25	257.31	NAF (Barren)
	EB1230893075	- N/A -	00525	BY0118CH	- N/A -	81.48	81.79	0.31	Sandstone (90%), Siltstone (10%)	1.5m below Floor (Coggan: COGDE)	6.3	1980	1.15	0.791	24.22	9.4	14.82	0.39	PAF
17	EB1326314032	- N/A -	GC_004	BY0296CH	- N/A -	49.89	50.06	0.17	Sandstone	Overburden	9.0	148	0.01		0.15	72.4	-72.25	472.82	NAF (Barren)
	EB1326314033	- N/A -	GC_005	BY0296CH	- N/A -	66.25	66.47	0.22	Sandstone	Interburden	8.0	116	0.03		0.92	10.0	-9.08	10.88	NAF (Barren)
	EB1326314034	N/A	GC_006	BY0296CH	N/A	79.65	79.90	0.25	Sandstone	Floor (Coggan: COGDE)	8.0	82	0.03		0.92	3.1	-2.18	3.37	NAF (Barren)
18	EB1329006001	- N/A -	GC_001	BY0318CH	- N/A -	12.20	12.38	0.18	Sandstone	Overburden	7.4	165	0.04		1.23	19.2	-17.98	15.67	NAF (Barren)
	EB1329006002	- N/A -	GC_002	BY0318CH	- N/A -	14.40	14.63	0.23	Sandstone	Interburden	6.9	94	0.05		1.53	15.8	-14.27	10.32	NAF (Barren)
	EB1329006003	- N/A -	GC_003	BY0318CH	- N/A -	20.61	20.89	0.28	Sandstone	Interburden	8.0	93	0.04		1.23	3.3	-2.08	2.69	NAF (Barren)
	EB1329006004	N/A	GC_004	BY0318CH	N/A	27.24	27.38	0.14	Sandstone	Floor (Coggan: COGDE)	3.8	362	1.24	0.774	23.70	0.3	23.45	0.01	PAF
Uneconomic Seam																			
8	EB1230893035	- N/A -	00935	BY0118CH	- N/A -	34.45	34.85	0.40	Siltstone	Roof (Unec. Seam) - GDA	9.1	531	0.01		0.15	15.9	-15.75	103.84	NAF (Barren)
	EB1230893038	- N/A -	00938	BY0118CH	- N/A -	36.00	36.32	0.32	Siltstone, Carbonaceous shale	Roof (Unec. Seam) - GDB	8.7	294	0.06		1.84	75.7	-73.86	41.20	NAF (Barren)
	EB1230893042	- N/A -	00942	BY0118CH	- N/A -	43.18	43.54	0.36	Tuff, Carbonaceous Mudstone	Roof (Unec. Seam) - GDD	9.7	781	0.11		3.37	30.8	-27.43	9.14	NAF
	EB1230893046	- N/A -	00946	BY0118CH	- N/A -	46.60	46.94	0.34	Mudstone, Tuff	Roof (Unec. Seam) - GDE	9.3	733	0.10		3.06	15.8	-12.74	5.16	NAF (Barren)
	EB1230893051	- N/A -	00501	BY0118CH	- N/A -	53.17	53.47	0.30	Siltstone	Roof (Unec. Seam) - GDG	9.1	161	0.03		0.92	18.9	-17.98	20.57	NAF (Barren)
	EB1230893054	- N/A -	00504	BY0118CH	- N/A -	54.43	54.81	0.38	Carbonaceous shale, Siltstone	Roof (Unec. Seam) - GDJ	8.8	118	0.21		6.43	14.8	-8.37	2.30	NAF
9	EB1230893036	- N/A -	00936	BY0118CH	- N/A -	35.09	35.35	0.26	Coal, Carbonaceous shale	Coal (Unec. Seam) - GDA	8.8	238	0.37	0.006	0.18	42.3	-42.12	230.20	NAF (Barren)
	EB1230893039	- N/A -	00939	BY0118CH	- N/A -	36.52	36.90	0.38	Coal, Tuff, Carbonaceous shale	Coal (Unec. Seam) - GDB	9.0	338	0.26	0.007	0.21	8.8	-8.59	41.05	NAF (Barren)
	EB1230893043	- N/A -	00943	BY0118CH	- N/A -	43.54	44.16	0.62	Coal, Carbonaceous shale	Coal (Unec. Seam) - GDD	8.6	108	0.34	0.006	0.18	19.4	-19.22	105.58	NAF (Barren)

Table B3: Composite Samples Selected for Static Multi-Element Tests

RGS ME No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹ µS/cm	Total S %	Scr ² %	MPA ² kg H2SO4/t	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³
						from	to	range											
	EB1230893047	- N/A -	00947	BY0118CH	- N/A -	46.94	47.30	0.36	Coal, Siltstone	Coal (Unec. Seam) - GDE	9.3	235	0.28		8.58	193.0	-184.43	22.51	NAF
	EB1230893052	- N/A -	00502	BY0118CH	- N/A -	53.47	53.96	0.49	Coal, Carbonaceous shale	Coal (Unec. Seam) - GDG	8.1	60	0.27	0.003	0.08	10.1	-10.02	131.92	NAF (Barren)
	EB1230893055	- N/A -	00505	BY0118CH	- N/A -	54.81	55.12	0.31	Coal (Stony)	Coal (Unec. Seam) - GDJ	8.7	114	0.22		6.74	385.0	-378.26	57.14	NAF
10	EB1230893037	- N/A -	00937	BY0118CH	- N/A -	35.35	35.65	0.30	Siltstone	Floor (Unec. Seam) - GDA	8.7	392	0.03		0.92	17.2	-16.28	18.72	NAF (Barren)
	EB1230893040	- N/A -	00940	BY0118CH	- N/A -	37.20	37.50	0.30	Siltstone	Floor (Unec. Seam) - GDB	8.9	359	0.02		0.61	22.8	-22.19	37.22	NAF (Barren)
	EB1230893044	- N/A -	00944	BY0118CH	- N/A -	44.16	44.56	0.40	Siltstone	Floor (Unec. Seam) - GDD	8.7	435	0.05		1.53	21.5	-19.97	14.04	NAF (Barren)
	EB1230893048	- N/A -	00948	BY0118CH	- N/A -	47.30	47.72	0.42	Carbonaceous shale, Siltstone	Floor (Unec. Seam) - GDE	9.4	376	0.10		3.06	38.6	-35.54	12.60	NAF (Barren)
	EB1230893053	- N/A -	00503	BY0118CH	- N/A -	53.96	54.28	0.32	Siltstone	Floor (Unec. Seam) - GDE	8.8	117	0.07		2.14	10.6	-8.46	4.94	NAF (Barren)
	EB1230893056	- N/A -	00506	BY0118CH	- N/A -	55.12	55.36	0.24	Siltstone	Floor (Unec. Seam) - GDJ	8.4	238	0.03		0.92	72.5	-71.58	78.91	NAF (Barren)
ULAN SEAM: Roof/Parting/Floor + Coal																			
7	EB1230893018	- N/A -	00918	BY0070	- N/A -	17.00	19.00	2.00	Dull Coal (75%), Siltstone + Mudstone (25%)	Coal Composite (Ulan: ULMN, ULNN) + Floor (ULNN)	8.3	412	0.16		4.90	48.2	-43.30	9.84	NAF
	EB1230893008	- N/A -	00908	BY0071CH	- N/A -	18.20	18.50	0.30	Coal+Mudstone (50%), Siltstone	Roof (Ulan: ULHJ)	7.7	351	0.005		0.15	4.8	-4.65	31.35	NAF (Barren)
	EB1230893009	- N/A -	00909	BY0071CH	- N/A -	20.70	21.02	0.32	Tuff (100%)	Parting (Ulan - FMKR ply)	8.4	437	0.05		1.53	3.1	-1.57	2.02	NAF (Barren)
	EB1230893010	- N/A -	00910	BY0071CH	- N/A -	22.96	23.26	0.30	Siltstone (100%)	Floor (Ulan: ULNN)	5.3	150	0.005		0.15	0.3	-0.10	1.63	NAF (Barren)
	EB1230893058	- N/A -	00508	BY0118CH	- N/A -	60.00	60.26	0.26	Tuff (100%)	Roof (Ulan: ULNB)	9.3	404	0.05		1.53	518.0	-516.47	338.29	NAF (Barren)
	EB1230893059	- N/A -	00509	BY0118CH	- N/A -	60.43	60.95	0.52	Dull & Stony Coal (100%)	Coal Composite (Ulan: ULNB, ULNC)	8.5	103	0.41	0.003	0.08	13.2	-13.12	172.41	NAF (Barren)
	EB1230893060	- N/A -	00510	BY0118CH	- N/A -	60.95	61.27	0.32	Siltstone (50%), Sandstone (30%), Carbonaceous shale (20%)	Floor (Ulan: ULNC)	8.6	63	0.04		1.23	9.6	-8.38	7.84	NAF (Barren)
	EB1230893065	- N/A -	00515	BY0118CH	- N/A -	68.67	69.00	0.33	Siltstone, Carbonaceous shale (50%)	Roof (Ulan: ULNH)	7.9	156	0.04		1.23	8.8	-7.58	7.18	NAF (Barren)

Table B3: Composite Samples Selected for Static Multi-Element Tests

RGS ME No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹ µS/cm	Total S %	Scr ² %	MPA ² kg H2SO4/t	ANC ² kg H2SO4/t	NAPP ² kg H2SO4/t	ANC: MPA Ratio	Sample Classification ³
						from	to	range											
	EB1230893066	- N/A -	00516	BY0118CH	- N/A -	69.50	69.85	0.35	Dull Coal (100%)	Coal Composite (Ulan: ULNH, ULIP)	7.5	114	0.24	0.036	1.10	8.7	-7.60	7.89	NAF (Barren)
	EB1230893067	- N/A -	00517	BY0118CH	- N/A -	70.56	70.80	0.24	Tuff (100%)	Parting (Ulan - CMKR ply)	8.7	331	0.06		1.84	108.0	-106.16	58.78	NAF (Barren)
	EB1230893068	- N/A -	00518	BY0118CH	- N/A -	71.65	72.00	0.35	Tuff (100%)	Parting (Ulan - FMKR ply)	8.4	218	0.07		2.14	7.8	-5.66	3.64	NAF (Barren)
	EB1230893069	- N/A -	00519	BY0118CH	- N/A -	74.25	74.50	0.25	Siltstone, Sandstone (50%)	Floor (Ulan: ULNN)	8.0	83	0.02		0.61	4.9	-4.29	8.00	NAF (Barren)
COGGAN SEAM: Roof + Floor + Coal																			
6	EB1230893020	- N/A -	00920	BY0070CH	- N/A -	24.00	26.00	2.00	Dull Coal (80%), Siltstone (20%)	Coal Composite (Coggan: COGC, COGDE) + Floor (COGDE)	8.1	258	0.13	0.016	0.49	6.9	-6.41	14.08	NAF (Barren)
	EB1230893012	- N/A -	00912	BY0071CH	- N/A -	27.41	27.91	0.50	Sandstone (100%)	Roof (Coggan: COGB)	5.5	228	0.005		0.15	0.3	-0.10	1.63	NAF (Barren)
	EB1230893013	- N/A -	00913	BY0071CH	- N/A -	30.53	30.83	0.30	Sandstone (100%)	Floor (Coggan: COGDE)	3.5	706	0.30	0.098	3.00	0.3	2.75	0.08	NAF (Barren)
	EB1230893072	- N/A -	00522	BY0118CH	- N/A -	76.39	76.81	0.42	Sandstone, Conglomerate (50%)	Roof (Coggan: COGB)	7.7	246	0.01		0.31	4.3	-3.99	14.04	NAF (Barren)
	EB1230893073	- N/A -	00523	BY0118CH	- N/A -	77.00	77.30	0.30	Stony Coal (100%)	Coal (Coggan: COGB)	7.6	64	0.21	0.006	0.18	5.4	-5.22	29.39	NAF (Barren)
	EB1230893074	- N/A -	00524	BY0118CH	- N/A -	79.98	80.32	0.34	Sandstone (80%), Siltstone (20%)	Floor (Coggan: COGDE)	3.5	1510	0.58	0.376	11.52	0.3	11.27	0.02	PAF
Coarse Reject : ULAN																			
11	EB1306433004	2001259202	MU1386-48	BY0003LDR1	RC1305-4132	Composite			ULNBC-1/2 + ULNHI-1/2 + ULMN-1/2	S1.80 Composite (Ulan) - Coarse Reject	8.5	147	0.17		5.21	29.6	-24.39	5.69	NAF
	EB1302369004	2001294402	MU1386-12	BY0016LDR2	N/A	28.01	29.39	1.38	ULN-1/2/3	S1.80 Composite (Ulan) - Coarse Reject	6.4	578	1.51	1.290	39.5	36.2	3.31	0.92	Uncertain
	EB1306433014	2001259302	MU1386-60	BY0037LDR1	RC1305-4152	109.24	110.57	1.33	ULNM-01 + ULNN-01	S1.80 Composite (Ulan) - Coarse Reject	8.4	139	0.11		3.37	37.2	-33.83	11.04	NAF
	EB1306744004	2001279002	MU1386-75	BY0062LDR1	RC1306-2013	127.49	128.50	1.01	ULNM-1/2	S1.80 Composite (Ulan) - Coarse Reject	7.6	30	0.19		5.82	19.5	-13.68	3.35	NAF

Table B3: Composite Samples Selected for Static Multi-Element Tests

RGS ME No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification
						from	to	range				µS/cm	%	kg H2SO4/t					
21	EB1404773001	N/A	N/A	BY0204CH	N/A	Composite			CHPP reject - Ulan Seam	7.0	407	0.08		2.45	47.6	-45.15	19.43	NAF (Barren)	
	EB1404773002	N/A	N/A	BY0285LD	N/A	Composite			CHPP reject - Ulan Seam	7.4	705	0.08		2.45	41	-38.55	16.73	NAF (Barren)	
Coarse Reject : COGGAN																			
12	EB1306433009	2001259202	MU1386-53	BY0003LDR1	RC1305-4135	122.09	125.70	3.61	COGB-1/2 + COGC-1/2 + COGD-1/2	S1.80 Composite (Coggan) - Coarse Reject	8.0	67	0.16		4.90	99.0	-94.10	20.20	NAF
	EB1302369009	2001294402	MU1386-17	BY0016LDR2	N/A	37.74	39.70	1.96	COGB-1/2 + COGC-1/2	S1.80 Composite (Coggan) - Coarse Reject	6.3	168	0.43	0.356	10.90	4.8	6.10	0.44	PAF (LC)
	EB1306433024	2001319202	MU1386-70	BY0034LDR1	RC1305-4174	22.70	24.04	1.34	COGC-1/2	S1.80 Composite (Coggan) - Coarse Reject	3.8	700	4.46	3.250	99.53	46.1	53.43	0.46	PAF
	EB1306433019	2001259302	MU1386-65	BY0037LDR1	RC1305-4157	116.89	120.77	3.88	COGB-1/2/3 + COGC-1/2	S1.80 Composite (Coggan) - Coarse Reject	8.1	102	0.12	0.009	0.28	7.2	-6.92	26.12	NAF (Barren)
	EB1306744009	2001279002	MU1386-80	BY0062LDR1	RC1306-2018	133.44	135.83	2.39	COGC-1/2 + COGD-1/2	S1.80 Composite (Coggan) - Coarse Reject	5.2	294	0.89	0.350	10.72	16.8	-6.08	1.57	NAF
22	EB1404773006	N/A	N/A	BY0283LD	N/A	Composite			CHPP reject - Coggan Seam	4.0	1140	1.17	0.767	23.49	4.6	18.89	0.20	PAF	
	EB1404773003	N/A	N/A	BY0288LD	N/A	Composite			CHPP reject - Coggan Seam	3.8	419	0.19	0.187	5.73	3.5	2.23	0.61	Uncertain	
Tailings : ULAN																			
13	EB1306433005	2001259202	MU1386-49	BY0003LDR1	RC1305-4133	Composite			ULNBC-1/2 + ULNHI-1/2 + ULMN-1/2	-0.125 Composite (Ulan) - Tailings	8.3	105	0.38		11.6	29.0	-17.4	2.49	NAF
	EB1302369005	2001294402	MU1386-13	BY0016LDR2	N/A	28.01	29.39	1.38	ULN-1/2/3	-0.125 Composite (Ulan) - Tailings	7.0	553	5.17	4.670	143.0	25.6	117.4	0.18	PAF
	EB1306433015	2001259302	MU1386-61	BY0037LDR1	RC1305-4151	109.24	110.57	1.33	ULNM-01 + ULNN-01	-0.125 Composite (Ulan) - Tailings	7.9	66	0.32	0.025	0.77	17.2	-16.43	22.47	NAF (Barren)
	EB1306744005	2001279002	MU1386-76	BY0062LDR1	RC1306-2014	127.49	128.50	1.01	ULNM-1/2	-0.125 Composite (Ulan) - Tailings	7.6	47	0.34	0.025	0.77	10.7	-9.93	13.98	NAF (Barren)
23	EB1407953001	N/A	N/A	BY0232LD	N/A	Composite			Tailings Composite - Ulan Seam	7.3	110	0.15		4.6	30.4	-25.8	6.62	NAF	
	EB1407953004	N/A	N/A	BY0283LD, BY0285LD + BY0288LD	N/A	Composite			Tailings Composite - Ulan Seam	7.5	114	0.35		10.7	40.5	-29.8	3.78	NAF	

Table B3: Composite Samples Selected for Static Multi-Element Tests

RGS ME No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification
						from	to	range				µS/cm	%	kg H2SO4/t					
Tailings : COGGAN																			
14	EB1306433010	2001259202	MU1386-54	BY0003LDR1	RC1305-4136	122.09	125.70	3.61	COGB-1/2 + COGC-1/2 + COGD-1/2	-0.125 Composite (Coggan) - Tailings	7.9	37	0.33	0.005	0.15	4.8	-4.65	31.35	NAF (Barren)
	EB1302369010	2001294402	MU1386-18	BY0016LDR2	N/A	37.74	39.70	1.96	COGB-1/2 + COGC-1/2	-0.125 Composite (Coggan) - Tailings	4.9	270	1.05	0.766	23.46	2.8	20.66	0.12	PAF
	EB1306433025	2001319202	MU1386-71	BY0034LDR1	RC1305-4175	22.70	24.04	1.34	COGC-1/2	-0.125 Composite (Coggan) - Tailings	4.5	281	1.59	1.210	37.06	5.4	31.66	0.15	PAF
	EB1306433020	2001259302	MU1386-66	BY0037LDR1	RC1305-4158	116.89	120.77	3.88	COGB-1/2/3 + COGC-1/2	-0.125 Composite (Coggan) - Tailings	7.4	51	0.36	0.034	1.04	8.4	-7.36	8.07	NAF (Barren)
	EB1306744010	2001279002	MU1386-81	BY0062LDR1	RC1306-2019	133.44	135.83	2.39	COGC-1/2 + COGD-1/2	-0.125 Composite (Coggan) - Tailings	6.9	73	0.66	0.258	7.90	2.9	5.00	0.37	Uncertain
24	EB1407953002	N/A	N/A	BY0030LD	N/A	Composite			Tailings Composite - Coggan Seam		7.3	85	0.24	0.016	0.49	10.2	-9.71	20.82	NAF (Barren)
	EB1407953003	N/A	N/A	BY0283LD, BY0285LD + BY0288LD	N/A	Composite			Tailings Composite - Coggan Seam (Open Cut area)		6.6	135	0.59	0.444	13.60	10.1	3.50	0.74	Uncertain

Notes:

1. Current pH and electrical conductivity (EC) provided for 1:5 sample:water extracts
2. Scr = Chromium reducible sulfur; MPA = Maximum potential acidity; ANC = Acid neutralising capacity; NAPP = Net acid producing potential
3. Sample classification based on total sulfur, Scr, NAPP, ANC:MPA ratio data as described in the report text

Table B4: Multi-Element Results for Selected Composite Samples

	Sample Type --->		Overburden	Overburden + Coal (Ulan)	Interburden				Interburden + Roof	Overburden, Interburden + Parting (Ulan)
	RGS composite number --->		4	5	15	16	19	20	1	3
	ALS Laboratory ID --->		EB1233255079	EB1233255080	EB1400137022	EB1400137023	EB1400137026	EB1400137027	EB1233255076	EB1233255078
	Material Description --->		Overburden - Sandstone + Siltstone (BY0071CH)	Overburden + Raw Coal (Ulan seam) - mixed lithology (BY0070CH + BY0071CH)	Interburden - Sandstone (BY0273CH)	Interburden - Sandstone (BY0294CH)	Interburden - Sandstone (BY0320CH)	Interburden - Siltstone (BY0322CH)	Interburden + Roof - Carbonaceous Shale mostly (BY0118CH)	Over/Inter-Burden + Parting - Sandstone + Siltstone (BY0070CH + BY0118CH)
Parameters	Detection Limit	NEPC ¹ Health-Based Investigation Level (HILs)								
Major Elements			All units in mg/kg							
Aluminium (Al)	50	-	5,000	6,620	3,220	3,580	3,930	3,490	4,260	5,250
Calcium (Ca)	50	-	4,930	4,770	5,970	1,400	1,050	18,000	1,740	9,430
Iron (Fe)	50	-	18,900	31,600	19,400	20,400	15,500	18,700	33,300	18,500
Magnesium (Mg)	50	-	3,520	4,080	3,620	2,720	1,530	3,650	2,130	1,500
Potassium (K)	50	-	1,320	1,780	1,100	1,220	1,200	1,060	1,240	1,300
Sodium (Na)	50	-	360	610	130	120	80	160	830	580
Minor Elements			All units in mg/kg							
Antimony (Sb)	5	-	<5	<5	<5	<5	<5	<5	<5	<5
Arsenic (As)	5	300	8	11	8	6	7	10	5	5
Boron (B)	50	20,000	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium (Cd)	1	90	<1	<1	<1	<1	<1	<1	<1	<1
Chromium (Cr)	2	300 **	31	37	42	39	66	54	11	18
Cobalt (Co)	2	300	7	20	10	10	15	8	16	11
Copper (Cu)	5	17,000	15	33	22	22	21	19	30	17
Lead (Pb)	5	600	18	15	16	17	17	13	16	17
Manganese (Mn)	5	19,000	221	708	376	294	328	298	818	518
Molybdenum (Mo)	2	-	<2	<2	<2	<2	<2	<2	<2	<2
Nickel (Ni)	2	1,200	40	104	56	59	40	43	77	38
Phosphorus (P)	50	-	160	190	160	120	100	130	90	110
Selenium (Se)	5	700	<5	<5	<5	<5	<5	<5	<5	<5
Thorium (Th)	0.1	-	-	-	6.3	6.4	4.4	3.9	-	-
Uranium (U)	0.1	-	-	-	0.7	0.8	0.7	0.8	-	-
Zinc (Zn)	5	30,000	42	74	66	84	82	53	56	58
Exchangeable Ions			All units in meq/100g (except for ESP)							
Exch. Calcium (Ca)	0.1	-	-	-	3.3	1.5	1.1	23.4	-	-
Exch. Magnesium (Mg)	0.1	-	-	-	3.2	2.6	2.0	2.7	-	-
Exch. Potassium (K)	0.1	-	-	-	0.5	0.6	0.4	0.4	-	-
Exch. Sodium (Na)	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1	-	-
Cation Exchange Capacity (CEC)	0.1	-	-	-	7.1	4.8	3.6	26.5	-	-
Exchangeable Sodium Percentage (ESP)	0.1%	-	-	-	0.5	1.3	0.6	0.2	-	-
Calcium/Magnesium Ratio	0.1	-	-	-	1.0	0.6	0.6	8.7	-	-

Notes < indicates less than the analytical detection limit. Shaded cells exceed applied guideline limit.

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

1. NEPC (2013). National Environmental Protection Council (NEPC). National Environmental Protection (Assessment of Site Contamination) Measure (NEPM). Guideline on investigation levels for soil and groundwater. Health Based Investigation Level HIL(C); recreational open spaces .

Table B4: Multi-Element Results for Selected Composite Samples

	Sample Type --->		Overburden + Interburden + Floor (Coggan)			Uneconomic Seam			Parting + Roof + Floor + Coal (Ulan)	Roof + Floor + Coal (Coggan)
	RGS composite number --->		2	17	18	8	9	10	7	6
	ALS Laboratory ID --->		EB1233255077	EB1400137024	EB1400137025	EB1233255083	EB1233255084	EB1233255085	EB1233255082	EB1233255081
	Material Description --->		Over/Inter-Burden + Floor - Sandstone + Siltstone (BY0118CH)	Overburden, Interburden + Pit Floor - Sandstone (BY0296CH)	Overburden, Interburden + Pit Floor - Sandstone (BY0318CH)	Roof - Uneconomic Seam (BY0118CH)	Coal - Uneconomic Seam (BY0118CH)	Floor - Uneconomic Seam (BY0118CH)	Raw Coal + Roof/Parting/Floor (Ulan) - mixed lithology (BY0070CH, BY0071CH + BY0118CH)	Raw Coal + Roof/Floor (Coggan) - mixed lithology (BY0070CH, BY0071CH + BY0118CH)
Parameters	Detection Limit	NEPC ¹ Health-Based Investigation Level (HILs)								
Major Elements			All units in mg/kg							
Aluminium (Al)	50	-	5,310	3,720	3,510	7,110	3,400	7,020	5,030	4,040
Calcium (Ca)	50	-	9,540	6,650	1,400	2,870	32,700	5,740	17,600	930
Iron (Fe)	50	-	21,900	13,900	22,100	41,200	9,770	23,600	20,400	11,800
Magnesium (Mg)	50	-	4,480	3,800	2,230	4,790	10,300	3,670	4,720	500
Potassium (K)	50	-	1,390	1,120	1,060	1,890	720	1,690	1,400	640
Sodium (Na)	50	-	810	100	100	2,170	1,080	2,620	330	80
Minor Elements			All units in mg/kg							
Antimony (Sb)	5	-	<5	<5	<5	<5	<5	<5	<5	<5
Arsenic (As)	5	300	10	7	19	12	<5	11	7	7
Boron (B)	50	20,000	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium (Cd)	1	90	<1	<1	<1	<1	<1	<1	<1	<1
Chromium (Cr)	2	300 **	36	42	34	10	5	19	8	29
Cobalt (Co)	2	300	9	12	12	14	6	8	8	4
Copper (Cu)	5	17,000	18	18	24	17	9	25	16	11
Lead (Pb)	5	600	16	12	18	24	8	19	24	11
Manganese (Mn)	5	19,000	387	273	356	976	219	590	868	201
Molybdenum (Mo)	2	-	<2	<2	<2	<2	<2	<2	<2	<2
Nickel (Ni)	2	1,200	48	45	52	58	35	46	25	6
Phosphorus (P)	50	-	110	100	190	220	220	130	70	<50
Selenium (Se)	5	700	<5	<5	<5	<5	<5	<5	<5	<5
Thorium (Th)	0.1	-	-	4.7	5.3	-	-	-	-	-
Uranium (U)	0.1	-	-	0.5	0.7	-	-	-	-	-
Zinc (Zn)	5	30,000	58	44	74	76	30	52	51	23
Exchangeable Ions			All units in meq/100g (except for ESP)							
Exch. Calcium (Ca)	0.1	-	-	3.7	1.3	-	-	-	-	-
Exch. Magnesium (Mg)	0.1	-	-	4.7	1.9	-	-	-	-	-
Exch. Potassium (K)	0.1	-	-	0.5	0.3	-	-	-	-	-
Exch. Sodium (Na)	0.1	-	-	<0.1	<0.1	-	-	-	-	-
Cation Exchange Capacity (CEC)	0.1	-	-	8.9	3.5	-	-	-	-	-
Exchangeable Sodium Percentage (ESP)	0.1%	-	-	0.3	0.3	-	-	-	-	-
Calcium/Magnesium Ratio	0.1	-	-	0.8	0.7	-	-	-	-	-

Notes < indicates less than the analytical detection limit. Shaded cells exceed applied guideline limit.

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

1. NEPC (2013). National Environmental Protection Council (NEPC). National Environmental Protection (Assessment of Site Contamination) Measure (NEPM). Guideline on investigation levels for soil and groundwater. Health Based Investigation Level HIL(C); recreational open spaces .

Table B4: Multi-Element Results for Selected Composite Samples

	Sample Type --->		Coarse Reject - Ulan		Coarse Reject - Coggan		Tailings - Ulan		Tailings - Coggan	
	RGS composite number --->		11	21	12	22	13	23	14	24
	ALS Laboratory ID --->		EB1311473019	EB1408909012	EB1311473020	EB1408909013	EB1311473021	EB1408909014	EB1311473022	EB1408909015
	Material Description --->									
Parameters	Detection Limit	NEPC ¹ Health-Based Investigation Level (HILs)	Coarse Reject Composite - Ulan Seam (mixed drill holes)	Coarse Reject Composite - Ulan Seam (mixed drill holes)	Coarse Reject Composite - Coggan Seam (mixed drill holes)	Coarse Reject Composite - Coggan Seam (mixed drill holes)	Tailings Composite - Ulan Seam (mixed drill holes)	Tailings Composite - Ulan Seam (mixed drill holes)	Tailings Composite - Coggan Seam (mixed drill holes)	Tailings Composite - Coggan Seam (mixed drill holes)
Major Elements			All units in mg/kg							
Aluminium (Al)	50	-	4,490	2,100	3,680	3,130	2,080	3,750	2,050	2,440
Calcium (Ca)	50	-	7,760	15,500	4,980	3,300	4,380	9,660	1,140	2,770
Iron (Fe)	50	-	60,100	48,000	146,000	69,300	21,600	15,200	20,200	12,100
Magnesium (Mg)	50	-	3,970	6,030	2,840	1,270	1,600	3,590	540	840
Potassium (K)	50	-	460	680	270	230	260	900	130	240
Sodium (Na)	50	-	220	320	240	130	70	80	80	90
Minor Elements			All units in mg/kg							
Antimony (Sb)	5	-	<5	<5	<5	<5	<5	<5	<5	<5
Arsenic (As)	5	300	10	<5	<5	<5	<5	<5	<5	<5
Boron (B)	50	20,000	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium (Cd)	1	90	<1	<1	1	<1	<1	<1	<1	<1
Chromium (Cr)	2	300 **	4	7	3	2	10	7	4	12
Cobalt (Co)	2	300	2	<2	<2	<2	3	<2	<2	<2
Copper (Cu)	5	17,000	20	12	24	27	78	21	48	32
Lead (Pb)	5	600	36	19	14	15	21	35	14	17
Manganese (Mn)	5	19,000	1,470	1,280	3,490	1,940	320	202	370	240
Molybdenum (Mo)	2	-	<2	<2	<2	<2	<2	<2	<2	<2
Nickel (Ni)	2	1,200	11	3	<2	<2	16	8	3	3
Phosphorus (P)	50	-	80	392	150	419	<50	281	130	414
Selenium (Se)	5	700	<5	<5	<5	<5	<5	<5	<5	<5
Thorium (Th)	0.1	-	-	10.5	-	9.8	-	21.8	-	8.3
Uranium (U)	0.1	-	-	1.2	-	1.1	-	2.1	-	1.0
Zinc (Zn)	5	30,000	59	28	58	15	368	116	426	102
Exchangeable Ions			All units in meq/100g (except for ESP)							
Exch. Calcium (Ca)	0.1	-	-	-	-	-	-	-	-	-
Exch. Magnesium (Mg)	0.1	-	-	-	-	-	-	-	-	-
Exch. Potassium (K)	0.1	-	-	-	-	-	-	-	-	-
Exch. Sodium (Na)	0.1	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity (CEC)	0.1	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percentage (ESP)	0.1%	-	-	-	-	-	-	-	-	-
Calcium/Magnesium Ratio	0.1	-	-	-	-	-	-	-	-	-

Notes < indicates less than the analytical detection limit. Shaded cells exceed applied guideline limit.

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

1. NEPC (2013). National Environmental Protection Council (NEPC). National Environmental Protection (Assessment of Site Contamination) Measure (NEPM). Guideline on investigation levels for soil and groundwater. Health Based Investigation Level HIL(C); recreational open spaces .

Table B5: Geochemical Abundance Index Results for Selected Composite Samples

			Sample Type --->	Overburden	Overburden + Coal (Ulan)	Interburden				Interburden + Roof	Overburden, Interburden + Parting (Ulan)
			RGS comp number --->	4	5	15	16	19	20	1	3
			ALS Laboratory ID --->	EB1233255079	EB1233255080	EB1400137022	EB1400137023	EB1400137026	EB1400137027	EB1233255076	EB1233255078
			Material Description --->								
Parameters	Detection Limit	Average Crustal Abundance ¹		Overburden - Sandstone + Siltstone (BY0071CH)	Overburden + Raw Coal (Ulan seam) - mixed lithology (BY0070CH + BY0071CH)	Interburden - Sandstone (BY0273CH)	Interburden - Sandstone (BY0294CH)	Interburden - Sandstone (BY0320CH)	Interburden - Siltstone (BY0322CH)	Interburden + Roof - Carbonaceous Shale mostly (BY0118CH)	Over/Inter-Burden + Parting - Sandstone + Siltstone (BY0070CH + BY0118CH)
Major Elements			mg/kg	Geochemical Abundance Index							
Aluminium (Al)	50	71000		0	0	0	0	0	0	0	0
Calcium (Ca)	50	15000		0	0	0	0	0	0	0	0
Iron (Fe)	50	40000		0	0	0	0	0	0	0	0
Magnesium (Mg)	50	5000		0	0	0	0	0	0	0	0
Potassium (K)	50	14000		0	0	0	0	0	0	0	0
Sodium (Na)	50	5000		0	0	0	0	0	0	0	0
Minor Elements			mg/kg	Geochemical Abundance Index							
Antimony (Sb)	5	5		0	0	0	0	0	0	0	0
Arsenic (As)	5	6		0	0	0	0	0	0	0	0
Boron (B)	50	100		0	0	0	0	0	0	0	0
Cadmium (Cd)	1	0.35		0	0	0	0	0	0	0	0
Chromium (Cr)	2	70		0	0	0	0	0	0	0	0
Cobalt (Co)	2	8		0	1	0	0	0	0	0	0
Copper (Cu)	5	30		0	0	0	0	0	0	0	0
Lead (Pb)	5	35		0	0	0	0	0	0	0	0
Manganese (Mn)	5	1,000		0	0	0	0	0	0	0	0
Molybdenum (Mo)	2	2		0	0	0	0	0	0	0	0
Nickel (Ni)	2	50		0	0	0	0	0	0	0	0
Phosphorus (P)	50	800		0	0	0	0	0	0	0	0
Selenium (Se)	5	0.4		0	0	0	0	0	0	0	0
Thorium (Th)	0.1	9		-	-	0	0	0	0	-	-
Uranium (U)	0.1	2		-	-	0	0	0	0	-	-
Zinc (Zn)	5	90		0	0	0	0	0	0	0	0

Notes:

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

1. Crustal Abundance values sourced from the "Gard Guide", chapter 5 (INAP, 2009).

1. when no Gard Guide value is available for particular element, then values are taken from Bowen H.J.M.(1979) Environmental Chemistry of the Elements, Academic Press, New York, p42-43.

Table B5: Geochemical Abundance Index Results for Selected Composite Samples

	Sample Type --->		Overburden + Interburden + Floor (Coggan)			Uneconomic Seam			Parting + Roof + Floor + Coal (Ulan)	Roof + Floor + Coal (Coggan)
	RGS comp number --->		2	17	18	8	9	10	7	6
	ALS Laboratory ID --->		EB1233255077	EB1400137024	EB1400137025	EB1233255083	EB1233255084	EB1233255085	EB1233255082	EB1233255081
	Material Description --->		Over/Inter-Burden + Floor - Sandstone + Siltstone (BY0118CH)	Overburden, Interburden + Pit Floor - Sandstone (BY0296CH)	Overburden, Interburden + Pit Floor - Sandstone (BY0318CH)	Roof - Uneconomic Seam (BY0118CH)	Coal - Uneconomic Seam (BY0118CH)	Floor - Uneconomic Seam (BY0118CH)	Raw Coal + Roof/Parting/Floor (Ulan) - mixed lithology (BY0070CH, BY0071CH + BY0118CH)	Raw Coal + Roof/Floor (Coggan) - mixed lithology (BY0070CH, BY0071CH + BY0118CH)
Parameters	Detection Limit	Average Crustal Abundance ¹								
Major Elements	mg/kg		Geochemical Abundance Index							
Aluminium (Al)	50	71000	0	0	0	0	0	0	0	0
Calcium (Ca)	50	15000	0	0	0	0	1	0	0	0
Iron (Fe)	50	40000	0	0	0	0	0	0	0	0
Magnesium (Mg)	50	5000	0	0	0	0	0	0	0	0
Potassium (K)	50	14000	0	0	0	0	0	0	0	0
Sodium (Na)	50	5000	0	0	0	0	0	0	0	0
Minor Elements	mg/kg		Geochemical Abundance Index							
Antimony (Sb)	5	5	0	0	0	0	0	0	0	0
Arsenic (As)	5	6	0	0	1	0	0	0	0	0
Boron (B)	50	100	0	0	0	0	0	0	0	0
Cadmium (Cd)	1	0.35	0	0	0	0	0	0	0	0
Chromium (Cr)	2	70	0	0	0	0	0	0	0	0
Cobalt (Co)	2	8	0	0	0	0	0	0	0	0
Copper (Cu)	5	30	0	0	0	0	0	0	0	0
Lead (Pb)	5	35	0	0	0	0	0	0	0	0
Manganese (Mn)	5	1,000	0	0	0	0	0	0	0	0
Molybdenum (Mo)	2	2	0	0	0	0	0	0	0	0
Nickel (Ni)	2	50	0	0	0	0	0	0	0	0
Phosphorus (P)	50	800	0	0	0	0	0	0	0	0
Selenium (Se)	5	0.4	0	0	0	0	0	0	0	0
Thorium (Th)	0.1	9	-	0	0	-	-	-	-	-
Uranium (U)	0.1	2	-	0	0	-	-	-	-	-
Zinc (Zn)	5	90	0	0	0	0	0	0	0	0

Notes:

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

1. Crustal Abundance values sourced from the "Gard Guide", chapter 5 (INAP, 2009).

1. when no Gard Guide value is available for particular element, then values are taken from Bowen H.J.M.(1979) Environmental Chemistry of the Elements, Academic Press, New York, p42-43.

Table B5: Geochemical Abundance Index Results for Selected Composite Samples

	Sample Type ---->		Coarse Reject - Ulan		Coarse Reject - Coggan		Tailings - Ulan		Tailings - Coggan	
	RGS comp number ---->		11	21	12	22	13	23	14	24
	ALS Laboratory ID ---->		EB1311473019	EB1408909012	EB1311473020	EB1408909013	EB1311473021	EB1408909014	EB1311473022	EB1408909015
	Material Description ---->									
Parameters	Detection Limit	Average Crustal Abundance ¹	Coarse Reject Composite - Ulan Seam (mixed drill holes)	Coarse Reject Composite - Ulan Seam (mixed drill holes)	Coarse Reject Composite - Coggan Seam (mixed drill holes)	Coarse Reject Composite - Coggan Seam (mixed drill holes)	Tailings Composite - Ulan Seam (mixed drill holes)	Tailings Composite - Ulan Seam (mixed drill holes)	Tailings Composite - Coggan Seam (mixed drill holes)	Tailings Composite - Coggan Seam (mixed drill holes)
Major Elements	mg/kg		Geochemical Abundance Index							
Aluminium (Al)	50	71000	0	0	0	0	0	0	0	0
Calcium (Ca)	50	15000	0	0	0	0	0	0	0	0
Iron (Fe)	50	40000	0	0	1	0	0	0	0	0
Magnesium (Mg)	50	5000	0	0	0	0	0	0	0	0
Potassium (K)	50	14000	0	0	0	0	0	0	0	0
Sodium (Na)	50	5000	0	0	0	0	0	0	0	0
Minor Elements	mg/kg		Geochemical Abundance Index							
Antimony (Sb)	5	5	0	0	0	0	0	0	0	0
Arsenic (As)	5	6	0	0	0	0	0	0	0	0
Boron (B)	50	100	0	0	0	0	0	0	0	0
Cadmium (Cd)	1	0.35	0	0	1	0	0	0	0	0
Chromium (Cr)	2	70	0	0	0	0	0	0	0	0
Cobalt (Co)	2	8	0	0	0	0	0	0	0	0
Copper (Cu)	5	30	0	0	0	0	1	0	0	0
Lead (Pb)	5	35	0	0	0	0	0	0	0	0
Manganese (Mn)	5	1,000	0	0	1	0	0	0	0	0
Molybdenum (Mo)	2	2	0	0	0	0	0	0	0	0
Nickel (Ni)	2	50	0	0	0	0	0	0	0	0
Phosphorus (P)	50	800	0	0	0	0	0	0	0	0
Selenium (Se)	5	0.4	0	0	0	0	0	0	0	0
Thorium (Th)	0.1	9	-	0	-	0	-	1	-	0
Uranium (U)	0.1	2	-	0	-	0	-	0	-	0
Zinc (Zn)	5	90	0	0	0	0	1	0	2	0

Notes:

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

1. Crustal Abundance values sourced from the "Gard Guide", chapter 5 (INAP, 2009).

1. when no Gard Guide value is available for particular element, then values are taken from Bowen H.J.M.(1979) Environmental Chemistry of the Elements, Academic Press, New York, p42-43.

Table B6: Multi-Element Results for Water Extracts from Selected Composite Samples

		Sample Type ---->	Overburden	Overburden + Coal (Ulan)	Interburden				Interburden + Roof	Overburden, Interburden + Parting (Ulan)
		RGS composite number -->	4	5	15	16	19	20	1	3
		ALS Laboratory ID -->	EB1233255079	EB1233255080	EB1400137022	EB1400137023	EB1400137026	EB1400137027	EB1233255076	EB1233255078
		Material Description -->	Overburden - Sandstone + Siltstone (BY0071CH)	Overburden + Raw Coal (Ulan seam) - mixed lithology (BY0070CH + BY0071CH)	Interburden - Sandstone (BY0273CH)	Interburden - Sandstone (BY0294CH)	Interburden - Sandstone (BY0320CH)	Interburden - Siltstone (BY0322CH)	Interburden + Roof - Carbonaceous Shale mostly (BY0118CH)	Over/Inter-Burden + Parting - Sandstone + Siltstone (BY0070CH + BY0118CH)
		Water Quality Guidelines								
Parameters	Detection Limit	Livestock Drinking Water ¹								
pH	0.01 pH unit	-	8.72	8.66	8.40	8.01	7.58	8.46	7.99	7.97
Electrical Conductivity	1 µS/cm	3580 ^A	326	522	131	81	98	84	252	349
Total Alkalinity (mgCaCO ₃ /L)	0.2 mg/L	-	64	97	54	31	31	74	126	82
Bicarbonate Alkalinity (mgCaCO ₃ /L)	0.2 mg/L	-	64	97	48	31	31	65	126	82
Carbonate Alkalinity (mgCaCO ₃ /L)	0.2 mg/L	-	<0.2	<0.2	6	<0.2	<0.2	9	<0.2	<0.2
Major Ions		All units in mg/L								
Calcium (Ca)	2	1,000	<2	<2	4	<2	2	8	<2	6
Magnesium (Mg)	2	-	<2	<2	4	<2	4	4	<2	2
Potassium (K)	2	-	12	10	12	8	12	12	4	14
Sodium (Na)	2	-	38	58	10	10	8	18	40	50
Chloride (Cl)	2	-	34	16	4	2	4	12	<2	2
Sulfate (SO ₄)	2	1,000	8	18	18	16	34	18	30	58
Metals		All units in mg/L								
Aluminium (Al)	0.2	5	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Antimony (Sb)	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	<0.02	0.04	0.02	<0.02	0.02	<0.02	<0.02
Boron (B)	0.2	5	<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
Chromium (Cr)*	0.02	1 (total)	<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	<0.02	<0.02	<0.02
Copper (Cu)	0.02	1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Iron (Fe)	0.2	1 (irrigation)	<0.2	<0.2	<0.2	<0.2	<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
Manganese (Mn)	0.02	2 (irrigation)	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02
Molybdenum (Mo)	0.02	0.15	<0.02	<0.02	0.04	0.04	0.10	0.04	0.04	0.08
Nickel (Ni)	0.02	1	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phosphorus (P)	0.4	-	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Selenium (Se)	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02
Thorium (Th)	0.002	-	-	-	<0.002	<0.002	<0.002	<0.002	-	-
Uranium (U)	0.002	0.2	-	-	<0.002	<0.002	<0.002	<0.002	-	-
Zinc (Zn)	0.02	20	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

* Cr (VI) = hexavalent

^A calculated based on total dissolved solids (TDS) conversion rate of 0.67% of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water.

Notes: < Indicates concentration less than the detection limit.

Shaded cells indicate values which exceed applied guideline values.

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Table B6: Multi-Element Results for Water Extracts from Selected Composite Samples

		Sample Type -->	Overburden + Interburden + Floor (Coggan)			Uneconomic Seam			Parting + Roof + Floor + Coal (Ulan)	Roof + Floor + Coal (Coggan)
		RGS composite number -->	2	17	18	8	9	10	7	6
		ALS Laboratory ID -->	EB1233255077	EB1400137024	EB1400137025	EB1233255083	EB1233255084	EB1233255085	EB1233255082	EB1233255081
		Material Description -->	Over/Inter-Burden + Floor - Sandstone + Siltstone (BY0118CH)	Overburden, Interburden + Pit Floor - Sandstone (BY0296CH)	Overburden, Interburden + Pit Floor - Sandstone (BY0318CH)	Roof - Uneconomic Seam (BY0118CH)	Coal - Uneconomic Seam (BY0118CH)	Floor - Uneconomic Seam (BY0118CH)	Raw Coal + Roof/Parting/Floor (Ulan) - mixed lithology (BY0070CH, BY0071CH + BY0118CH)	Raw Coal + Roof/Floor (Coggan) - mixed lithology (BY0070CH, BY0071CH + BY0118CH)
		Water Quality Guidelines	Livestock Drinking Water ¹							
Parameters	Detection Limit									
pH	0.01 pH unit	-	7.07	8.15	4.40	9.01	8.59	8.73	6.37	3.97
Electrical Conductivity	1 µS/cm	3580 ^A	569	115	179	436	182	320	235	502
Total Alkalinity (mgCaCO ₃ /L)	0.2 mg/L	-	128	62	18	100	149	159	79	13
Bicarbonate Alkalinity (mgCaCO ₃ /L)	0.2 mg/L	-	128	56	18	100	149	159	79	13
Carbonate Alkalinity (mgCaCO ₃ /L)	0.2 mg/L	-	<0.2	6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Major Ions		All units in mg/L								
Calcium (Ca)	2	1,000	20	4	12	<2	6	<2	10	64
Magnesium (Mg)	2	-	6	6	14	<2	4	<2	8	24
Potassium (K)	2	-	24	12	14	4	8	6	16	12
Sodium (Na)	2	-	64	8	12	52	46	70	22	8
Chloride (Cl)	2	-	4	4	4	4	2	4	4	4
Sulfate (SO ₄)	2	1,000	172	16	122	26	4	22	18	260
Metals		All units in mg/L								
Aluminium (Al)	0.2	5	<0.2	<0.2	<0.2	<0.2	<0.2	0.4	<0.2	<0.2
Antimony (Sb)	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	0.02	<0.02	0.30	0.02	0.14	<0.02	<0.02
Boron (B)	0.2	5	<0.2	<0.2	<0.2	<0.2	0.4	<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
Chromium (Cr)*	0.02	1 (total)	<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	0.06	<0.02	<0.02	<0.02	<0.02	0.06
Copper (Cu)	0.02	1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Iron (Fe)	0.2	1 (irrigation)	<0.2	<0.2	<0.2	<0.2	<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
Manganese (Mn)	0.02	2 (irrigation)	<0.02	<0.02	0.22	<0.02	<0.02	<0.02	<0.02	1.3
Molybdenum (Mo)	0.02	0.15	0.02	0.04	<0.02	0.14	0.02	0.04	0.02	<0.02
Nickel (Ni)	0.02	1	<0.02	<0.02	0.16	<0.02	<0.02	<0.02	<0.02	0.08
Phosphorus (P)	0.4	-	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Selenium (Se)	0.02	0.02	<0.02	<0.02	<0.02	0.04	<0.02	0.04	<0.02	<0.02
Thorium (Th)	0.002	-	-	<0.002	<0.002	-	-	-	-	-
Uranium (U)	0.002	0.2	-	<0.002	<0.002	-	-	-	-	-
Zinc (Zn)	0.02	20	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.1

* Cr (VI) = hexavalent

^A calculated based on total dissolved solids (TDS) conversion rate of 0.67% of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water.

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Shaded cells indicate values which exceed applied guideline values.

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Table B6: Multi-Element Results for Water Extracts from Selected Composite Samples

		Sample Type -->	Coarse Reject - Ulan		Coarse Reject - Coggan		Tailings - Ulan		Tailings - Coggan	
		RGS composite number -->	11	21	12	22	13	23	14	24
		ALS Laboratory ID -->	EB1311473019	EB1408909012	EB1311473020	EB1408909013	EB1311473021	EB1408909014	EB1311473022	EB1408909015
		Material Description -->	Coarse Reject Composite - Ulan Seam (mixed drill holes)	Coarse Reject Composite - Ulan Seam (mixed drill holes)	Coarse Reject Composite - Coggan Seam (mixed drill holes)	Coarse Reject Composite - Coggan Seam (mixed drill holes)	Tailings Composite - Ulan Seam (mixed drill holes)	Tailings Composite - Ulan Seam (mixed drill holes)	Tailings Composite - Coggan Seam (mixed drill holes)	Tailings Composite - Coggan Seam (mixed drill holes)
		Water Quality Guidelines								
Parameters	Detection Limit	Livestock Drinking Water ¹								
pH	0.01 pH unit	-	6.97	7.16	4.48	3.89	7.45	7.39	5.05	6.82
Electrical Conductivity	1 µS/cm	3580 ^A	224	556	266	780	193	112	142	110
Total Alkalinity (mgCaCO ₃ /L)	0.2 mg/L	-	66	81	5	<0.2	59	35	16	38
Bicarbonate Alkalinity (mgCaCO ₃ /L)	0.2 mg/L	-	66	81	5	<0.2	59	35	16	38
Carbonate Alkalinity (mgCaCO ₃ /L)	0.2 mg/L	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Major Ions		All units in mg/L								
Calcium (Ca)	2	1,000	44	78	42	76	76	12	24	24
Magnesium (Mg)	2	-	16	24	24	48	18	4	8	6
Potassium (K)	2	-	8	18	6	4	4	10	2	4
Sodium (Na)	2	-	24	32	20	6	4	8	6	6
Chloride (Cl)	2	-	28	266	42	162	10	4	8	4
Sulfate (SO ₄)	2	1,000	142	4	238	374	178	12	108	42
Metals		All units in mg/L								
Aluminium (Al)	0.2	5	<0.2	<0.2	0.4	4.0	<0.2	<0.2	<0.2	<0.2
Antimony (Sb)	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	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02
Boron (B)	0.2	5	<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
Chromium (Cr)*	0.02	1 (total)	<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	<0.02	<0.02	<0.02
Copper (Cu)	0.02	1	<0.02	<0.02	<0.02	0.14	<0.02	<0.02	0.0	<0.02
Iron (Fe)	0.2	1 (irrigation)	<0.2	<0.2	6.8	54.6	<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
Manganese (Mn)	0.02	2 (irrigation)	0.2	0.04	4.9	17.9	0.20	<0.02	0.98	<0.02
Molybdenum (Mo)	0.02	0.15	<0.02	0.04	<0.02	<0.02	<0.02	0.02	<0.02	<0.02
Nickel (Ni)	0.02	1	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	0.02	<0.02
Phosphorus (P)	0.4	-	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Selenium (Se)	0.02	0.02	0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	0.04
Thorium (Th)	0.002	-	-	<0.002	-	<0.002	-	<0.002	-	<0.002
Uranium (U)	0.002	0.2	-	<0.002	-	0.004	-	<0.002	-	<0.002
Zinc (Zn)	0.02	20	<0.02	<0.02	1.5	0.1	0.8	<0.02	17.9	<0.02

* Cr (VI) = hexavalent

^A calculated based on total dissolved solids (TDS) conversion rate of 0.67% of EC. TDS is an approximate measure of inorganic dissolved salts and should not exceed 2,400mg/L for livestock drinking water.

Notes: < Indicates concentration less than the detection limit.

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Table B7: Composite Samples Selected for Kinetic Leach Column Tests

RGS KLC No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³
						from	to	range				µS/cm	%	kg H2SO4/t					
Overburden + Interburden + Parting (Ulan)																			
2	EB1230893045	- N/A -	00945	BY0118CH	- N/A -	45.11	45.40	0.29	Siltstone	Overburden	8.8	496	0.06		1.84	21.9	-20.06	11.92	NAF (Barren)
	EB1230893057	- N/A -	00507	BY0118CH	- N/A -	58.72	58.94	0.22	Siltstone	Overburden	8.6	57	0.02		0.61	11.6	-10.99	18.94	NAF (Barren)
	EB1230893070	- N/A -	00520	BY0118CH	- N/A -	74.60	74.94	0.34	Siltstone, Sandstone (50%)	Parting (Ulan - UCSIL ply)	7.5	110	0.04		1.23	4.0	-2.78	3.27	NAF (Barren)
Overburden + Interburden + Floor (Coggan)																			
1	EB1230893041	- N/A -	00941	BY0118CH	- N/A -	40.58	40.91	0.33	Siltstone	Overburden	9.0	376	0.02		0.61	18.3	-17.69	29.88	NAF (Barren)
	EB1230893050	- N/A -	00950	BY0118CH	- N/A -	51.54	51.88	0.34	Siltstone	Overburden	9.2	186	0.02		0.61	19.1	-18.49	31.18	NAF (Barren)
	EB1230893061	- N/A -	00511	BY0118CH	- N/A -	63.38	63.68	0.30	Sandstone	Interburden	8.7	321	0.01		0.31	75.0	-74.69	244.90	NAF (Barren)
	EB1230893063	- N/A -	00513	BY0118CH	- N/A -	65.52	65.87	0.35	Siltstone, Sandstone	Interburden	8.5	305	0.02		0.61	65.5	-64.89	106.94	NAF (Barren)
	EB1230893071	- N/A -	00521	BY0118CH	- N/A -	75.50	75.86	0.36	Sandstone	Interburden	8.4	248	0.01		0.15	39.4	-39.25	257.31	NAF (Barren)
	EB1230893075	- N/A -	00525	BY0118CH	- N/A -	81.48	81.79	0.31	Sandstone (90%), Siltstone (10%)	1.5m below Floor (Coggan: COGDE)	6.3	1980	1.15	0.791	24.22	9.4	14.82	0.39	PAF
ULAN SEAM: Roof/Parting/Floor + Coal																			
4	EB1230893008	- N/A -	00908	BY0071CH	- N/A -	18.20	18.50	0.30	Coal+Mudstone (50%), Siltstone	Roof (Ulan: ULHJ)	7.7	351	0.005		0.15	4.8	-4.65	31.35	NAF (Barren)
	EB1230893009	- N/A -	00909	BY0071CH	- N/A -	20.70	21.02	0.32	Tuff (100%)	Parting (Ulan - FMKR ply)	8.4	437	0.05		1.53	3.1	-1.57	2.02	NAF (Barren)
	EB1230893010	- N/A -	00910	BY0071CH	- N/A -	22.96	23.26	0.30	Siltstone (100%)	Floor (Ulan: ULNN)	5.3	150	0.005		0.15	0.3	-0.10	1.63	NAF (Barren)
	EB1230893058	- N/A -	00508	BY0118CH	- N/A -	60.00	60.26	0.26	Tuff (100%)	Roof (Ulan: ULNB)	9.3	404	0.05		1.53	518.0	-516.47	338.29	NAF (Barren)
	EB1230893059	- N/A -	00509	BY0118CH	- N/A -	60.43	60.95	0.52	Dull & Stony Coal (100%)	Coal Composite (Ulan: ULNB, ULNC)	8.5	103	0.41	0.003	0.08	13.2	-13.12	172.41	NAF (Barren)
	EB1230893060	- N/A -	00510	BY0118CH	- N/A -	60.95	61.27	0.32	Siltstone (50%), Sandstone (30%), Carbonaceous shale (20%)	Floor (Ulan: ULNC)	8.6	63	0.04		1.23	9.6	-8.38	7.84	NAF (Barren)
	EB1230893065	- N/A -	00515	BY0118CH	- N/A -	68.67	69.00	0.33	Siltstone, Carbonaceous shale (50%)	Roof (Ulan: ULNH)	7.9	156	0.04		1.23	8.8	-7.58	7.18	NAF (Barren)
	EB1230893066	- N/A -	00516	BY0118CH	- N/A -	69.50	69.85	0.35	Dull Coal (100%)	Coal Composite (Ulan: ULNH, ULIP)	7.5	114	0.24	0.036	1.10	8.7	-7.60	7.89	NAF (Barren)
	EB1230893067	- N/A -	00517	BY0118CH	- N/A -	70.56	70.80	0.24	Tuff (100%)	Parting (Ulan - CMKR ply)	8.7	331	0.06		1.84	108.0	-106.16	58.78	NAF (Barren)
	EB1230893068	- N/A -	00518	BY0118CH	- N/A -	71.65	72.00	0.35	Tuff (100%)	Parting (Ulan - FMKR ply)	8.4	218	0.07		2.14	7.8	-5.66	3.64	NAF (Barren)
	EB1230893069	- N/A -	00519	BY0118CH	- N/A -	74.25	74.50	0.25	Siltstone, Sandstone (50%)	Floor (Ulan: ULNN)	8.0	83	0.02		0.61	4.9	-4.29	8.00	NAF (Barren)

Table B7: Composite Samples Selected for Kinetic Leach Column Tests

RGS KLC No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³
						from	to	range				µS/cm	%	kg H2SO4/t					
COGGAN SEAM: Roof + Floor + Coal																			
3	EB1230893012	- N/A -	00912	BY0071CH	- N/A -	27.41	27.91	0.50	Sandstone (100%)	Roof (Coggan: COGB)	5.5	228	0.005		0.15	0.3	-0.10	1.63	NAF (Barren)
	EB1230893013	- N/A -	00913	BY0071CH	- N/A -	30.53	30.83	0.30	Sandstone (100%)	Floor (Coggan: COGDE)	3.5	706	0.30	0.098	3.00	0.3	2.75	0.08	NAF (Barren)
	EB1230893072	- N/A -	00522	BY0118CH	- N/A -	76.39	76.81	0.42	Sandstone, Conglomerate (50%)	Roof (Coggan: COGB)	7.7	246	0.01		0.31	4.3	-3.99	14.04	NAF (Barren)
	EB1230893073	- N/A -	00523	BY0118CH	- N/A -	77.00	77.30	0.30	Stony Coal (100%)	Coal (Coggan: COGB)	7.6	64	0.21	0.006	0.18	5.4	-5.22	29.39	NAF (Barren)
	EB1230893074	- N/A -	00524	BY0118CH	- N/A -	79.98	80.32	0.34	Sandstone (80%), Siltstone (20%)	Floor (Coggan: COGDE)	3.5	1510	0.58	0.376	11.52	0.3	11.27	0.02	PAF
Coarse Reject : COGGAN																			
6	EB1306433009	2001259202	MU1386-53	BY0003LDR1	RC1305-4135	122.09	125.70	3.61	COGB-1/2 + COGC- 1/2 + COGD-1/2	S1.80 Composite (Coggan) - Coarse Reject	8.0	67	0.16		4.90	99.0	-94.10	20.20	NAF
	EB1302369009	2001294402	MU1386-17	BY0016LDR2	N/A	37.74	39.70	1.96	COGB-1/2 + COGC- 1/2	S1.80 Composite (Coggan) - Coarse Reject	6.3	168	0.43	0.356	10.90	4.8	6.10	0.44	PAF (LC)
	EB1306433024	2001319202	MU1386-70	BY0034LDR1	RC1305-4174	22.70	24.04	1.34	COGC-1/2	S1.80 Composite (Coggan) - Coarse Reject	3.8	700	4.46	3.250	99.53	46.1	53.43	0.46	PAF
	EB1306433019	2001259302	MU1386-65	BY0037LDR1	RC1305-4157	116.89	120.77	3.88	COGB-1/2/3 + COGC- 1/2	S1.80 Composite (Coggan) - Coarse Reject	8.1	102	0.12	0.009	0.28	7.2	-6.92	26.12	NAF (Barren)
	EB1306744009	2001279002	MU1386-80	BY0062LDR1	RC1306-2018	133.44	135.83	2.39	COGC-1/2 + COGD- 1/2	S1.80 Composite (Coggan) - Coarse Reject	5.2	294	0.89	0.350	10.72	16.8	-6.08	1.57	NAF
8	EB1404773006	N/A	N/A	BY0283LD	N/A	Composite			CHPP reject - Coggan Seam		4.0	1140	1.17	0.767	23.49	4.6	18.89	0.20	PAF
	EB1404773003	N/A	N/A	BY0288LD	N/A	Composite			CHPP reject - Coggan Seam		3.8	419	0.19	0.187	5.73	3.5	2.23	0.61	Uncertain
Tailings : ULAN																			
5	EB1306433005	2001259202	MU1386-49	BY0003LDR1	RC1305-4133	Composite			ULNBC-1/2 + ULNHI- 1/2 + ULMN-1/2	-0.125 Composite (Ulan) - Tailings	8.3	105	0.38		11.6	29.0	-17.4	2.49	NAF
	EB1302369005	2001294402	MU1386-13	BY0016LDR2	N/A	28.01	29.39	1.38	ULN-1/2/3	-0.125 Composite (Ulan) - Tailings	7.0	553	5.17	4.670	143.0	25.6	117.4	0.18	PAF
	EB1306433015	2001259302	MU1386-61	BY0037LDR1	RC1305-4151	109.24	110.57	1.33	ULNM-01 + ULNN-01	-0.125 Composite (Ulan) - Tailings	7.9	66	0.32	0.025	0.77	17.2	-16.43	22.47	NAF (Barren)
	EB1306744005	2001279002	MU1386-76	BY0062LDR1	RC1306-2014	127.49	128.50	1.01	ULNM-1/2	-0.125 Composite (Ulan) - Tailings	7.6	47	0.34	0.025	0.77	10.7	-9.93	13.98	NAF (Barren)

Table B7: Composite Samples Selected for Kinetic Leach Column Tests

RGS KLC No.	ALS Laboratory Number	ACIRL or SGS Job No.	Client Sample ID	Drill Hole Number	Additional Identification Codes	Depth Interval (m)			Lithological Description and/or Coal Quality Lab Seam Codes	Sample Type & Seam Source	pH ¹	EC ¹	Total S	Scr ²	MPA ²	ANC ²	NAPP ²	ANC: MPA Ratio	Sample Classification ³	
						from	to	range				µS/cm	%	kg H2SO4/t						
Tailings : COGGAN																				
7	EB1306433010	2001259202	MU1386-54	BY0003LDR1	RC1305-4136	122.09	125.70	3.61	COGB-1/2 + COGC-1/2 + COGD-1/2	-0.125 Composite (Coggan) - Tailings	7.9	37	0.33	0.005	0.15	4.8	-4.65	31.35	NAF (Barren)	
	EB1302369010	2001294402	MU1386-18	BY0016LDR2	N/A	37.74	39.70	1.96	COGB-1/2 + COGC-1/2	-0.125 Composite (Coggan) - Tailings	4.9	270	1.05	0.766	23.46	2.8	20.66	0.12	PAF	
	EB1306433025	2001319202	MU1386-71	BY0034LDR1	RC1305-4175	22.70	24.04	1.34	COGC-1/2	-0.125 Composite (Coggan) - Tailings	4.5	281	1.59	1.210	37.06	5.4	31.66	0.15	PAF	
	EB1306433020	2001259302	MU1386-66	BY0037LDR1	RC1305-4158	116.89	120.77	3.88	COGB-1/2/3 + COGC-1/2	-0.125 Composite (Coggan) - Tailings	7.4	51	0.36	0.034	1.04	8.4	-7.36	8.07	NAF (Barren)	
	EB1306744010	2001279002	MU1386-81	BY0062LDR1	RC1306-2019	133.44	135.83	2.39	COGC-1/2 + COGD-1/2	-0.125 Composite (Coggan) - Tailings	6.9	73	0.66	0.258	7.90	2.9	5.00	0.37	Uncertain	
9	EB1407953002	N/A	N/A	BY0030LD	N/A	Composite			Tailings Composite - Coggan Seam		7.3	85	0.24	0.016	0.49	10.2	-9.71	20.82	NAF (Barren)	
	EB1407953003	N/A	N/A	BY0283LD, BY0285LD + BY0288LD	N/A	Composite			Tailings Composite - Coggan Seam (Open Cut area)		6.6	135	0.59	0.444	13.60	10.1	3.50	0.74	Uncertain	

Notes:

1. Current pH and electrical conductivity (EC) provided for 1:5 sample:water extracts
2. Scr = Chromium reducible sulfur; MPA = Maximum potential acidity; ANC = Acid neutralising capacity; NAPP = Net acid producing potential
3. Sample classification based on total sulfur, Scr, NAPP, ANC:MPA ratio data as described in the report text

ATTACHMENT C

Tables of Results and Trends – Kinetic Leach Column Tests

RGS-KLC # 1: Bylong Coal Project
KLC Test Results: Over/Interburden & Floor

		Weight (kg)	1.58	Total S (%)	0.20	ANC	37.78	
		pH (1:5)	7.07	CRS (%)	0.144	NAPP	-33.36	
		EC (µS/cm)	569	MPA	4.42	ANC:MPA	8.55	
Date		21-Dec-12	4-Jan-13	18-Jan-13	1-Feb-13	15-Feb-13	1-Mar-13	15-Mar-13
Week		0	2	4	6	8	10	12
Leach Number		1	2	3	4	5	6	7
ALS Laboratory ID		EB1233397	EB1300266	EB1301128	EB1302358	EB1303930	EB1305353	EB1306627
Volume Collected (L)		0.786	0.812	0.822	0.844	0.821	0.851	0.840
Cum. Volume (L)		0.79	1.60	2.42	3.26	4.09	4.94	5.78
Pore Volumes		0.6	1.2	1.8	2.4	3.0	3.7	4.3
pH		6.97	6.77	5.88	5.90	5.62	5.67	5.89
EC (µS/cm)		501	302	355	402	411	452	406
Acidity (mg/L)*		5	2	5	8	5	5	2
Alkalinity (mg/L)*		33	4	5	<1	4	5	3
Net Alkalinity (mg/L)*		28	2	0	-8	-1	0	1
	Guideline Values[#]							
Aluminium (Al)	5	0.01	0.02	0.17	0.26	0.23	0.11	0.07
Arsenic (As)	0.5	0.003	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Boron (B)	5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Calcium (Ca)	1000	24	10	14	15	18	19	18
Cadmium (Cd)	0.01	<0.0001	0.0003	0.0001	<0.0001	0.0002	0.0001	<0.0001
Chloride (Cl)	-	6	8	5	3	2	2	1
Cobalt (Co)	1	0.009	0.008	0.012	0.011	0.012	0.014	0.011
Chromium (Cr)	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (Cu)	1	0.001	<0.001	<0.001	0.002	0.002	<0.001	<0.001
Fluoride (F)	2	-	-	-	-	-	-	-
Iron (Fe)	1 [#]	<0.05	<0.05	0.09	0.11	0.32	0.60	0.22
Potassium (K)	-	9	4	6	5	6	6	5
Magnesium (Mg)	-	6	3	4	5	6	7	8
Manganese (Mn)	2 [#]	0.278	0.136	0.210	0.218	0.250	0.313	0.301
Molybdenum (Mo)	0.15	0.020	0.003	0.002	<0.001	<0.001	<0.001	<0.001
Sodium (Na)	-	59	40	49	50	52	50	44
Nickel (Ni)	1	0.009	0.010	0.022	0.026	0.028	0.032	0.028
Phosphorus (P)	-	-	-	-	-	-	-	-
Lead (Pb)	0.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfate (SO₄)	1,000	200	116	151	175	184	193	179
Antimony (Sb)	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium (Se)	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium (Th)	-	-	-	-	-	-	-	-
Uranium (U)	0.2	-	-	-	-	-	-	-
Zinc (Zn)	20	<0.005	0.007	0.032	0.043	0.048	0.049	0.039
Calculations**								
SO₄ Release Rate		99	59	78	93	95	104	95
Cumulative SO₄ Release		99	159	237	330	426	529	624
Ca Release Rate		11.9	5.1	7.3	8.0	9.3	10.2	9.5
Cumulative Ca Release		11.9	17.0	24.3	32.3	41.6	51.8	61.4
Mg Release Rate		3.0	1.5	2.1	2.7	3.1	3.8	4.2
Cumulative Mg Release		3.0	4.5	6.6	9.3	12.4	16.1	20.4
Residual ANC (%)		99.9	99.8	99.8	99.7	99.6	99.5	99.4
Residual Sulfur (%)		98.3	97.4	96.0	94.5	92.9	91.2	89.6
SO₄/(Ca+Mg) molar ratio		2.5	3.2	3.1	3.1	2.8	2.6	2.4

< indicates less than the analytical detection limit. * Acidity and alkalinity data calculated in mg CaCO₃/L.

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

Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity

MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential

[#] Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, 2000, ANZECC (Australian and New Zealand Environment Conservation Council) and ARMCAZ (Agriculture and Resource Management Council of Australia and New Zealand). Livestock Drinking Water Levels (Irrigation Levels used for Fe and Mn).

RGS-KLC # 2: Bylong Coal Project
KLC Test Results: Overburden & Parting

		Weight (kg)	1.45	Total S (%)	0.04	ANC	12.50	
		pH (1:5)	7.92	CRS (%)	---	NAPP	-11.28	
		EC (µS/cm)	221	MPA	1.23	ANC:MPA	10.20	
Date		21-Dec-12	4-Jan-13	18-Jan-13	1-Feb-13	15-Feb-13	1-Mar-13	15-Mar-13
Week		0	2	4	6	8	10	12
Leach Number		1	2	3	4	5	6	7
ALS Laboratory ID		EB1233397	EB1300266	EB1301128	EB1302358	EB1303930	EB1305353	EB1306627
Volume Collected (L)		0.777	0.802	0.806	0.845	0.822	0.841	0.845
Cum. Volume (L)		0.78	1.58	2.39	3.23	4.05	4.89	5.74
Pore Volumes		0.6	1.2	1.8	2.4	3.0	3.6	4.3
pH		7.44	7.07	6.98	7.41	7.38	7.86	7.97
EC (µS/cm)		227	189	172	205	158	165	172
Acidity (mg/L)*		2	2	2	2	1	2	<1
Alkalinity (mg/L)*		15	8	11	16	21	18	34
Net Alkalinity (mg/L)*		13	6	9	14	20	16	34
	Guideline Values [#]							
Aluminium (Al)	5	0.04	0.06	0.16	0.13	1.00	1.11	0.65
Arsenic (As)	0.5	0.007	0.001	0.001	0.001	0.001	0.002	0.002
Boron (B)	5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Calcium (Ca)	1000	<1	2	2	2	1	1	<1
Cadmium (Cd)	0.01	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chloride (Cl)	-	3	1	1	1	<1	<1	<1
Cobalt (Co)	1	<0.001	0.002	<0.001	<0.001	0.001	0.001	<0.001
Chromium (Cr)	1	<0.001	<0.001	<0.001	<0.001	0.002	0.002	<0.001
Copper (Cu)	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Fluoride (F)	2	-	-	-	-	-	-	-
Iron (Fe)	1 [#]	<0.05	<0.05	<0.05	<0.05	0.12	0.13	0.06
Potassium (K)	-	3	2	2	2	2	2	2
Magnesium (Mg)	-	<1	<1	<1	<1	<1	<1	<1
Manganese (Mn)	2 [#]	0.003	0.035	0.006	0.002	0.002	0.001	<0.001
Molybdenum (Mo)	0.15	0.091	0.028	0.034	0.053	0.026	0.049	0.058
Sodium (Na)	-	38	32	29	34	26	28	32
Nickel (Ni)	1	<0.001	0.003	<0.001	<0.001	0.002	0.003	0.001
Phosphorus (P)	-	-	-	-	-	-	-	-
Lead (Pb)	0.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfate (SO ₄)	1,000	63	62	49	66	46	43	48
Antimony (Sb)	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium (Se)	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02
Thorium (Th)	-	-	-	-	-	-	-	-
Uranium (U)	0.2	-	-	-	-	-	-	-
Zinc (Zn)	20	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calculations**								
SO ₄ Release Rate		34	34	27	38	26	25	28
Cumulative SO ₄ Release		34	68	95	134	160	185	213
Ca Release Rate		0.3	1.1	1.1	1.2	0.6	0.6	0.3
Cumulative Ca Release		0.3	1.4	2.5	3.7	4.2	4.8	5.1
Mg Release Rate		0.3	0.3	0.3	0.3	0.3	0.3	0.3
Cumulative Mg Release		0.3	0.5	0.8	1.1	1.4	1.7	2.0
Residual ANC (%)		100.0	100.0	99.9	99.9	99.9	99.9	99.8
Residual Sulfur (%)		97.2	94.3	92.0	88.8	86.7	84.6	82.2
SO ₄ /(Ca+Mg) molar ratio		19.8	9.2	7.2	9.8	10.5	9.8	15.1

< indicates less than the analytical detection limit. * Acidity and alkalinity data calculated in mg CaCO₃/L.

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

Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity

MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential

[#] Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, 2000, ANZECC (Australian and New Zealand Environment Conservation Council) and ARMCANZ (Agriculture and Resource Management Council of Australia and New Zealand). Livestock Drinking Water Levels (Irrigation Levels used for Fe and Mn).

RGS-KLC # 3: Bylong Coal Project

KLC Test Results: Coal, Roof + Floor (Coggan Seam)

		Weight (kg)	1.38	Total S (%)	0.22	ANC	2.09	
		pH (1:5)	3.90	CRS (%)	0.099	NAPP	0.94	
		EC (µS/cm)	551	MPA	3.03	ANC:MPA	0.69	
Date		21-Dec-12	4-Jan-13	18-Jan-13	1-Feb-13	15-Feb-13	1-Mar-13	15-Mar-13
Week		0	2	4	6	8	10	12
Leach Number		1	2	3	4	5	6	7
ALS Laboratory ID		EB1233397	EB1300266	EB1301128	EB1302358	EB1303930	EB1305353	EB1306627
Volume Collected (L)		0.793	0.806	0.812	0.826	0.816	0.835	0.830
Cum. Volume (L)		0.79	1.60	2.41	3.24	4.05	4.89	5.72
Pore Volumes		0.7	1.4	2.1	2.8	3.5	4.3	5.0
pH		3.57	3.77	3.49	3.36	3.32	3.37	3.38
EC (µS/cm)		569	330	357	428	401	403	385
Acidity (mg/L)*		40	16	27	27	26	35	32
Alkalinity (mg/L)*		<1	<1	<1	<1	<1	<1	<1
Net Alkalinity (mg/L)*		-40	-16	-27	-27	-26	-35	-32
	Guideline Values[#]							
Aluminium (Al)	5	1.21	0.37	0.48	0.65	0.47	0.56	0.45
Arsenic (As)	0.5	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (B)	5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Calcium (Ca)	1000	42	23	24	28	26	27	26
Cadmium (Cd)	0.01	0.002	0.0018	0.0018	0.0022	0.0019	0.0021	0.0019
Chloride (Cl)	-	5	1	1	1	<1	<1	<1
Cobalt (Co)	1	0.116	0.098	0.11	0.093	0.092	0.084	0.074
Chromium (Cr)	1	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (Cu)	1	0.056	0.016	0.037	0.041	0.043	0.021	0.016
Fluoride (F)	2	-	-	-	-	-	-	-
Iron (Fe)	1 [#]	8.35	2.57	3.17	2.66	2.01	1.96	0.83
Potassium (K)	-	7	2	2	2	2	1	1
Magnesium (Mg)	-	20	12	13	15	15	15	15
Manganese (Mn)	2 [#]	1.60	2.18	2.63	3.28	3.11	3.74	3.72
Molybdenum (Mo)	0.15	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Sodium (Na)	-	14	6	5	5	4	4	3
Nickel (Ni)	1	0.164	0.139	0.167	0.153	0.148	0.140	0.124
Phosphorus (P)	-	-	-	-	-	-	-	-
Lead (Pb)	0.1	0.006	<0.001	0.001	0.001	0.002	0.002	0.001
Sulfate (SO₄)	1,000	245	140	150	177	164	157	158
Antimony (Sb)	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium (Se)	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium (Th)	-	-	-	-	-	-	-	-
Uranium (U)	0.2	-	-	-	-	-	-	-
Zinc (Zn)	20	0.423	0.268	0.294	0.285	0.255	0.233	0.196
Calculations**								
SO₄ Release Rate		141	82	89	106	97	95	95
Cumulative SO₄ Release		141	223	312	418	516	611	706
Ca Release Rate		24.2	13.5	14.2	16.8	15.4	16.4	15.7
Cumulative Ca Release		24.2	37.7	51.9	68.7	84.1	100.5	116.2
Mg Release Rate		11.5	7.0	7.7	9.0	8.9	9.1	9.1
Cumulative Mg Release		11.5	18.6	26.2	35.3	44.2	53.3	62.3
Residual ANC (%)		94.9	92.0	88.9	85.2	81.6	78.0	74.4
Residual Sulfur (%)		97.9	96.6	95.3	93.7	92.2	90.7	89.3
SO₄/(Ca+Mg) molar ratio		1.4	1.4	1.4	1.4	1.3	1.3	1.3

< indicates less than the analytical detection limit. * Acidity and alkalinity data calculated in mg CaCO₃/L.** SO₄, Ca and Mg release rates calculated in mg/kg/flush.

Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity

MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential

[#] Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, 2000, ANZECC (Australian and New Zealand Environment Conservation Council) and ARMCAZ (Agriculture and Resource Management Council of Australia and New Zealand). Livestock Drinking Water Levels (Irrigation Levels used for Fe and Mn).

RGS-KLC # 4: Bylong Coal Project

KLC Test Results: Coal + Parting/Roof/Floor (Ulan Seam)

		Weight (kg)	1.87	Total S (%)	0.09	ANC	62.47	
		pH (1:5)	6.33	CRS (%)	0.034	NAPP	-61.41	
		EC (µS/cm)	219	MPA	1.05	ANC:MPA	59.28	
Date	21-Dec-12	4-Jan-13	18-Jan-13	1-Feb-13	15-Feb-13	1-Mar-13	15-Mar-13	
Week	0	2	4	6	8	10	12	
Leach Number	1	2	3	4	5	6	7	
ALS Laboratory ID	EB1233397	EB1300266	EB1301128	EB1302358	EB1303930	EB1305353	EB1306627	
Volume Collected (L)	0.605	0.686	0.666	0.803	0.705	0.764	0.791	
Cum. Volume (L)	0.61	1.29	1.96	2.76	3.47	4.23	5.02	
Pore Volumes	0.4	1.0	1.4	2.0	2.6	3.1	3.7	
pH	8.03	8.29	8.09	7.54	7.67	7.39	7.28	
EC (µS/cm)	217	206	187	220	166	170	129	
Acidity (mg/L)*	2	<1	3	3	1	2	<1	
Alkalinity (mg/L)*	46	21	22	17	28	68	17	
Net Alkalinity (mg/L)*	44	21	19	14	27	66	17	
	Guideline Values [#]							
Aluminium (Al)	5	0.07	0.08	0.02	<0.01	0.09	0.06	0.04
Arsenic (As)	0.5	0.002	<0.001	0.002	0.001	0.001	0.001	0.001
Boron (B)	5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Calcium (Ca)	1000	6	6	5	6	5	4	3
Cadmium (Cd)	0.01	<0.0001	0.0004	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chloride (Cl)	-	6	5	3	6	2	3	2
Cobalt (Co)	1	<0.001	0.014	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (Cr)	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (Cu)	1	0.001	0.008	<0.001	<0.001	<0.001	<0.001	<0.001
Fluoride (F)	2	-	-	-	-	-	-	-
Iron (Fe)	1 [#]	<0.05	0.29	<0.05	<0.05	<0.05	<0.05	<0.05
Potassium (K)	-	7	5	5	5	4	4	4
Magnesium (Mg)	-	3	3	3	3	3	2	2
Manganese (Mn)	2 [#]	0.056	0.290	0.009	0.008	0.008	0.007	0.004
Molybdenum (Mo)	0.15	0.014	0.016	0.019	0.034	0.018	0.033	0.029
Sodium (Na)	-	27	26	22	26	18	19	15
Nickel (Ni)	1	<0.001	0.020	0.002	0.002	0.002	0.002	0.001
Phosphorus (P)	-	-	-	-	-	-	-	-
Lead (Pb)	0.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfate (SO ₄)	1,000	34	50	45	58	44	36	29
Antimony (Sb)	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium (Se)	0.02	<0.01	0.02	0.02	0.03	0.02	0.02	0.02
Thorium (Th)	-	-	-	-	-	-	-	-
Uranium (U)	0.2	-	-	-	-	-	-	-
Zinc (Zn)	20	<0.005	0.041	<0.005	<0.005	<0.005	<0.005	<0.005
Calculations**								
SO ₄ Release Rate		11	18	16	25	17	15	12
Cumulative SO ₄ Release		11	29	45	70	87	101	114
Ca Release Rate		1.9	2.2	1.8	2.6	1.9	1.6	1.3
Cumulative Ca Release		1.9	4.1	5.9	8.5	10.4	12.0	13.3
Mg Release Rate		1.0	1.1	1.1	1.3	1.1	0.8	0.8
Cumulative Mg Release		1.0	2.1	3.1	4.4	5.5	6.4	7.2
Residual ANC (%)		100.0	100.0	100.0	99.9	99.9	99.9	99.9
Residual Sulfur (%)		99.6	98.9	98.3	97.4	96.8	96.2	95.8
SO ₄ /(Ca+Mg) molar ratio		1.3	1.9	1.9	2.2	1.8	2.1	1.9

< indicates less than the analytical detection limit. * Acidity and alkalinity data calculated in mg CaCO₃/L.

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

Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity

MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential

[#] Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, 2000, ANZECC (Australian and New Zealand Environment Conservation Council) and ARMCANZ (Agriculture and Resource Management Council of Australia and New Zealand). Livestock Drinking Water Levels (Irrigation Levels used for Fe and Mn).

RGS-KLC # 5: Bylong Coal Project
KLC Test Results: Tailings (Ulan Seam)

		Weight (kg)	0.89	Total S (%)	1.55	ANC	20.63		
		pH (1:5)	7.45	CRS (%)	1.275	NAPP	18.42		
		EC (µS/cm)	193	MPA	39.05	ANC:MPA	0.53		
Date		3-May-13	17-May-13	30-May-13	13-Jun-13	28-Jun-13	12-Jul-13	26-Jul-13	18-Nov-13
Week		0	2	4	6	8	10	12	28
Leach Number		1	2	3	4	5	6	7	8
ALS Laboratory ID		EB1310616	EB1311894	EB1313073	EB1314258	EB1315545	EB1316701	EB1318003	EB1328295
Volume Collected (L)		0.764	0.654	0.598	0.792	0.698	0.718	0.779	0.766
Cum. Volume (L)		0.76	1.42	2.02	2.81	3.51	4.22	5.00	5.77
Pore Volumes		0.7	1.2	1.8	2.4	3.0	3.7	4.4	5.0
pH		7.29	6.14	6.27	6.37	6.50	6.65	6.77	6.72
EC (µS/cm)		884	67	113	357	159	957	631	499
Acidity (mg/L)*		6	2	1	1	1	4	4	5
Alkalinity (mg/L)*		107	10	12	22	10	36	85	60
Net Alkalinity (mg/L)*		101	8	11	21	9	32	81	55
	Guideline Values[#]								
Aluminium (Al)	5	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic (As)	0.5	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (B)	5	0.29	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	0.16
Calcium (Ca)	1000	214	8	16	48	20	155	99	82
Cadmium (Cd)	0.01	0.0044	0.0001	0.0003	0.0006	0.0002	0.0013	0.0006	0.0006
Chloride (Cl)	-	24	<1	<1	7	2	18	5	5
Cobalt (Co)	1	0.013	<0.001	<0.001	<0.001	<0.001	0.002	0.001	<0.001
Chromium (Cr)	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (Cu)	1	0.014	<0.001	<0.001	<0.001	<0.001	0.002	0.003	0.008
Fluoride (F)	2	-	-	-	-	-	-	-	-
Iron (Fe)	1 [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10	<0.05
Potassium (K)	-	6	<1	<1	<1	<1	1	<1	2
Magnesium (Mg)	-	77	1	3	12	5	44	29	26
Manganese (Mn)	2 [#]	1.950	0.013	0.017	0.087	0.022	0.212	0.120	0.054
Molybdenum (Mo)	0.15	0.012	<0.001	<0.001	0.003	<0.001	0.005	0.006	0.005
Sodium (Na)	-	18	<1	<1	1	<1	4	4	3
Nickel (Ni)	1	0.053	<0.001	<0.001	0.002	<0.001	0.003	0.002	0.002
Phosphorus (P)	-	-	-	-	-	-	-	-	-
Lead (Pb)	0.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfate (SO₄)	1,000	769	14	42	142	61	353	239	201
Antimony (Sb)	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium (Se)	0.02	0.05	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02
Thorium (Th)	-	-	-	-	-	-	-	-	-
Uranium (U)	0.2	-	-	-	-	-	-	-	-
Zinc (Zn)	20	0.754	0.046	0.096	0.136	0.029	0.192	0.143	0.084
Calculations**									
SO₄ Release Rate		662	10	28	127	48	286	210	174
Cumulative SO₄ Release		662	673	701	828	876	1162	1371	1545
Ca Release Rate		184.3	5.9	10.8	42.9	15.7	125.5	86.9	70.8
Cumulative Ca Release		184.3	190.2	201.0	243.9	259.6	385.1	472.0	542.8
Mg Release Rate		66.3	0.7	2.0	10.7	3.9	35.6	25.5	22.5
Cumulative Mg Release		66.3	67.1	69.1	79.8	83.7	119.3	144.8	167.3
Residual ANC (%)		96.5	96.4	96.3	95.5	95.3	93.1	91.6	90.3
Residual Sulfur (%)		98.6	98.6	98.5	98.2	98.1	97.5	97.0	96.7
SO₄/(Ca+Mg) molar ratio		0.9	0.6	0.8	0.9	0.9	0.6	0.7	0.7

< indicates less than the analytical detection limit. * Acidity and alkalinity data calculated in mg CaCO₃/L.

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

Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity

MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential

Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, 2000, ANZECC (Australian and New Zealand Environment Conservation Council) and ARMCAZ (Agriculture and Resource Management Council of Australia and New Zealand). Livestock Drinking Water Levels (Irrigation Levels used for Fe and Mn).

RGS-KLC # 6: Bylong Coal Project

KLC Test Results: Coarse Reject (Coggan Seam)

		Weight (kg)	1.23	Total S (%)	1.21	ANC	34.78		
		pH (1:5)	4.48	CRS (%)	0.825	NAPP	-9.51		
		EC (µS/cm)	266	MPA	25.27	ANC:MPA	1.38		
Date		3-May-13	17-May-13	30-May-13	13-Jun-13	28-Jun-13	12-Jul-13	26-Jul-13	18-Nov-13
Week		0	2	4	6	8	10	12	28
Leach Number		1	2	3	4	5	6	7	8
ALS Laboratory ID		EB1310616	EB1311894	EB1313073	EB1314258	EB1315545	EB1316701	EB1318003	EB1328295
Volume Collected (L)		0.692	0.726	0.716	0.750	0.703	0.702	0.731	0.668
Cum. Volume (L)		0.69	1.42	2.13	2.88	3.59	4.29	5.02	5.69
Pore Volumes		0.5	1.1	1.6	2.1	2.7	3.2	3.7	4.2
pH		3.97	4.29	4.17	4.47	6.15	5.67	6.34	4.18
EC (µS/cm)		1,302	1,284	1,069	1,178	873	876	941	1,011
Acidity (mg/L)*		167	48	41	11	48	7	7	16
Alkalinity (mg/L)*		<1	<1	<1	<1	<1	4	4	<1
Net Alkalinity (mg/L)*		-167	-48	-41	-11	-48	-3	-3	-16
	Guideline Values*								
Aluminium (Al)	5	1.52	0.31	0.18	<0.01	0.02	<0.01	<0.50	0.28
Arsenic (As)	0.5	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001
Boron (B)	5	0.16	0.09	0.09	<0.05	<0.05	<0.05	<0.50	0.06
Calcium (Ca)	1000	74	112	87	96	74	77	88	96
Cadmium (Cd)	0.01	0.0168	0.0096	0.0063	0.0049	0.0033	0.0027	<0.0050	0.0033
Chloride (Cl)	-	33	33	31	26	11	13	19	5
Cobalt (Co)	1	0.026	0.009	0.005	0.002	0.001	<0.001	<0.010	0.002
Chromium (Cr)	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Copper (Cu)	1	0.146	0.035	0.021	0.003	0.003	0.001	<0.050	0.012
Fluoride (F)	2	-	-	-	-	-	-	-	-
Iron (Fe)	1 [#]	67.4	10.5	10.4	0.4	1.79	0.75	<0.50	30.1
Potassium (K)	-	12	9	6	5	4	3	3	4
Magnesium (Mg)	-	48	78	68	84	65	69	76	70
Manganese (Mn)	2 [#]	8.8	17.8	16.3	20.8	12.8	11.3	10.1	5.0
Molybdenum (Mo)	0.15	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Sodium (Na)	-	78	52	29	25	12	8	6	4
Nickel (Ni)	1	0.179	0.068	0.045	0.031	0.016	<0.001	<0.050	0.012
Phosphorus (P)	-	-	-	-	-	-	-	-	-
Lead (Pb)	0.1	0.002	0.002	0.001	<0.001	<0.001	<0.001	<0.010	0.001
Sulfate (SO₄)	1,000	675	691	547	566	469	235	490	468
Antimony (Sb)	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Selenium (Se)	0.02	0.03	0.03	0.02	0.01	0.01	<0.01	<0.10	<0.01
Thorium (Th)	-	-	-	-	-	-	-	-	-
Uranium (U)	0.2	-	-	-	-	-	-	-	-
Zinc (Zn)	20	1.720	0.701	0.275	0.064	0.033	0.017	<0.050	0.064
Calculations**									
SO₄ Release Rate		380	408	319	345	268	134	291	254
Cumulative SO₄ Release		380	788	1107	1452	1721	1855	2146	2401
Ca Release Rate		41.7	66.2	50.7	58.6	42.3	44.0	52.3	52.2
Cumulative Ca Release		41.7	107.8	158.5	217.1	259.4	303.4	355.7	407.9
Mg Release Rate		27.0	46.1	39.6	51.3	37.2	39.4	45.2	38.0
Cumulative Mg Release		27.0	73.1	112.7	164.0	201.2	240.6	285.8	323.8
Residual ANC (%)		99.4	98.4	97.6	96.6	95.8	95.1	94.2	93.4
Residual Sulfur (%)		99.0	97.8	96.9	96.0	95.3	94.9	94.1	93.4
SO₄/(Ca+Mg) molar ratio		1.8	1.2	1.1	1.0	1.1	0.5	1.0	0.9

< indicates less than the analytical detection limit. * Acidity and alkalinity data calculated in mg CaCO₃/L.

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

Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity

MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential

Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, 2000, ANZECC (Australian and New Zealand Environment Conservation Council) and ARMCANZ (Agriculture and Resource Management Council of Australia and New Zealand). Livestock Drinking Water Levels (Irrigation Levels used for Fe and Mn).

RGS-KLC # 7: Bylong Coal Project

KLC Test Results: Tailings 1 (Coggan Seam)

		Weight (kg)	0.94	Total S (%)	0.80	ANC	4.86		
		pH (1:5)	5.05	CRS (%)	0.455	NAPP	9.06		
		EC (µS/cm)	142	MPA	13.92	ANC:MPA	0.35		
Date		3-May-13	17-May-13	30-May-13	13-Jun-13	28-Jun-13	12-Jul-13	26-Jul-13	18-Nov-13
Week		0	2	4	6	8	10	12	28
Leach Number		1	2	3	4	5	6	7	8
ALS Laboratory ID		EB1310616	EB1311894	EB1313073	EB1314258	EB1315545	EB1316701	EB1318003	EB1328295
Volume Collected (L)		0.744	0.683	0.645	0.798	0.768	0.780	0.778	0.772
Cum. Volume (L)		0.74	1.43	2.07	2.87	3.64	4.42	5.20	5.97
Pore Volumes		0.6	1.1	1.5	2.1	2.7	3.3	3.8	4.4
pH		5.80	5.41	5.45	5.39	5.96	5.51	5.86	5.22
EC (µS/cm)		863	1,186	734	366	118	453	582	676
Acidity (mg/L)*		103	256	100	34	24	41	43	22
Alkalinity (mg/L)*		6	<1	4	4	<1	4	4	3
Net Alkalinity (mg/L)*		-97	-256	-96	-30	-24	-37	-39	-19
		Guideline Values [#]							
Aluminium (Al)	5	0.02	0.22	0.07	<0.01	<0.01	0.01	<0.01	0.03
Arsenic (As)	0.5	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (B)	5	0.17	0.11	0.09	<0.05	<0.05	<0.05	0.06	0.08
Calcium (Ca)	1000	102	139	71	27	7	40	49	59
Cadmium (Cd)	0.01	0.0768	0.1080	0.0523	0.0199	0.0046	0.0232	0.0234	0.0234
Chloride (Cl)	-	21	7	4	4	1	4	8	4
Cobalt (Co)	1	0.033	0.038	0.021	0.010	0.002	0.012	0.013	0.008
Chromium (Cr)	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (Cu)	1	0.222	0.368	0.208	0.080	0.020	0.050	0.032	0.057
Fluoride (F)	2	-	-	-	-	-	-	-	-
Iron (Fe)	1 [#]	0.12	0.12	<0.05	<0.05	<0.05	<0.05	0.06	0.08
Potassium (K)	-	6	3	2	<1	<1	<1	1	2
Magnesium (Mg)	-	40	47	27	13	4	22	29	40
Manganese (Mn)	2 [#]	5.3	7.8	6.0	2.8	0.9	6.7	7.6	8.3
Molybdenum (Mo)	0.15	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sodium (Na)	-	33	14	7	3	<1	3	4	4
Nickel (Ni)	1	0.124	0.141	0.088	0.040	0.009	<0.001	0.054	0.037
Phosphorus (P)	-	-	-	-	-	-	-	-	-
Lead (Pb)	0.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfate (SO ₄)	1,000	563	727	345	170	39	188	266	229
Antimony (Sb)	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium (Se)	0.02	0.05	0.03	0.01	<0.01	<0.01	<0.01	0.01	0.01
Thorium (Th)	-	-	-	-	-	-	-	-	-
Uranium (U)	0.2	-	-	-	-	-	-	-	-
Zinc (Zn)	20	57.0	123.0	62.4	25.5	5.2	21.4	22.5	10.6
Calculations**									
SO ₄ Release Rate		447	529	237	145	32	156	221	199
Cumulative SO ₄ Release		447	976	1213	1358	1390	1546	1767	1966
Ca Release Rate		80.9	101.2	48.8	23.0	5.7	33.3	40.6	51.4
Cumulative Ca Release		80.9	182.1	230.9	253.9	259.6	292.9	333.5	384.9
Mg Release Rate		31.7	34.2	18.6	11.1	3.3	18.3	24.1	34.8
Cumulative Mg Release		31.7	65.9	84.5	95.6	98.9	117.1	141.2	176.0
Residual ANC (%)		93.3	85.4	81.4	79.3	78.7	75.5	71.5	66.0
Residual Sulfur (%)		98.1	95.9	94.9	94.3	94.2	93.6	92.6	91.8
SO ₄ /(Ca+Mg) molar ratio		1.4	1.4	1.2	1.5	1.2	1.0	1.1	0.8

< indicates less than the analytical detection limit. * Acidity and alkalinity data calculated in mg CaCO₃/L.** SO₄, Ca and Mg release rates calculated in mg/kg/flush.

Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity

MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential

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RGS-KLC # 8: Bylong Coal Project
KLC Test Results: Coarse Reject 2 - (Coggan Seam)

		Weight (kg)	1.84	Total S (%)	0.68	ANC	4.05	
		pH (1:5)	3.89	CRS (%)	0.477	NAPP	10.56	
		EC (µS/cm)	780	MPA	14.61	ANC:MPA	0.28	
Date		12-Apr-14	13-May-14	12-Jun-14	15-Jul-14	12-Aug-14	11-Sep-14	14-Oct-14
Week		0	4	9	13	17	22	26
Leach Number		1	2	3	4	5	6	7
ALS Laboratory ID		EB1409089	EB1411422	EB1414297	EB1417155	EB1440497	EB1442286	EB1444311
Volume Collected (L)		0.807	0.696	0.843	0.788	0.805	0.803	0.794
Cum. Volume (L)		0.81	1.50	2.35	3.13	3.94	4.74	5.54
Pore Volumes		0.6	1.1	1.7	2.3	2.9	3.5	4.1
pH		3.35	3.64	4.03	3.96	4.18	4.06	4.08
EC (µS/cm)		1,196	1,509	3,180	1,842	1,559	1,664	1,310
Acidity (mg/L)*		335	82	95	69	50	47	22
Alkalinity (mg/L)*		<1	<1	<1	<1	<1	<1	<1
Net Alkalinity (mg/L)*		-335	-82	-95	-69	-50	-47	-22
	Guideline Values[#]							
Aluminium (Al)	5	2.19	0.37	0.03	<0.01	<0.01	<0.01	0.05
Arsenic (As)	0.5	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (B)	5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Calcium (Ca)	1000	54	91	156	100	87	92	80
Cadmium (Cd)	0.01	0.0012	0.0024	0.0039	0.0028	0.0029	0.0034	0.0029
Chloride (Cl)	-	85	461	942	767	614	561	337
Cobalt (Co)	1	0.006	0.006	0.005	0.002	0.001	<0.001	<0.001
Chromium (Cr)	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (Cu)	1	0.089	0.033	0.009	0.01	0.004	0.004	0.005
Fluoride (F)	2	0.4	0.1	<0.1	0.2	<0.1	<0.1	<0.1
Iron (Fe)	1 [#]	124	14.6	2.4	0.75	0.81	0.92	1.89
Potassium (K)	-	6	<1	<1	<1	<1	1	1
Magnesium (Mg)	-	44	86	223	128	111	112	83
Manganese (Mn)	2 [#]	15.4	41.3	129.0	67.3	59.0	56.3	41.6
Molybdenum (Mo)	0.15	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sodium (Na)	-	14	13	26	14	13	13	9
Nickel (Ni)	1	0.010	0.01	0.018	0.007	0.006	0.007	0.004
Phosphorus (P)	-	<0.01	<0.01	-	-	-	-	-
Lead (Pb)	0.1	0.012	0.002	0.006	0.003	0.002	0.002	0.002
Sulfate (SO₄)	1,000	537	244	380	195	202	226	239
Antimony (Sb)	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium (Se)	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium (Th)	-	0.002	<0.001	-	-	-	-	-
Uranium (U)	0.2	0.005	<0.001	-	-	-	-	-
Zinc (Zn)	20	0.185	0.065	0.015	<0.005	<0.005	0.007	0.008
Calculations**								
SO₄ Release Rate		235	92	174	83	88	99	103
Cumulative SO₄ Release		235	328	502	585	673	772	875
Ca Release Rate		23.7	34.4	71.4	42.8	38.0	40.1	34.5
Cumulative Ca Release		23.7	58.1	129.5	172.3	210.4	250.5	285.0
Mg Release Rate		19.3	32.5	102.1	54.8	48.5	48.9	35.8
Cumulative Mg Release		19.3	51.8	153.9	208.7	257.2	306.1	341.9
Residual ANC (%)		96.6	91.3	76.8	68.8	61.7	54.4	48.7
Residual Sulfur (%)		98.8	98.4	97.5	97.1	96.7	96.2	95.7
SO₄/(Ca+Mg) molar ratio		1.8	0.4	0.3	0.3	0.3	0.3	0.5

< indicates less than the analytical detection limit. * Acidity and alkalinity data calculated in mg CaCO₃/L.

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

Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity

MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential

Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, 2000, ANZECC (Australian and New Zealand Environment Conservation Council) and ARM CANZ (Agriculture and Resource Management Council of Australia and New Zealand). Livestock Drinking Water Levels (Irrigation Levels used for Fe and Mn).

RGS-KLC # 9: Bylong Coal Project
KLC Test Results: Tailings 2 - (Coggan Seam)

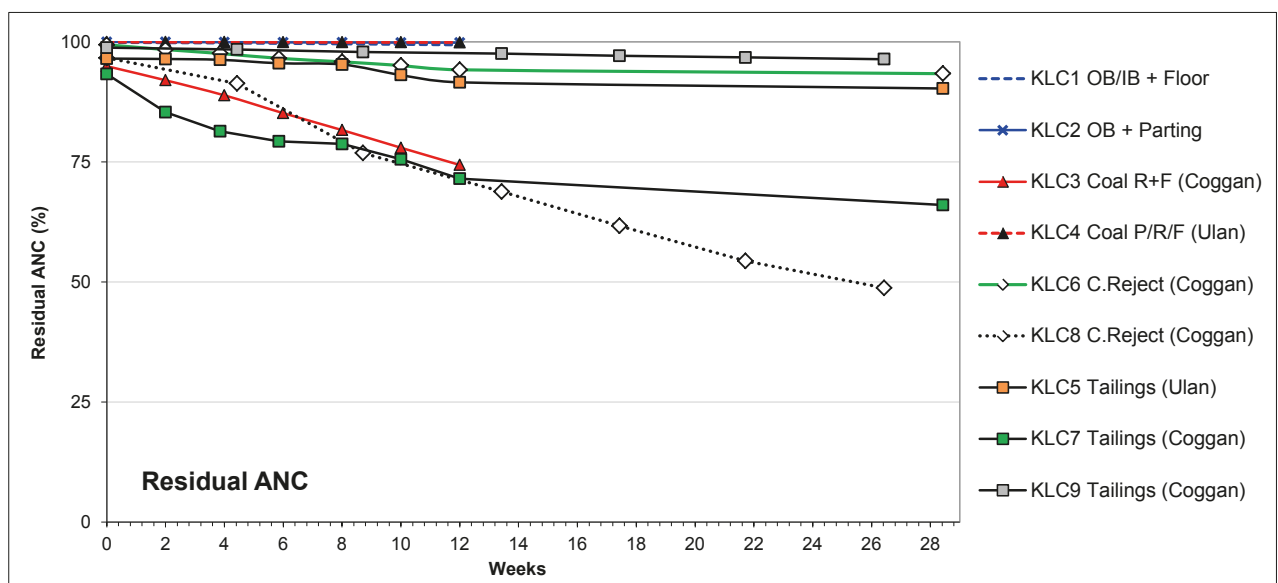
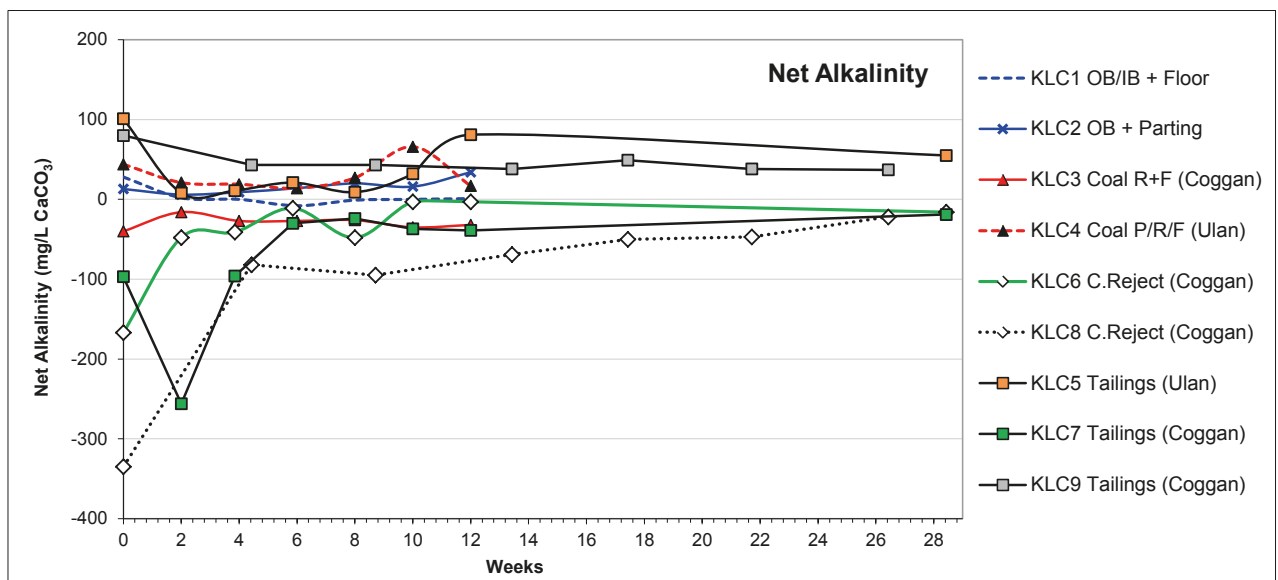
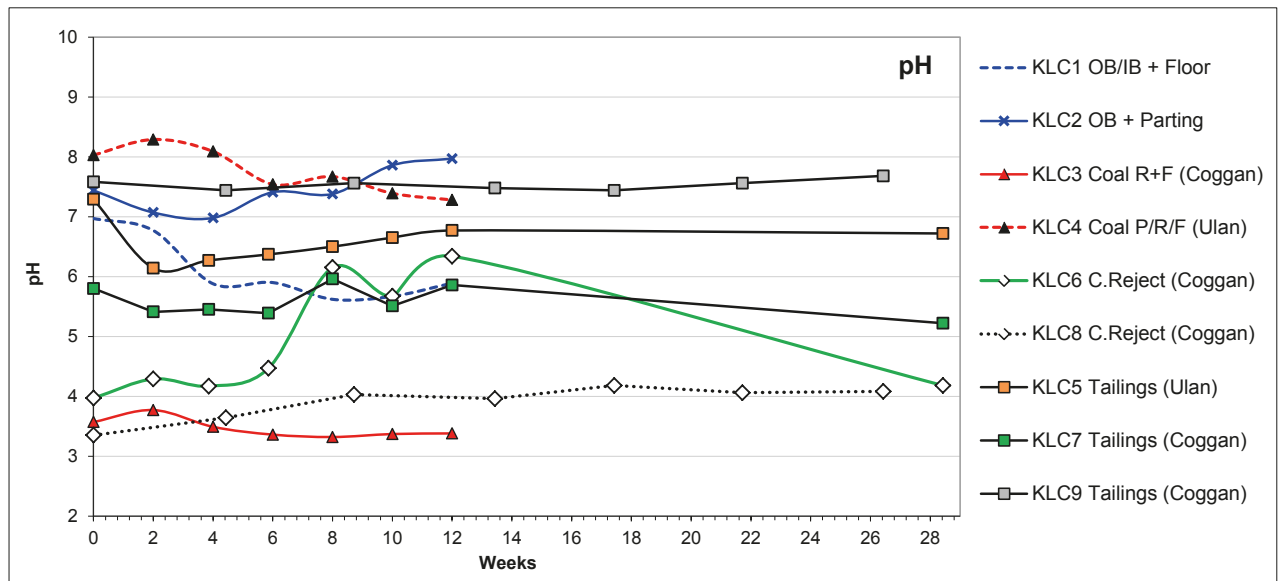
		Weight (kg)	1.34	Total S (%)	0.42	ANC	10.2	
		pH (1:5)	6.82	CRS (%)	0.230	NAPP	-3.11	
		EC (µS/cm)	110	MPA	7.04	ANC:MPA	1.44	
Date		12-Apr-14	13-May-14	12-Jun-14	15-Jul-14	12-Aug-14	11-Sep-14	14-Oct-14
Week		0	4	9	13	17	22	26
Leach Number		1	2	3	4	5	6	7
ALS Laboratory ID		EB1409089	EB1411422	EB1414297	EB1417155	EB1440497	EB1442286	EB1444311
Volume Collected (L)		0.886	0.592	0.777	0.619	0.732	0.721	0.694
Cum. Volume (L)		0.89	1.48	2.26	2.87	3.61	4.33	5.02
Pore Volumes		0.7	1.1	1.7	2.1	2.7	3.2	3.7
pH		7.58	7.44	7.56	7.48	7.44	7.56	7.68
EC (µS/cm)		477	207	227	154	180	158	156
Acidity (mg/L)*		5	3	<1	<1	<1	<1	5
Alkalinity (mg/L)*		85	46	43	38	49	38	42
Net Alkalinity (mg/L)*		80	43	43	38	49	38	37
		Guideline Values [#]						
Aluminium (Al)	5	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic (As)	0.5	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (B)	5	0.09	<0.05	0.06	<0.05	0.07	<0.05	<0.05
Calcium (Ca)	1000	47	22	22	18	22	18	18
Cadmium (Cd)	0.01	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chloride (Cl)	-	22	7	6	2	3	2	2
Cobalt (Co)	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (Cr)	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (Cu)	1	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Fluoride (F)	2	0.9	1.6	1.1	1.3	1.4	1.5	1.1
Iron (Fe)	1 [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Potassium (K)	-	3	1	<1	<1	<1	<1	<1
Magnesium (Mg)	-	18	8	9	7	8	6	6
Manganese (Mn)	2 [#]	0.223	0.032	0.009	0.012	0.014	0.011	0.008
Molybdenum (Mo)	0.15	0.004	0.003	0.004	0.004	0.004	0.003	0.003
Sodium (Na)	-	22	5	4	3	3	2	2
Nickel (Ni)	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phosphorus (P)	-	<0.01	<0.01	-	-	-	-	-
Lead (Pb)	0.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfate (SO ₄)	1,000	138	52	60	31	38	31	30
Antimony (Sb)	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium (Se)	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Thorium (Th)	-	<0.001	<0.001	-	-	-	-	-
Uranium (U)	0.2	0.001	<0.001	-	-	-	-	-
Zinc (Zn)	20	0.016	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calculations**								
SO ₄ Release Rate		91	23	35	14	21	17	16
Cumulative SO ₄ Release		91	114	149	163	184	200	216
Ca Release Rate		31.0	9.7	12.7	8.3	12.0	9.7	9.3
Cumulative Ca Release		31.0	40.7	53.4	61.7	73.7	83.4	92.7
Mg Release Rate		11.9	3.5	5.2	3.2	4.4	3.2	3.1
Cumulative Mg Release		11.9	15.4	20.6	23.8	28.2	31.4	34.5
Residual ANC (%)		98.8	98.4	97.9	97.6	97.1	96.7	96.4
Residual Sulfur (%)		99.3	99.1	98.8	98.7	98.5	98.4	98.3
SO ₄ /(Ca+Mg) molar ratio		0.8	0.6	0.7	0.4	0.5	0.5	0.4

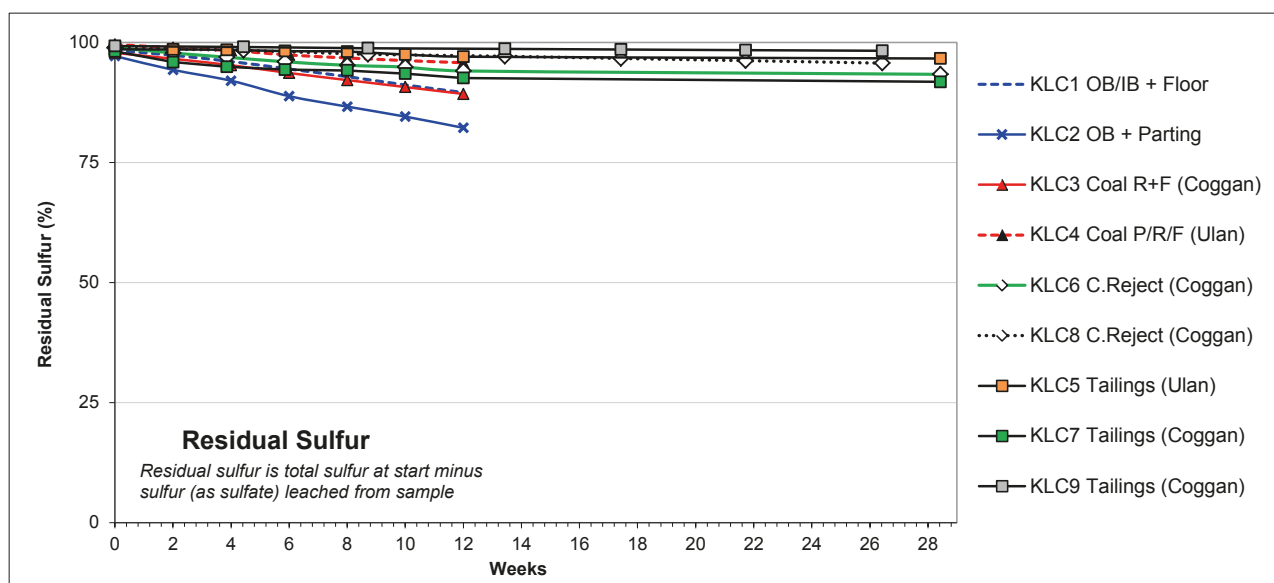
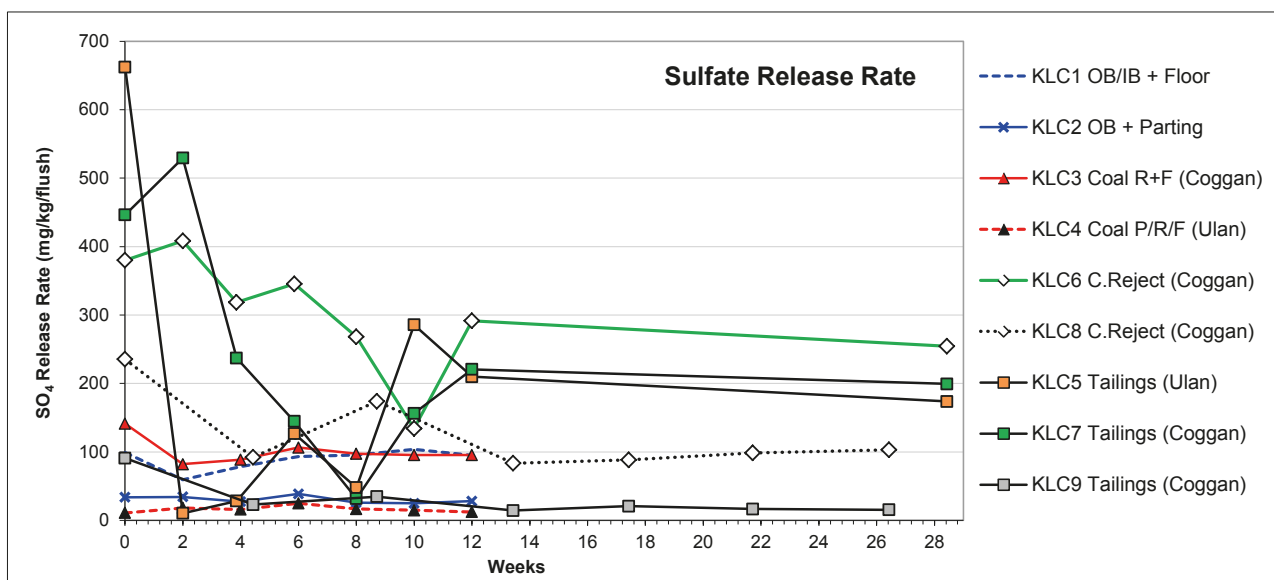
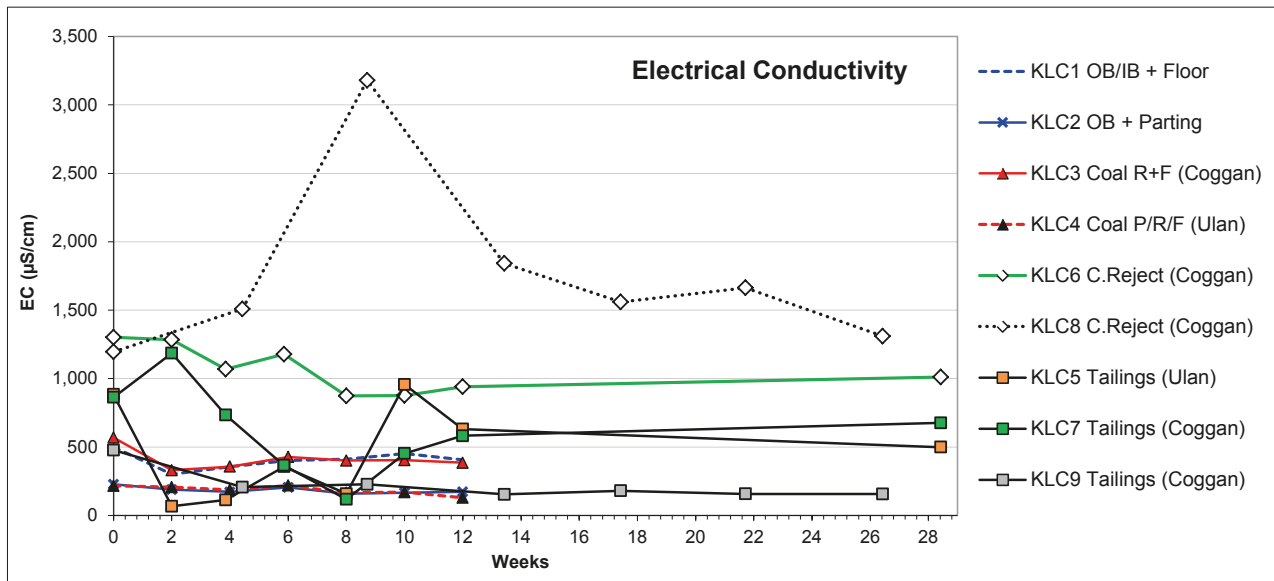
< indicates less than the analytical detection limit. * Acidity and alkalinity data calculated in mg CaCO₃/L.** SO₄, Ca and Mg release rates calculated in mg/kg/flush.

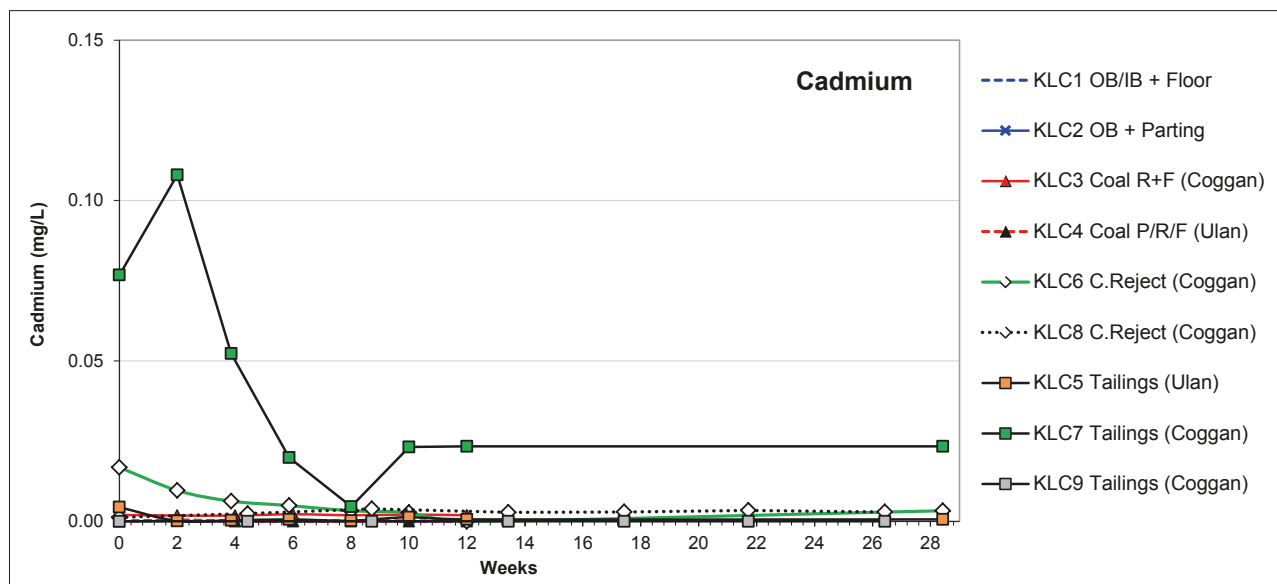
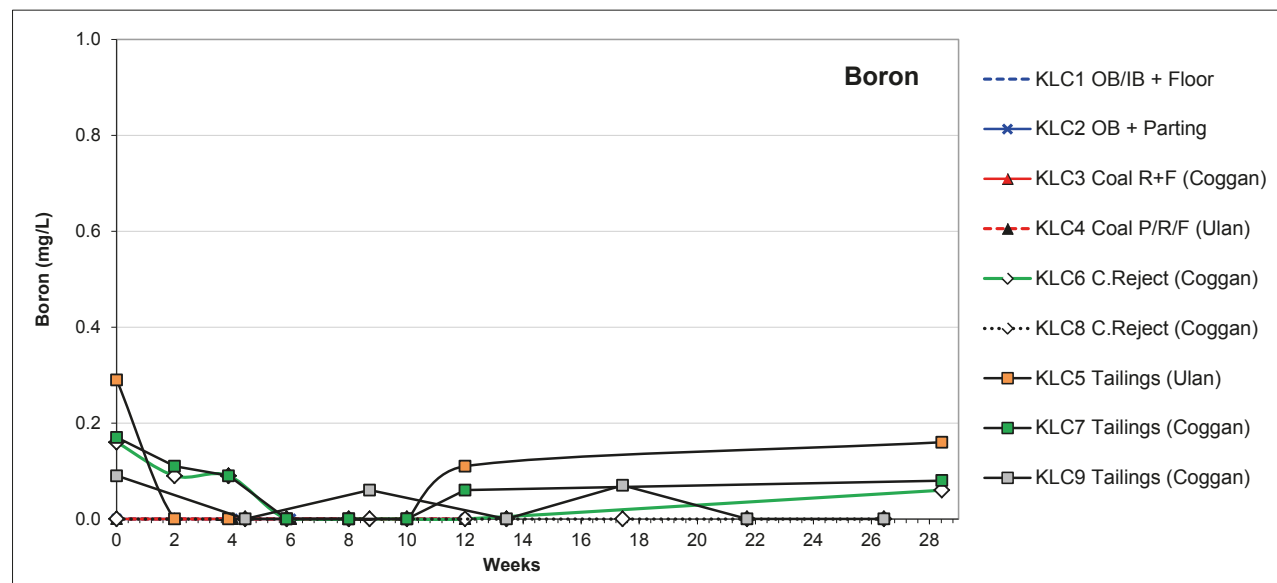
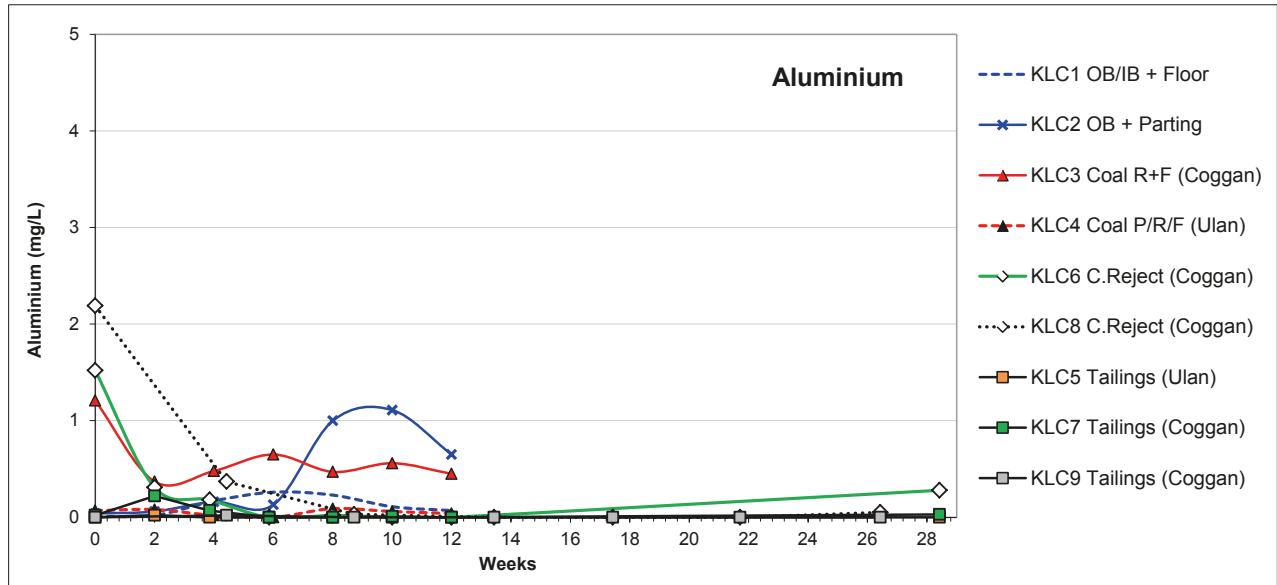
Total S = Total Sulfur; Scr = Chromium Reducible Sulfur; and ANC = Acid Neutralising Capacity

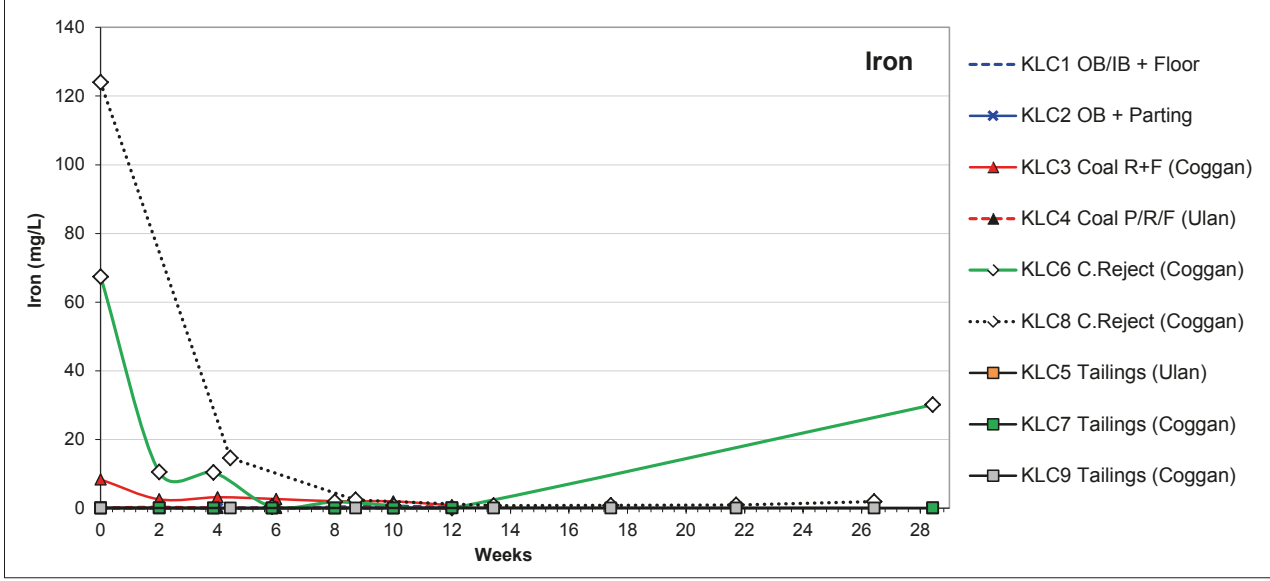
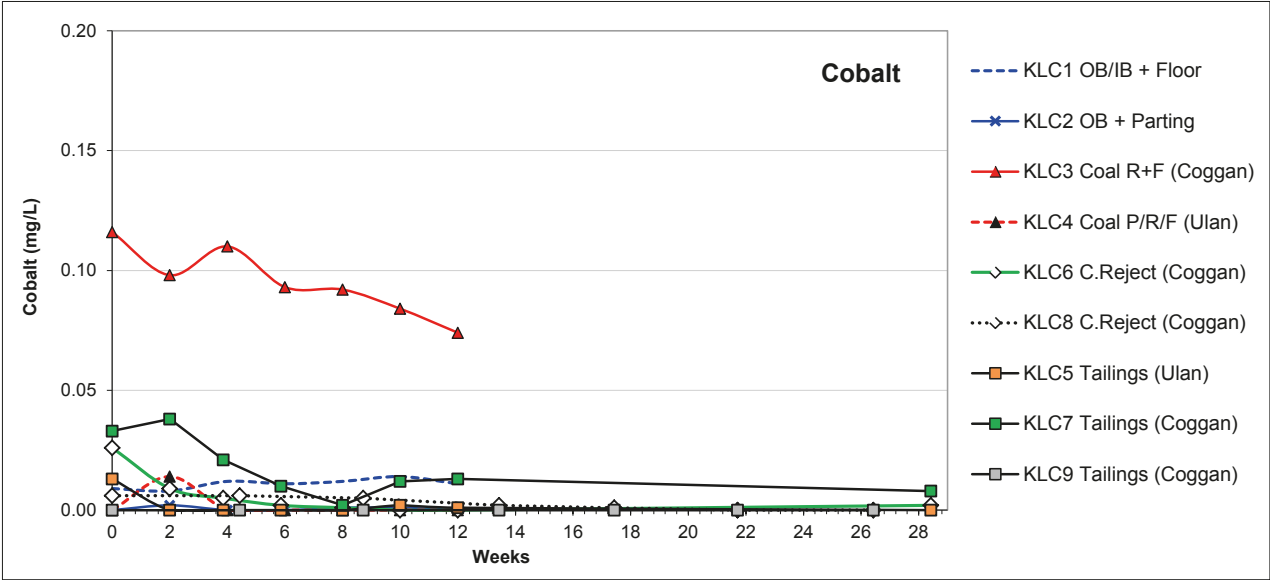
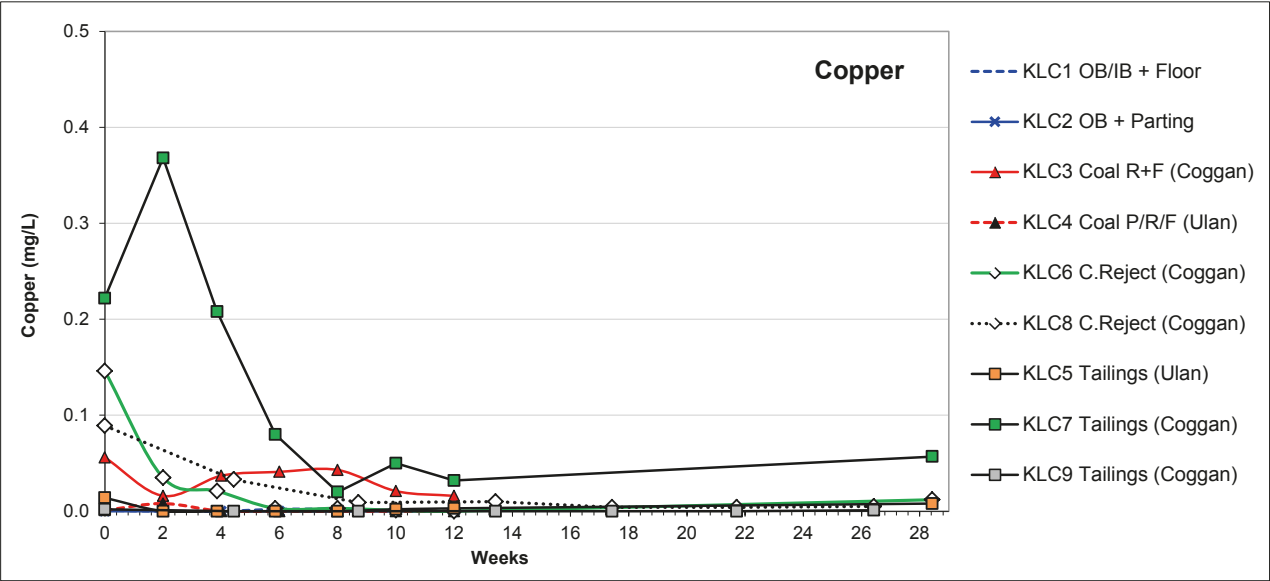
MPA = Maximum Potential Acidity, and NAPP = Net Acid Producing Potential

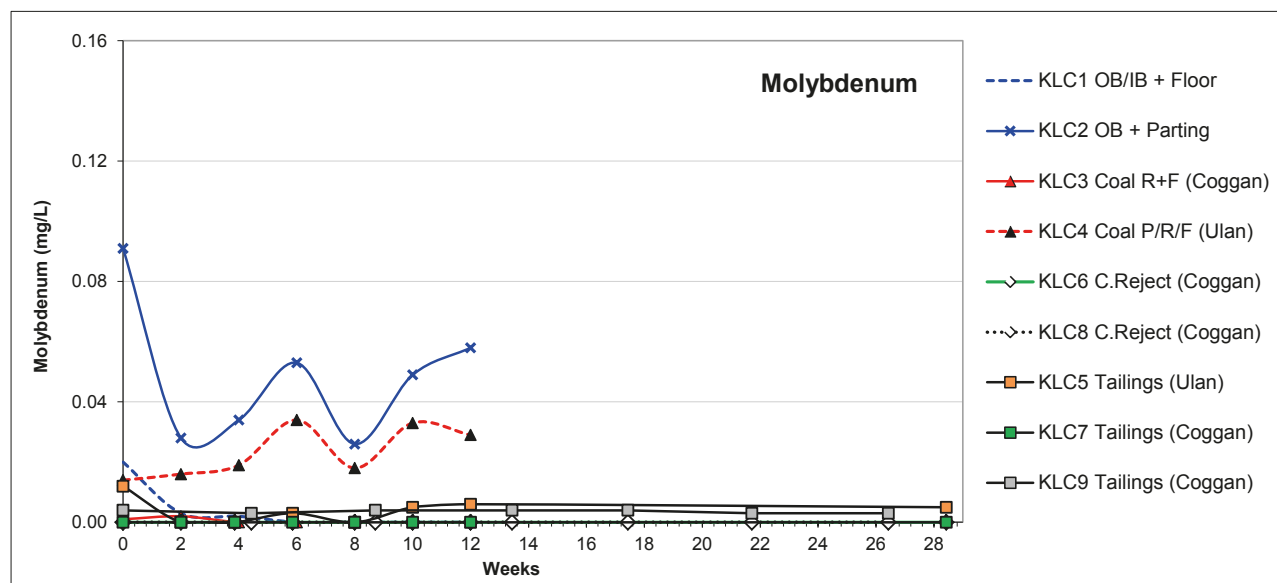
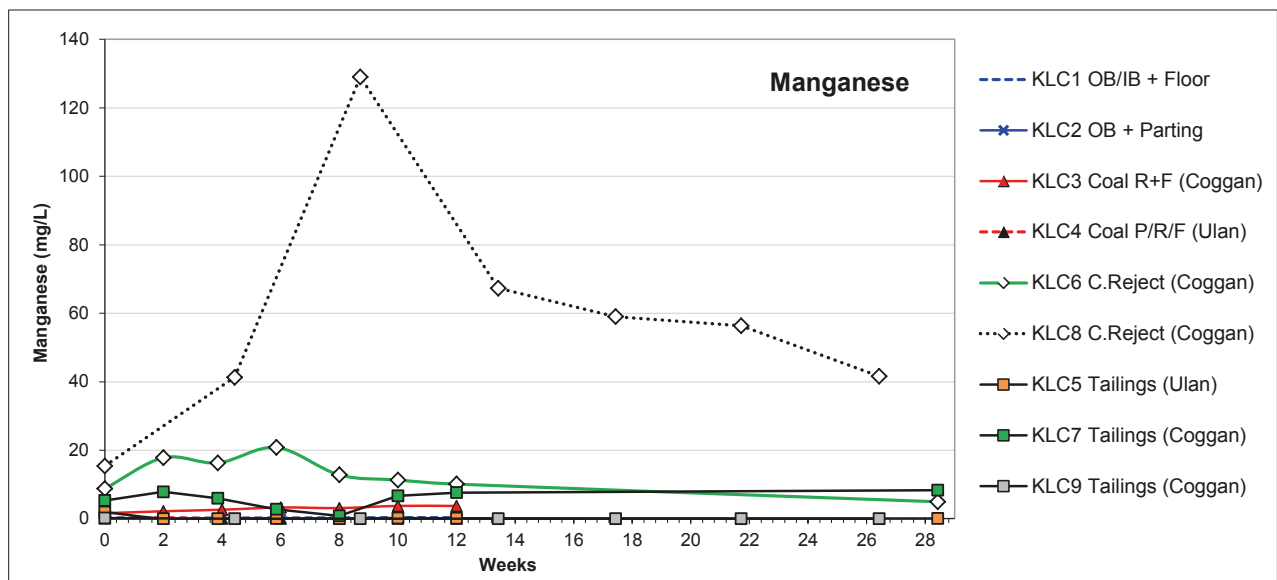
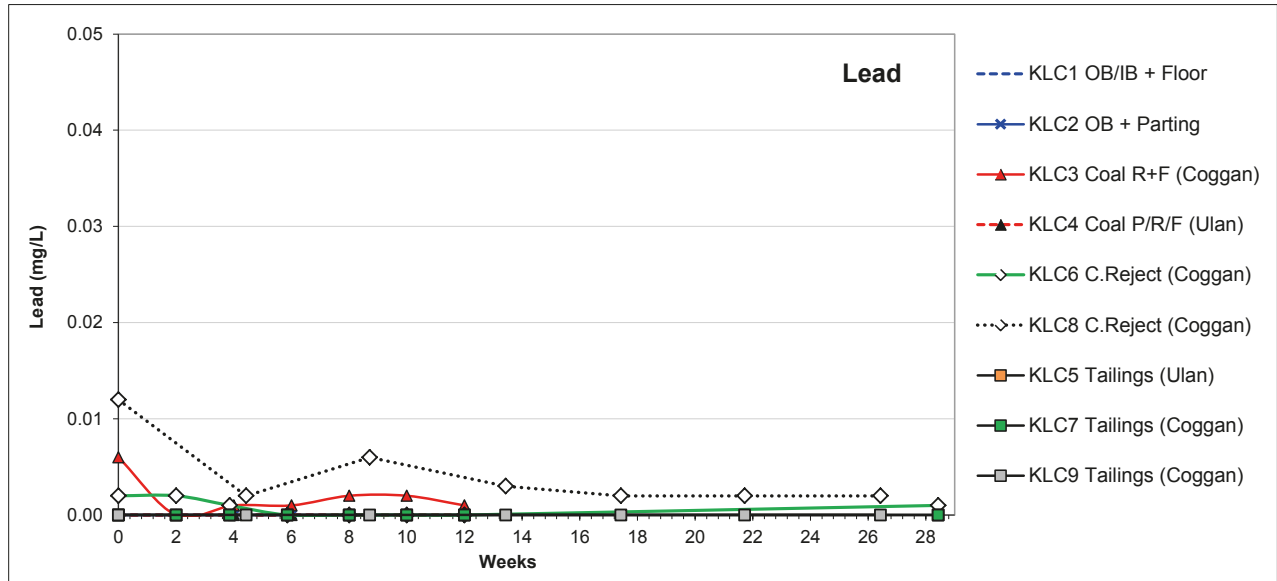
Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, 2000, ANZECC (Australian and New Zealand Environment Conservation Council) and ARMCAZ (Agriculture and Resource Management Council of Australia and New Zealand). Livestock Drinking Water Levels (Irrigation Levels used for Fe and Mn).

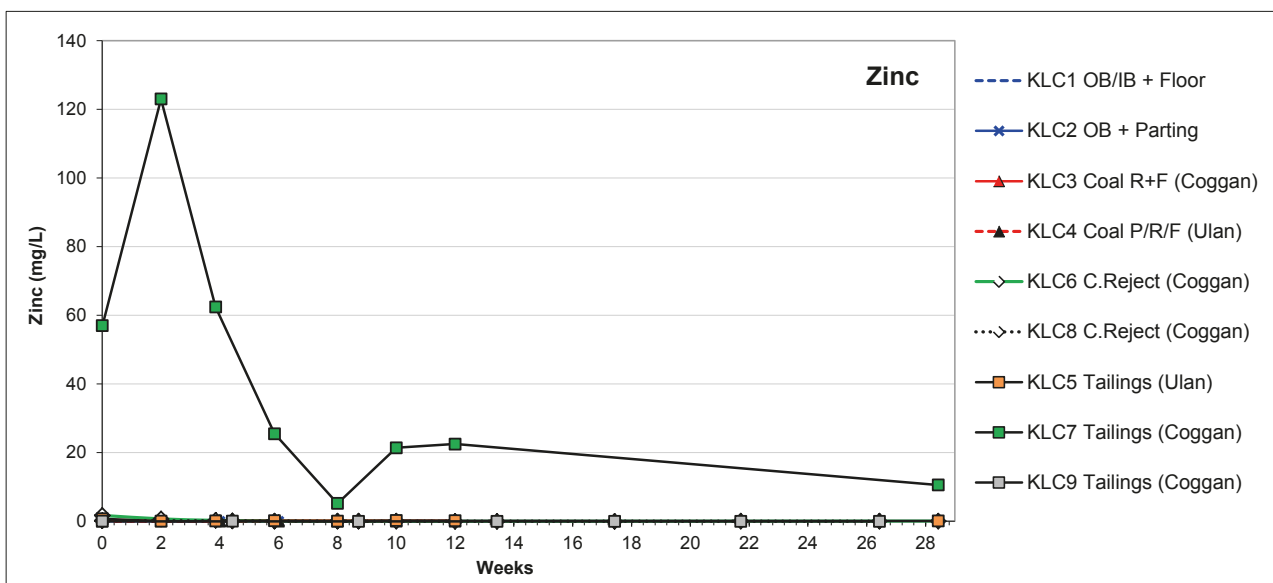
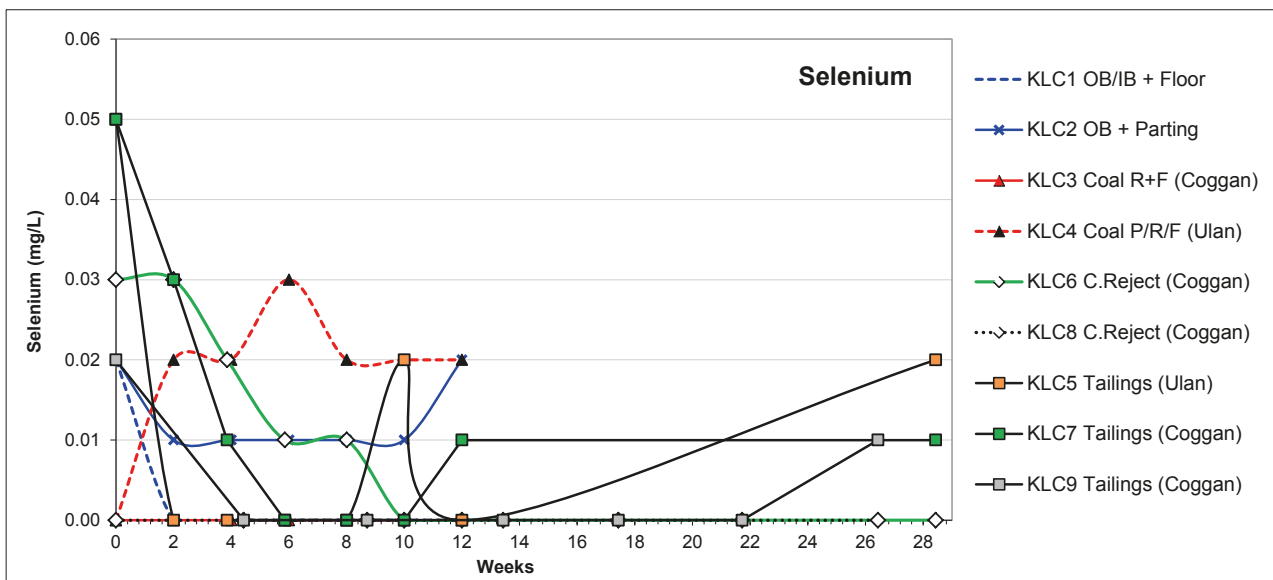
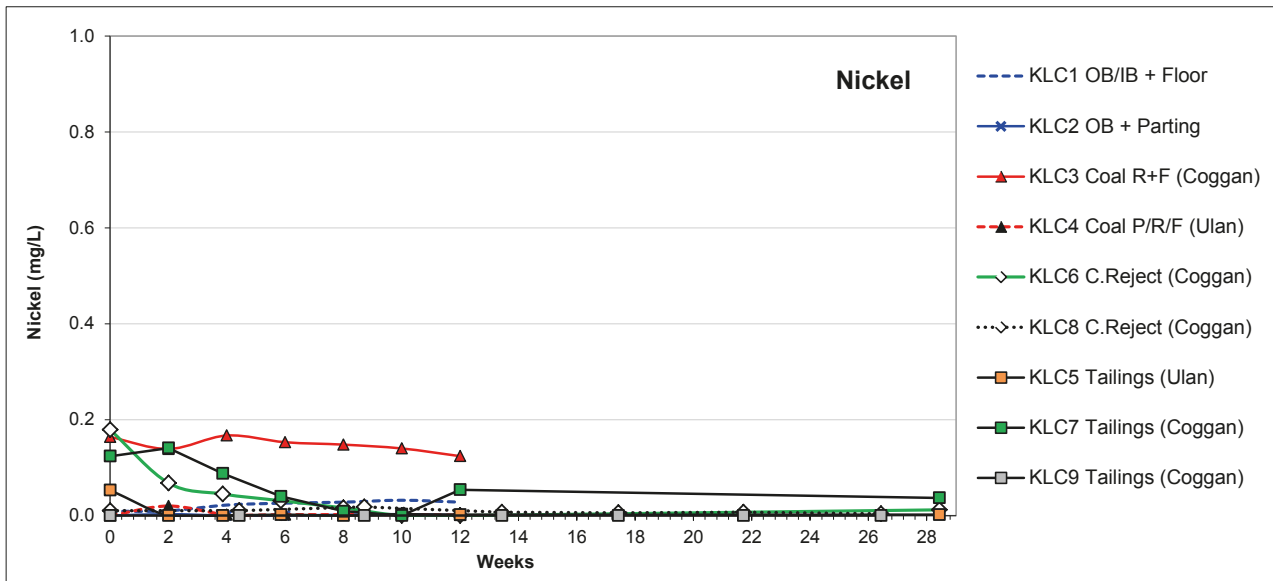












ATTACHMENT D

ALS Laboratory Results

(Certificates of Analysis)

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1230893	Page	: 1 of 17
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Bylong Project 111211	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 27-NOV-2012
Sampler	: Alan Robertson	Issue Date	: 19-DEC-2012
Site	: Bylong		
Quote number	: BN/057/11 V2	No. of samples received	: 80
		No. of samples analysed	: 75

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Stephen Hislop	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	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 insufficient sample for analysis.

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

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

Page : 3 of 17
 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

				00901 BY0071CH 6.40-6.70	00902 BY0071CH 9.20-9.50	00903 BY0071CH 10.08-10.42	00904 BY0071CH 11.02-11.32	00905 BY0071CH 14.58-14.98
Client sampling date / time				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-001	EB1230893-002	EB1230893-003	EB1230893-004	EB1230893-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.7	9.3	8.9	8.9	8.5
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	<0.5	<0.5	<0.5	0.6	<0.5
Net Acid Production Potential	----	0.5	kg H2SO4/t	-3.6	-48.9	-10.3	-43.1	-15.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	356	259	545	1130	363
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.6	48.9	10.3	43.7	15.1
ANC as CaCO3	----	0.1	% CaCO3	0.4	5.0	1.0	4.4	1.5
Fizz Rating	----	0	Fizz Unit	0	2	0	2	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	0.02	<0.01

Page : 4 of 17
 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00906 BY0071CH 15.20-15.50	00907 BY0071CH 15.71-16.01	00908 BY0071CH 18.20-18.50	00909 BY0071CH 20.70-21.02	00910 BY0071CH 22.96-23.26
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-006	EB1230893-007	EB1230893-008	EB1230893-009	EB1230893-010
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.0	8.0	7.7	8.4	5.3
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	<0.5	<0.5	<0.5	1.5	<0.5
Net Acid Production Potential	----	0.5	kg H2SO4/t	-5.7	-4.0	-4.8	-1.6	<0.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	474	492	351	437	150
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	5.7	4.0	4.8	3.1	<0.5
ANC as CaCO3	----	0.1	% CaCO3	0.6	0.4	0.5	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	%	<0.01	<0.01	<0.01	0.05	<0.01

Page : 5 of 17
 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00911 BY0071CH 25.92-26.23 02-NOV-2012 15:00 EB1230893-011	00912 BY0071CH 27.41-27.91 02-NOV-2012 15:00 EB1230893-012	00913 BY0071CH 30.53-30.83 02-NOV-2012 15:00 EB1230893-013	00914 BY0071CH 32.54-33.00 02-NOV-2012 15:00 EB1230893-014	00915 BY0071CH 2-6 02-NOV-2012 15:00 EB1230893-015
Compound	CAS Number	LOR	Unit					
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.9	5.5	3.5	7.8	8.3
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	<0.5	<0.5	9.2	6.7	0.6
Net Acid Production Potential	----	0.5	kg H2SO4/t	-1.9	<0.5	9.2	-32.9	-118
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	219	228	706	1540	401
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	1.9	<0.5	<0.5	39.6	119
ANC as CaCO3	----	0.1	% CaCO3	0.2	<0.1	<0.1	4.0	12.1
Fizz Rating	----	0	Fizz Unit	0	0	0	2	2
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	0.30	0.22	0.02

Page : 6 of 17
 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00916 BY0070CH 3-9	00917 BY0070CH 10-16	00918 BY0070CH 17-19	00919 BY0070CH 20-23	00920 BY0070CH 24-26
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-016	EB1230893-017	EB1230893-018	EB1230893-019	EB1230893-020
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.0	8.5	8.3	8.3	8.1
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	<0.5	<0.5	4.9	0.9	4.0
Net Acid Production Potential	----	0.5	kg H2SO4/t	-189	-34.4	-43.3	-8.6	-2.9
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	607	498	412	259	258
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	189	34.4	48.2	9.5	6.9
ANC as CaCO3	----	0.1	% CaCO3	19.2	3.5	4.9	1.0	0.7
Fizz Rating	----	0	Fizz Unit	3	2	2	0	0
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.01	<0.01	0.16	0.03	0.13

Page : 7 of 17
 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	00921 BY0070CH 27-33	00922 BY0034 1-13	00923 BY0034 14-20	00924 BY0034 21-24	00925 BY0034 25-27
Client sampling date / time					02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit		EB1230893-021	EB1230893-022	EB1230893-023	EB1230893-024	EB1230893-025
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.9	8.3	7.8	6.8	4.0
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		4.3	<0.5	1.5	2.1	11.0
Net Acid Production Potential	----	0.5	kg H2SO4/t		-92.7	-4.7	-14.5	-3.8	7.0
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		822	155	355	608	1700
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		97.0	4.7	16.0	5.9	4.0
ANC as CaCO3	----	0.1	% CaCO3		9.9	0.5	1.6	0.6	0.4
Fizz Rating	----	0	Fizz Unit		2	0	1	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.14	<0.01	0.05	0.07	0.36

Page : 8 of 17
 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00926 BY0034 28-33	00927 BY0118CH 1-3	00928 BY0118CH 4-9	00929 BY0118CH 10-18	00930 BY0118CH 19.98-20.47
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-026	EB1230893-027	EB1230893-028	EB1230893-029	EB1230893-030
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.8	7.8	9.0	8.8	8.7
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	8.9	<0.5	<0.5	<0.5	<0.5
Net Acid Production Potential	----	0.5	kg H2SO4/t	-20.1	-38.0	-137	-54.0	-26.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	2350	1130	379	315	439
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	29.0	38.0	137	54.0	26.8
ANC as CaCO3	----	0.1	% CaCO3	3.0	3.9	13.9	5.5	2.7
Fizz Rating	----	0	Fizz Unit	1	2	2	2	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.29	<0.01	<0.01	<0.01	0.01

Page : 9 of 17
 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	00931	00932	00933	00934	00935
					BY0118CH 22.86-23.16	BY0118CH 27.22-27.59	BY0118CH 30.06-30.43	BY0118CH 32.86-33.23	BY0118CH 34.45-34.85
Client sampling date / time					02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit		EB1230893-031	EB1230893-032	EB1230893-033	EB1230893-034	EB1230893-035
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.3	7.9	8.6	8.3	9.1
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		0.6	0.6	0.6	2.4	<0.5
Net Acid Production Potential	----	0.5	kg H2SO4/t		-58.9	-73.2	-23.8	-13.0	-15.9
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		452	513	366	316	531
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		59.5	73.8	24.4	15.4	15.9
ANC as CaCO3	----	0.1	% CaCO3		6.1	7.5	2.5	1.6	1.6
Fizz Rating	----	0	Fizz Unit		2	2	1	1	1
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.02	0.02	0.02	0.08	<0.01

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 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00936 BY0118CH 35.09-35.35	00937 BY0118CH 35.35-35.65	00938 BY0118CH 36.00-36.32	00939 BY0118CH 36.52-36.90	00940 BY0118CH 37.20-37.50
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-036	EB1230893-037	EB1230893-038	EB1230893-039	EB1230893-040
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.8	8.7	8.7	9.0	8.9
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	11.3	0.9	1.8	8.0	0.6
Net Acid Production Potential	----	0.5	kg H2SO4/t	-31.0	-16.3	-73.9	-0.8	-22.2
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	238	392	294	338	359
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	42.3	17.2	75.7	8.8	22.8
ANC as CaCO3	----	0.1	% CaCO3	4.3	1.8	7.7	0.9	2.3
Fizz Rating	----	0	Fizz Unit	2	1	2	0	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.37	0.03	0.06	0.26	0.02

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 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00941 BY0118CH 40.58-40.91	00942 BY0118CH 43.18-43.54	00943 BY0118CH 43.54-44.16	00944 BY0118CH 44.16-44.56	00945 BY0118CH 45.11-45.40
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-041	EB1230893-042	EB1230893-043	EB1230893-044	EB1230893-045
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.0	9.7	8.6	8.7	8.8
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	0.6	3.4	10.4	1.5	1.8
Net Acid Production Potential	----	0.5	kg H2SO4/t	-17.7	-27.4	-9.0	-20.0	-20.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	376	781	108	435	496
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	18.3	30.8	19.4	21.5	21.9
ANC as CaCO3	----	0.1	% CaCO3	1.9	3.1	2.0	2.2	2.2
Fizz Rating	----	0	Fizz Unit	1	2	1	1	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.02	0.11	0.34	0.05	0.06

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 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00946 BY0118CH 46.60-46.94	00947 BY0118CH 46.94-47.30	00948 BY0118CH 47.30-47.72	00949 BY0118CH 49.10-49.40	00950 BY0118CH 51.54-51.88
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-046	EB1230893-047	EB1230893-048	EB1230893-049	EB1230893-050
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.3	9.3	9.4	8.6	9.2
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	3.1	8.6	3.1	3.7	0.6
Net Acid Production Potential	----	0.5	kg H2SO4/t	-12.7	-184	-35.5	-19.3	-18.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	733	235	376	516	186
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	15.8	193	38.6	23.0	19.1
ANC as CaCO3	----	0.1	% CaCO3	1.6	19.7	3.9	2.4	1.9
Fizz Rating	----	0	Fizz Unit	1	3	2	1	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.10	0.28	0.10	0.12	0.02

Page : 13 of 17
 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00501 BY0118CH 53.17-53.47	00502 BY0118CH 53.47-53.96	00503 BY0118CH 53.96-54.28	00504 BY0118CH 54.43-54.81	00505 BY0118CH 54.81-55.12
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-051	EB1230893-052	EB1230893-053	EB1230893-054	EB1230893-055
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.1	8.1	8.8	8.8	8.7
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	0.9	8.3	2.1	6.4	6.7
Net Acid Production Potential	----	0.5	kg H2SO4/t	-18.0	-1.8	-8.4	-8.4	-378
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	161	60	117	118	114
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	18.9	10.1	10.6	14.8	385
ANC as CaCO3	----	0.1	% CaCO3	1.9	1.0	1.1	1.5	39.3
Fizz Rating	----	0	Fizz Unit	1	1	1	1	4
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.03	0.27	0.07	0.21	0.22

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 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00506 BY0118CH 55.12-55.36	00507 BY0118CH 58.72-58.94	00508 BY0118CH 60.00-60.26	00509 BY0118CH 60.43-60.95	00510 BY0118CH 60.95-61.27
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-056	EB1230893-057	EB1230893-058	EB1230893-059	EB1230893-060
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.4	8.6	9.3	8.5	8.6
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	0.9	0.6	1.5	12.5	1.2
Net Acid Production Potential	----	0.5	kg H2SO4/t	-71.6	-11.0	-516	-0.6	-8.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	238	57	404	103	63
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	72.5	11.6	518	13.2	9.6
ANC as CaCO3	----	0.1	% CaCO3	7.4	1.2	52.8	1.3	1.0
Fizz Rating	----	0	Fizz Unit	2	1	5	1	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.03	0.02	0.05	0.41	0.04

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 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00511 BY0118CH 63.38-63.68	00512 BY0118CH 64.30-64.50	00513 BY0118CH 65.52-65.87	00514 BY0118CH 67.00-67.38	00515 BY0118CH 68.67-69.00
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-061	EB1230893-062	EB1230893-063	EB1230893-064	EB1230893-065
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.7	7.9	8.5	7.8	7.9
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	<0.5	6.4	0.6	7.3	1.2
Net Acid Production Potential	----	0.5	kg H2SO4/t	-74.7	-5.4	-64.9	-2.8	-7.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	321	145	305	94	156
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	75.0	11.8	65.5	10.2	8.8
ANC as CaCO3	----	0.1	% CaCO3	7.6	1.2	6.7	1.0	0.9
Fizz Rating	----	0	Fizz Unit	2	1	2	1	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.01	0.21	0.02	0.24	0.04

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 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00516 BY0118CH 69.50-69.85	00517 BY0118CH 70.56-70.80	00518 BY0118CH 71.65-72.00	00519 BY0118CH 74.25-74.50	00520 BY0118CH 74.60-74.94
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-066	EB1230893-067	EB1230893-068	EB1230893-069	EB1230893-070
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.5	8.7	8.4	8.0	7.5
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	7.3	1.8	2.1	0.6	1.2
Net Acid Production Potential	----	0.5	kg H2SO4/t	-1.4	-106	-5.6	-4.3	-2.8
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	114	331	218	83	110
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	8.7	108	7.8	4.9	4.0
ANC as CaCO3	----	0.1	% CaCO3	0.9	11.0	0.8	0.5	0.4
Fizz Rating	----	0	Fizz Unit	1	2	0	0	0
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.24	0.06	0.07	0.02	0.04

Page : 17 of 17
 Work Order : EB1230893
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				00521 BY0118CH 75.50-75.86	00522 BY0118CH 76.39-76.81	00523 BY0118CH 77.00-77.30	00524 BY0018CH 79.98-80.32	00525 BY0118CH 81.48-81.79
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1230893-071	EB1230893-072	EB1230893-073	EB1230893-074	EB1230893-075
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.4	7.7	7.6	3.5	6.3
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	<0.5	<0.5	6.4	17.7	35.2
Net Acid Production Potential	----	0.5	kg H2SO4/t	-39.4	-4.0	1.0	17.7	25.8
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	248	246	64	1510	1980
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	39.4	4.3	5.4	<0.5	9.4
ANC as CaCO3	----	0.1	% CaCO3	4.0	0.4	0.6	<0.1	1.0
Fizz Rating	----	0	Fizz Unit	2	0	0	0	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.01	0.21	0.58	1.15

CERTIFICATE OF ANALYSIS

Work Order	: EB1302369	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 01-FEB-2013
Sampler	: ACIRL Maitland	Issue Date	: 11-FEB-2013
Site	: Bylong NSW		
Quote number	: BN/413/12	No. of samples received	: 10
		No. of samples analysed	: 10

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics



General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

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

Page : 3 of 4
 Work Order : EB1302369
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: COAL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				MU1386-09 ULNI-1/2/3	MU1386-10 ULNH-01	MU1386-11 ULNJ-01	MU1386-12 ULN-1/2/3	MU1386-13 ULN-1/2/3
				01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00
Compound	CAS Number	LOR	Unit	EB1302369-001	EB1302369-002	EB1302369-003	EB1302369-004	EB1302369-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.2	5.2	6.8	6.4	7.0
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	27.8	11.6	10.4	46.2	158
Net Acid Production Potential	----	0.5	kg H2SO4/t	15.3	10.3	3.2	10.0	133
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	545	163	307	578	553
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	12.5	1.3	7.2	36.2	25.6
ANC as CaCO3	----	0.1	% CaCO3	1.3	0.1	0.7	3.7	2.6
Fizz Rating	----	0	Fizz Unit	1	0	0	1	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.91	0.38	0.34	1.51	5.17

Page : 4 of 4
 Work Order : EB1302369
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: COAL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				MU1386-14 COGB-1/2 + COGC-1/2	MU1386-15 COGB-RF	MU1386-16 COGD-01	MU1386-17 COGB-1/2 + COGC-1/2	MU1386-18 COGB-1/2 + COGC-1/2
				01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00
				EB1302369-006	EB1302369-007	EB1302369-008	EB1302369-009	EB1302369-010
Compound	CAS Number	LOR	Unit					
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.3	6.1	7.6	6.3	4.9
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	8.3	1.2	6.7	13.2	32.1
Net Acid Production Potential	----	0.5	kg H2SO4/t	4.8	-1.8	<0.5	8.4	29.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	170	134	104	168	270
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.5	3.0	6.5	4.8	2.8
ANC as CaCO3	----	0.1	% CaCO3	0.4	0.3	0.7	0.5	0.3
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.27	0.04	0.22	0.43	1.05

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1306433	Page	: 1 of 7
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 13-MAR-2013
C-O-C number	: ----	Issue Date	: 27-MAR-2013
Sampler	: ACIRL Maitland	No. of samples received	: 25
Site	: Byong, NSW	No. of samples analysed	: 25
Quote number	: BN/413/12		

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

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils



Page : 2 of 7
Work Order : EB1306433
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211

General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

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

Page : 3 of 7
 Work Order : EB1306433
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				MU1386-45 RC1305-4131	MU1386-46 RC1305-9101	MU1386-47 RC1305-9102	MU1386-48 RC1305-4132	MU1386-49 RC1305-4133
				12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00
Compound	CAS Number	LOR	Unit	EB1306433-001	EB1306433-002	EB1306433-003	EB1306433-004	EB1306433-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.0	8.5	9.3	8.5	8.3
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	11.6	4.9	9.5	5.2	11.6
Net Acid Production Potential	----	0.5	kg H2SO4/t	5.3	-4.6	-30.0	-24.4	-17.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	34	139	120	147	105
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	6.3	9.5	39.5	29.6	29.0
ANC as CaCO3	----	0.1	% CaCO3	0.6	1.0	4.0	3.0	3.0
Fizz Rating	----	0	Fizz Unit	0	0	2	1	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.38	0.16	0.31	0.17	0.38

Page : 4 of 7
 Work Order : EB1306433
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MU1386-50 RC1305-4134	MU1386-51 RC1305-4137	MU1386-52 RC1305-4154	MU1386-53 RC1305-4135	MU1386-54 RC1305-4136
Client sampling date / time					12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00
Compound	CAS Number	LOR	Unit		EB1306433-006	EB1306433-007	EB1306433-008	EB1306433-009	EB1306433-010
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.2	9.0	8.2	8.0	7.9
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		10.4	1.2	11.6	4.9	10.1
Net Acid Production Potential	----	0.5	kg H2SO4/t		1.1	-65.9	9.0	-94.1	5.3
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		41	150	26	67	37
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		9.3	67.1	2.6	99.0	4.8
ANC as CaCO3	----	0.1	% CaCO3		1.0	6.8	0.3	10.1	0.5
Fizz Rating	----	0	Fizz Unit		1	2	0	3	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.34	0.04	0.38	0.16	0.33

Page : 5 of 7
 Work Order : EB1306433
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				MU1386-57 RC1305-4139	MU1386-58 RC1305-4138	MU1386-59 RC1305-4153	MU1386-60 RC1305-4152	MU1386-61 RC1305-4151
				12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00
Compound	CAS Number	LOR	Unit	EB1306433-011	EB1306433-012	EB1306433-013	EB1306433-014	EB1306433-015
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.1	9.1	8.8	8.4	7.9
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	10.1	4.9	1.5	3.4	9.8
Net Acid Production Potential	----	0.5	kg H2SO4/t	-7.7	-22.4	-4.1	-33.8	-7.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	49	86	62	139	66
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	17.8	27.3	5.6	37.2	17.2
ANC as CaCO3	----	0.1	% CaCO3	1.8	2.8	0.6	3.8	1.8
Fizz Rating	----	0	Fizz Unit	1	1	0	2	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.33	0.16	0.05	0.11	0.32

Page : 6 of 7
 Work Order : EB1306433
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MU1386-62 RC1305-4156	MU1386-63 RC1305-4159	MU1386-64 RC1305-4171	MU1386-65 RC1305-4157	MU1386-66 RC1305-4158
Client sampling date / time					12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00
Compound	CAS Number	LOR	Unit		EB1306433-016	EB1306433-017	EB1306433-018	EB1306433-019	EB1306433-020
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.0	7.5	8.1	8.1	7.4
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		11.0	10.4	11.0	3.7	11.0
Net Acid Production Potential	----	0.5	kg H2SO4/t		6.5	6.4	3.8	-3.5	2.6
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		40	61	54	102	51
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		4.5	4.0	7.2	7.2	8.4
ANC as CaCO3	----	0.1	% CaCO3		0.4	0.4	0.7	0.7	0.8
Fizz Rating	----	0	Fizz Unit		0	0	0	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.36	0.34	0.36	0.12	0.36

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 Work Order : EB1306433
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				MU1386-67 RC1305-4173	MU1386-68 RC1305-4155	MU1386-69 RC1305-4172	MU1386-70 RC1305-4174	MU1386-71 RC1305-4175
				12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00
Compound	CAS Number	LOR	Unit	EB1306433-021	EB1306433-022	EB1306433-023	EB1306433-024	EB1306433-025
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	3.8	3.8	3.4	3.8	4.5
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	34.3	17.7	28.2	136	48.6
Net Acid Production Potential	----	0.5	kg H2SO4/t	30.6	16.7	27.4	90.4	43.2
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	841	333	940	700	281
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.7	1.0	0.7	46.1	5.4
ANC as CaCO3	----	0.1	% CaCO3	0.4	0.1	<0.1	4.7	0.6
Fizz Rating	----	0	Fizz Unit	0	0	0	2	0
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	1.12	0.58	0.92	4.46	1.59

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1306744	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 16-MAR-2013
Sampler	: ACIRL Maitland	Issue Date	: 26-MAR-2013
Site	: Bylong, NSW		
Quote number	: BN/413/12	No. of samples received	: 10
		No. of samples analysed	: 10

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils



General Comments

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

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LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

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

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 Work Order : EB1306744
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	RC1306-2001 MU1386-72	RC1306-2011 MU1386-73	RC1306-2012 MU1386-74	RC1306-2013 MU1386-75	RC1306-2014 MU1386-76
Client sampling date / time					[15-MAR-2013]	[15-MAR-2013]	[15-MAR-2013]	[15-MAR-2013]	[15-MAR-2013]
Compound	CAS Number	LOR	Unit		EB1306744-001	EB1306744-002	EB1306744-003	EB1306744-004	EB1306744-005
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.0	7.0	7.3	7.6	7.6
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		10.1	8.9	2.1	5.8	10.4
Net Acid Production Potential	----	0.5	kg H2SO4/t		1.3	-18.6	-2.4	-13.7	<0.5
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		21	21	16	30	47
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		8.8	27.5	4.6	19.5	10.7
ANC as CaCO3	----	0.1	% CaCO3		0.9	2.8	0.5	2.0	1.1
Fizz Rating	----	0	Fizz Unit		0	1	0	1	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.33	0.29	0.07	0.19	0.34

Page : 4 of 4
 Work Order : EB1306744
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				RC1306-2015 MU1386-77	RC1306-2016 MU1386-78	RC1306-2017 MU1386-79	RC1306-2018 MU1386-80	RC1306-2019 MU1386-81
				[15-MAR-2013]	[15-MAR-2013]	[15-MAR-2013]	[15-MAR-2013]	[15-MAR-2013]
Compound	CAS Number	LOR	Unit	EB1306744-006	EB1306744-007	EB1306744-008	EB1306744-009	EB1306744-010
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.9	7.0	6.8	5.2	6.9
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	11.6	12.8	12.8	27.2	20.2
Net Acid Production Potential	----	0.5	kg H2SO4/t	9.5	11.2	10.4	10.4	17.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	22	25	12	294	73
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.1	1.6	2.4	16.8	2.9
ANC as CaCO3	----	0.1	% CaCO3	0.2	0.2	0.2	1.7	0.3
Fizz Rating	----	0	Fizz Unit	0	0	0	1	0
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.38	0.42	0.42	0.89	0.66

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1312228	Page	: 1 of 13
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Bylong Project 111211	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 20-MAY-2013
Sampler	: Alan Robertson	Issue Date	: 03-JUN-2013
Site	: Bylong		
Quote number	: BN/413/12	No. of samples received	: 55
		No. of samples analysed	: 55

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- General Comments
- Analytical Results



NATA Accredited Laboratory 825

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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
SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics



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LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

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



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	GC_001 BY0172CH	GC_002 BY0172CH	GC_003 BY0172CH	GC_004 BY0172CH	GC_005 BY0172CH
Client sampling date / time					17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit		EB1312228-001	EB1312228-002	EB1312228-003	EB1312228-004	EB1312228-005
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.5	7.9	8.6	5.7	8.1
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		<0.5	1.2	1.2	15.6	0.9
Net Acid Production Potential	----	0.5	kg H2SO4/t		-0.7	-3.4	-77.4	-3.5	-23.6
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		92	69	217	868	123
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		0.7	4.6	78.6	19.1	24.5
ANC as CaCO3	----	0.1	% CaCO3		<0.1	0.5	8.0	1.9	2.5
Fizz Rating	----	0	Fizz Unit		0	0	2	1	1
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		<0.01	0.04	0.04	0.51	0.03

Page : 4 of 13
 Work Order : EB1312228
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				GC_006 BY0172CH	GC_007 BY0172CH	GC_008 BY0172CH	GC_009 BY0172CH	GC_010 BY0172CH
				17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit	EB1312228-006	EB1312228-007	EB1312228-008	EB1312228-009	EB1312228-010
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.9	7.7	7.9	6.3	6.8
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	3.1	3.7	1.5	2.8	3.4
Net Acid Production Potential	----	0.5	kg H2SO4/t	-13.2	-18.0	-4.6	1.2	-0.9
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	88	64	55	191	160
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	16.3	21.7	6.1	1.5	4.3
ANC as CaCO3	----	0.1	% CaCO3	1.7	2.2	0.6	0.2	0.4
Fizz Rating	----	0	Fizz Unit	1	1	0	0	0
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.10	0.12	0.05	0.09	0.11



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	GC_011 BY0172CH	GC_012 BY0172CH	GC_013 BY0172CH	GC_014 BY0172CH	GC_015 BY0172CH
Client sampling date / time					17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit		EB1312228-011	EB1312228-012	EB1312228-013	EB1312228-014	EB1312228-015
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.9	7.8	7.7	8.4	8.0
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		3.1	4.0	45.6	3.4	10.7
Net Acid Production Potential	----	0.5	kg H2SO4/t		-25.0	-13.5	-84.4	-415	-11.4
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		660	697	2010	448	756
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		28.1	17.5	130	418	22.1
ANC as CaCO3	----	0.1	% CaCO3		2.9	1.8	13.3	42.6	2.2
Fizz Rating	----	0	Fizz Unit		1	1	3	4	1
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.10	0.13	1.49	0.11	0.35

Page : 6 of 13
 Work Order : EB1312228
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				GC_0001 BY0173CH	GC_0002 BY0173CH	GC_0001 BY0175CH	GC_0002 BY0175CH	GC_0003 BY0175CH
				17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit	EB1312228-016	EB1312228-017	EB1312228-018	EB1312228-019	EB1312228-020
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.8	7.6	8.0	7.7	8.0
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	1.8	3.4	1.2	1.8	1.2
Net Acid Production Potential	----	0.5	kg H2SO4/t	-87.1	-5.6	-4.9	-8.1	-8.8
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	218	318	125	208	116
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	88.9	9.0	6.1	9.9	10.0
ANC as CaCO3	----	0.1	% CaCO3	9.1	0.9	0.6	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	%	0.06	0.11	0.04	0.06	0.04



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	GC_0004 BY0175CH	GC_0005 BY0175CH	GC_0001 BY0178CH	GC_0002 BY0178CH	GC_0003 BY0178CH
Client sampling date / time					17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit		EB1312228-021	EB1312228-022	EB1312228-023	EB1312228-024	EB1312228-025
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		6.8	6.1	7.7	7.8	5.1
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		1.2	6.7	1.5	1.2	12.8
Net Acid Production Potential	----	0.5	kg H2SO4/t		-1.2	4.1	-13.8	-2.7	11.8
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		88	273	164	53	453
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		2.4	2.6	15.3	3.9	1.1
ANC as CaCO3	----	0.1	% CaCO3		0.2	0.3	1.6	0.4	0.1
Fizz Rating	----	0	Fizz Unit		0	0	1	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.04	0.22	0.05	0.04	0.42

Page : 8 of 13
 Work Order : EB1312228
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				GC_001 BY0180CH	GC_002 BY0180CH	GC_003 BY0180CH	GC_004 BY0180CH	GC_005 BY0180CH
				17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit	EB1312228-026	EB1312228-027	EB1312228-028	EB1312228-029	EB1312228-030
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.0	8.9	8.0	8.3	8.2
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	<0.5	<0.5	<0.5	1.2	0.9
Net Acid Production Potential	----	0.5	kg H2SO4/t	-4.3	-2.6	-4.2	-9.0	-7.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	472	232	228	182	180
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	4.3	2.6	4.2	10.2	8.3
ANC as CaCO3	----	0.1	% CaCO3	0.4	0.3	0.4	1.0	0.8
Fizz Rating	----	0	Fizz Unit	0	0	0	1	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	0.04	0.03

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 Work Order : EB1312228
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	GC_006 BY0180CH	GC_007 BY0180CH	GC_008 BY0180CH	GC_009 BY0180CH	GC_010 BY0180CH
Client sampling date / time					17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit		EB1312228-031	EB1312228-032	EB1312228-033	EB1312228-034	EB1312228-035
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.9	8.0	8.7	7.0	8.8
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		3.4	1.2	1.2	15.0	1.2
Net Acid Production Potential	----	0.5	kg H2SO4/t		-6.0	-5.4	-72.5	5.4	-115
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		189	98	204	341	218
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		9.4	6.6	73.7	9.6	116
ANC as CaCO3	----	0.1	% CaCO3		1.0	0.7	7.5	1.0	11.8
Fizz Rating	----	0	Fizz Unit		0	0	2	0	3
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.11	0.04	0.04	0.49	0.04

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 Work Order : EB1312228
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				GC_011 BY0180CH	GC_012 BY0180CH	GC_013 BY0180CH	GC_014 BY0180CH	GC_015 BY0180CH
				17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit	EB1312228-036	EB1312228-037	EB1312228-038	EB1312228-039	EB1312228-040
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.8	7.9	8.4	7.6	7.6
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	2.8	1.2	3.7	2.8	4.0
Net Acid Production Potential	----	0.5	kg H2SO4/t	-13.2	-12.5	-11.5	-42.7	-9.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	142	109	166	256	76
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	16.0	13.7	15.2	45.5	13.6
ANC as CaCO3	----	0.1	% CaCO3	1.6	1.4	1.6	4.6	1.4
Fizz Rating	----	0	Fizz Unit	1	1	1	2	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.09	0.04	0.12	0.09	0.13

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 Work Order : EB1312228
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	GC_016 BY0180CH	GC_017 BY0180CH	GC_018 BY0180CH	GC_019 BY0180CH	GC_020 BY0180CH
Client sampling date / time					17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit		EB1312228-041	EB1312228-042	EB1312228-043	EB1312228-044	EB1312228-045
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.9	7.6	7.5	6.2	7.4
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		2.4	1.2	1.8	5.2	19.3
Net Acid Production Potential	----	0.5	kg H2SO4/t		-2.8	-2.7	-3.5	0.8	-64.7
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		57	148	107	361	1290
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		5.2	3.9	5.3	4.4	84.0
ANC as CaCO3	----	0.1	% CaCO3		0.5	0.4	0.5	0.4	8.6
Fizz Rating	----	0	Fizz Unit		0	0	0	0	2
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.08	0.04	0.06	0.17	0.63

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 Work Order : EB1312228
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				GC_021 BY0180CH	GC_022 BY0180CH	GC_023 BY0180CH	GC_024 BY0180CH	GC_025 BY0180CH
				17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit	EB1312228-046	EB1312228-047	EB1312228-048	EB1312228-049	EB1312228-050
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.7	8.3	8.1	8.0	7.6
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	14.4	14.4	15.9	4.0	16.2
Net Acid Production Potential	----	0.5	kg H2SO4/t	8.1	-136	-35.1	-43.2	0.8
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	489	380	623	732	1410
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	6.3	150	51.0	47.2	15.4
ANC as CaCO3	----	0.1	% CaCO3	0.6	15.2	5.2	4.8	1.6
Fizz Rating	----	0	Fizz Unit	0	3	2	2	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.47	0.47	0.52	0.13	0.53



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	GC_026 BY0180CH	GC_027 BY0180CH	GC_001 BY0215CH	GC_002 BY0215CH	GC_003 BY0215CH
Client sampling date / time					17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit		EB1312228-051	EB1312228-052	EB1312228-053	EB1312228-054	EB1312228-055
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.6	8.4	8.5	8.6	8.5
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		10.1	9.5	1.5	1.2	3.1
Net Acid Production Potential	----	0.5	kg H2SO4/t		-69.9	-532	-15.3	-24.6	-10.6
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		570	656	260	198	105
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		80.0	542	16.8	25.8	13.7
ANC as CaCO3	----	0.1	% CaCO3		8.2	55.3	1.7	2.6	1.4
Fizz Rating	----	0	Fizz Unit		2	5	1	1	1
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.33	0.31	0.05	0.04	0.10

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1233255	Page	: 1 of 11
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Bylong Project 111211	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 19-DEC-2012
Sampler	: Alan Robertson	Issue Date	: 08-JAN-2013
Site	: ----		
Quote number	: BN/057/11 V2	No. of samples received	: 85
		No. of samples analysed	: 26

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics



Page : 2 of 11
Work Order : EB1233255
Client : RGS ENVIRONMENTAL PTY LTD
Project : Bylong Project 111211

General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	EB1233255-002	EB1233255-003	EB1233255-005	EB1233255-011	EB1233255-012
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.013	0.008	<0.005	0.791	0.197



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID		00925 BY0034 25.00-27.00 EB1230893025	00920 BY0070CH 24.00-26.00 EB1230893020	00523 BY0118CH 77.00-77.30 EB1230893073	00913 BY0071CH 30.53-30.83 EB1230893013	00524 BY0118CH 79.98-80.32 EB1230893074
Client sampling date / time						02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit			EB1233255-037	EB1233255-042	EB1233255-043	EB1233255-044	EB1233255-045
EA026 : Chromium Reducible Sulfur										
Chromium Reducible Sulphur	----	0.005	%			0.185	0.016	0.006	0.098	0.376



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	EB1233255-050	EB1233255-051	EB1233255-064	EB1233255-065	EB1233255-067
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.036	<0.005	0.006	0.006	<0.005

Page : 6 of 11
 Work Order : EB1233255
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID	00939 BY0118CH 36.52-36.90 EB1230893039	COMPOSITE 1	COMPOSITE 2	COMPOSITE 3	COMPOSITE 4
Client sampling date / time					02-NOV-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00
Compound	CAS Number	LOR	Unit		EB1233255-069	EB1233255-076	EB1233255-077	EB1233255-078	EB1233255-079
EA026 : Chromium Reducible Sulfur									
Chromium Reducible Sulphur	----	0.005	%		0.007	----	----	----	----
ED037: Alkalinity									
Total Alkalinity as CaCO3	----	1	mg/kg		----	628	641	410	320
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg		----	628	641	410	320
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		----	<1	<1	<1	<1
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		----	150	860	290	40
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		----	<10	20	10	170
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		----	<10	100	30	<10
Magnesium	7439-95-4	10	mg/kg		----	<10	30	10	<10
Sodium	7440-23-5	10	mg/kg		----	200	320	250	190
Potassium	7440-09-7	10	mg/kg		----	20	120	70	60
ED093T: Total Major Cations									
Sodium	7440-23-5	50	mg/kg		----	830	810	580	360
Potassium	7440-09-7	50	mg/kg		----	1240	1390	1300	1320
Calcium	7440-70-2	50	mg/kg		----	1740	9540	9430	4930
Magnesium	7439-95-4	50	mg/kg		----	2130	4480	1500	3520
EG005S : Soluble Metals by ICPAES									
Aluminium	7429-90-5	1	mg/kg		----	<1	<1	<1	1
Antimony	7440-36-0	0.1	mg/kg		----	<0.1	<0.1	<0.1	<0.1
Arsenic	7440-38-2	0.1	mg/kg		----	<0.1	<0.1	<0.1	<0.1
Boron	7440-42-8	1	mg/kg		----	<1	<1	<1	<1
Cadmium	7440-43-9	0.1	mg/kg		----	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	0.1	mg/kg		----	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/kg		----	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/kg		----	<0.1	<0.1	<0.1	<0.1
Iron	7439-89-6	1	mg/kg		----	<1	<1	<1	<1
Lead	7439-92-1	0.1	mg/kg		----	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/kg		----	<0.1	<0.1	<0.1	<0.1
Molybdenum	7439-98-7	0.1	mg/kg		----	0.2	0.1	0.4	<0.1

Page : 7 of 11
 Work Order : EB1233255
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

00939 BY0118CH
 36.52-36.90
 EB1230893039

COMPOSITE 1

COMPOSITE 2

COMPOSITE 3

COMPOSITE 4

Client sampling date / time

02-NOV-2012 15:00

20-DEC-2012 15:00

20-DEC-2012 15:00

20-DEC-2012 15:00

20-DEC-2012 15:00

Compound	CAS Number	LOR	Unit	EB1233255-069	EB1233255-076	EB1233255-077	EB1233255-078	EB1233255-079
EG005S : Soluble Metals by ICPAES - Continued								
Nickel	7440-02-0	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.1	mg/kg	----	0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Phosphorus	7723-14-0	10	mg/kg	----	<10	<10	<10	<10
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	4260	5310	5250	5000
Antimony	7440-36-0	5	mg/kg	----	<5	<5	<5	<5
Arsenic	7440-38-2	5	mg/kg	----	5	10	5	8
Boron	7440-42-8	50	mg/kg	----	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg	----	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	----	11	36	18	31
Cobalt	7440-48-4	2	mg/kg	----	16	9	11	7
Copper	7440-50-8	5	mg/kg	----	30	18	17	15
Iron	7439-89-6	50	mg/kg	----	33300	21900	18500	18900
Lead	7439-92-1	5	mg/kg	----	16	16	17	18
Manganese	7439-96-5	5	mg/kg	----	818	387	518	221
Molybdenum	7439-98-7	2	mg/kg	----	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg	----	77	48	38	40
Selenium	7782-49-2	5	mg/kg	----	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg	----	56	58	58	42
Phosphorus	7723-14-0	50	mg/kg	----	90	110	110	160



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID	COMPOSITE 5	COMPOSITE 6	COMPOSITE 7	COMPOSITE 8	COMPOSITE 9
Client sampling date / time					20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00
Compound	CAS Number	LOR	Unit		EB1233255-080	EB1233255-081	EB1233255-082	EB1233255-083	EB1233255-084
ED037: Alkalinity									
Total Alkalinity as CaCO ₃	----	1	mg/kg		487	64	397	500	743
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/kg		487	64	397	500	743
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/kg		<1	<1	<1	<1	<1
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO ₄ 2-	14808-79-8	10	mg/kg		90	1300	90	130	20
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		80	20	20	20	10
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		<10	320	50	<10	30
Magnesium	7439-95-4	10	mg/kg		<10	120	40	<10	20
Sodium	7440-23-5	10	mg/kg		290	40	110	260	230
Potassium	7440-09-7	10	mg/kg		50	60	80	20	40
ED093T: Total Major Cations									
Sodium	7440-23-5	50	mg/kg		610	80	330	2170	1080
Potassium	7440-09-7	50	mg/kg		1780	640	1400	1890	720
Calcium	7440-70-2	50	mg/kg		4770	930	17600	2870	32700
Magnesium	7439-95-4	50	mg/kg		4080	500	4720	4790	10300
EG005S : Soluble Metals by ICPAES									
Aluminium	7429-90-5	1	mg/kg		<1	<1	<1	<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	<0.1	1.5	0.1
Boron	7440-42-8	1	mg/kg		<1	<1	<1	<1	2
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	0.3	<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		<0.1	6.5	<0.1	<0.1	<0.1
Molybdenum	7439-98-7	0.1	mg/kg		<0.1	<0.1	0.1	0.7	0.1
Nickel	7440-02-0	0.1	mg/kg		0.2	0.4	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.1	mg/kg		<0.1	<0.1	<0.1	0.2	<0.1
Zinc	7440-66-6	0.1	mg/kg		<0.1	0.3	<0.1	<0.1	<0.1

Page : 9 of 11
 Work Order : EB1233255
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

Client sampling date / time

				COMPOSITE 5	COMPOSITE 6	COMPOSITE 7	COMPOSITE 8	COMPOSITE 9
				20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00
				EB1233255-080	EB1233255-081	EB1233255-082	EB1233255-083	EB1233255-084
Compound	CAS Number	LOR	Unit					
EG005S : Soluble Metals by ICPAES - Continued								
Phosphorus	7723-14-0	10	mg/kg	<10	<10	<10	<10	<10
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	6620	4040	5030	7110	3400
Antimony	7440-36-0	5	mg/kg	<5	<5	<5	<5	<5
Arsenic	7440-38-2	5	mg/kg	11	7	7	12	<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	37	29	8	10	5
Cobalt	7440-48-4	2	mg/kg	20	4	8	14	6
Copper	7440-50-8	5	mg/kg	33	11	16	17	9
Iron	7439-89-6	50	mg/kg	31600	11800	20400	41200	9770
Lead	7439-92-1	5	mg/kg	15	11	24	24	8
Manganese	7439-96-5	5	mg/kg	708	201	868	976	219
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg	104	6	25	58	35
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg	74	23	51	76	30
Phosphorus	7723-14-0	50	mg/kg	190	<50	70	220	220



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID	COMPOSITE 10	----	----	----	----
				Client sampling date / time	20-DEC-2012 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1233255-085	----	----	----	----
ED037: Alkalinity									
Total Alkalinity as CaCO ₃	----	1	mg/kg		794	----	----	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/kg		794	----	----	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/kg		<1	----	----	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO ₄ 2-	14808-79-8	10	mg/kg		110	----	----	----	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		20	----	----	----	----
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		<10	----	----	----	----
Magnesium	7439-95-4	10	mg/kg		<10	----	----	----	----
Sodium	7440-23-5	10	mg/kg		350	----	----	----	----
Potassium	7440-09-7	10	mg/kg		30	----	----	----	----
ED093T: Total Major Cations									
Sodium	7440-23-5	50	mg/kg		2620	----	----	----	----
Potassium	7440-09-7	50	mg/kg		1690	----	----	----	----
Calcium	7440-70-2	50	mg/kg		5740	----	----	----	----
Magnesium	7439-95-4	50	mg/kg		3670	----	----	----	----
EG005S : Soluble Metals by ICPAES									
Aluminium	7429-90-5	1	mg/kg		2	----	----	----	----
Antimony	7440-36-0	0.1	mg/kg		<0.1	----	----	----	----
Arsenic	7440-38-2	0.1	mg/kg		0.7	----	----	----	----
Boron	7440-42-8	1	mg/kg		<1	----	----	----	----
Cadmium	7440-43-9	0.1	mg/kg		<0.1	----	----	----	----
Chromium	7440-47-3	0.1	mg/kg		<0.1	----	----	----	----
Cobalt	7440-48-4	0.1	mg/kg		<0.1	----	----	----	----
Copper	7440-50-8	0.1	mg/kg		<0.1	----	----	----	----
Iron	7439-89-6	1	mg/kg		<1	----	----	----	----
Lead	7439-92-1	0.1	mg/kg		<0.1	----	----	----	----
Manganese	7439-96-5	0.1	mg/kg		<0.1	----	----	----	----
Molybdenum	7439-98-7	0.1	mg/kg		0.2	----	----	----	----
Nickel	7440-02-0	0.1	mg/kg		<0.1	----	----	----	----
Selenium	7782-49-2	0.1	mg/kg		0.2	----	----	----	----
Zinc	7440-66-6	0.1	mg/kg		<0.1	----	----	----	----

Page : 11 of 11
 Work Order : EB1233255
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

COMPOSITE 10

Client sampling date / time

20-DEC-2012 15:00

Compound	CAS Number	LOR	Unit	EB1233255-085	----	----	----	----
EG005S : Soluble Metals by ICPAES - Continued								
Phosphorus	7723-14-0	10	mg/kg	<10	----	----	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	7020	----	----	----	----
Antimony	7440-36-0	5	mg/kg	<5	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	11	----	----	----	----
Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	19	----	----	----	----
Cobalt	7440-48-4	2	mg/kg	8	----	----	----	----
Copper	7440-50-8	5	mg/kg	25	----	----	----	----
Iron	7439-89-6	50	mg/kg	23600	----	----	----	----
Lead	7439-92-1	5	mg/kg	19	----	----	----	----
Manganese	7439-96-5	5	mg/kg	590	----	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	----	----	----	----
Nickel	7440-02-0	2	mg/kg	46	----	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
Zinc	7440-66-6	5	mg/kg	52	----	----	----	----
Phosphorus	7723-14-0	50	mg/kg	130	----	----	----	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1303774	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 Bylong	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 14-FEB-2013
Sampler	: Alan Robertson	Issue Date	: 28-FEB-2013
Site	: ----		
Quote number	: BN/057/11 V2	No. of samples received	: 9
		No. of samples analysed	: 9

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



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Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils



Page : 2 of 4
Work Order : EB1303774
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 Bylong

General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID				
				Client sampling date / time				
				MU1386-09 ULNI-1/2/3	MU1386-10 ULNH-01	MU1386-11 ULNJ-01	MU1386-12 ULN-1/2/3	MU1386-13 ULN-1/2/3
				14-FEB-2013 15:00	14-FEB-2013 15:00	14-FEB-2013 15:00	14-FEB-2013 15:00	14-FEB-2013 15:00
Compound	CAS Number	LOR	Unit	EB1303774-001	EB1303774-002	EB1303774-003	EB1303774-004	EB1303774-005
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.548	0.113	0.252	1.29	4.67



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

Client sampling date / time

				MU1386-14 COGB-1/2 + COGC-1/2	MU1386-16 COGD-01	MU1386-17 COGB-1/2 + COGC-1/2	MU1386-18 COGB-1/2 + COGC-1/2	----
				14-FEB-2013 15:00	14-FEB-2013 15:00	14-FEB-2013 15:00	14-FEB-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1303774-006	EB1303774-007	EB1303774-008	EB1303774-009	----
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.094	0.037	0.356	0.766	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1307848	Page	: 1 of 7
Amendment	: 1		
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 Bylong	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 28-MAR-2013
Sampler	: Alan Robertson	Issue Date	: 11-APR-2013
Site	: ----		
Quote number	: BN/057/11 V2	No. of samples received	: 24
		No. of samples analysed	: 24

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



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ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils



Page : 2 of 7
Work Order : EB1307848 Amendment 1
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 Bylong

General Comments

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

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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

- This report has been amended following changes to the analytical data reported. The quality system is being utilised to resolve this issue. The specific data affected includes the CRS result for sample MU1386-72 RC1306-2001.

Page : 3 of 7
 Work Order : EB1307848 Amendment 1
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 Bylong



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	MU1386-45 RC1305-4131	MU1386-46 RC1305-9101	MU1386-50 RC1305-4134	MU1386-52 RC1305-4154	MU1386-54 RC1305-4136
				12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00
EA026 : Chromium Reducible Sulfur	CAS Number	LOR	Unit	EB1307848-001	EB1307848-002	EB1307848-003	EB1307848-004	EB1307848-005
				0.006	0.065	0.014	<0.005	0.005



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

				Client sample ID				
				Client sampling date / time	MU1386-57 RC1305-4139	MU1386-61 RC1305-4151	MU1386-62 RC1305-4156	MU1386-63 RC1305-4159
					12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00
Compound	CAS Number	LOR	Unit		EB1307848-006	EB1307848-007	EB1307848-008	EB1307848-009
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%		0.006	0.025	<0.005	0.022

Page : 5 of 7
 Work Order : EB1307848 Amendment 1
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 Bylong



Analytical Results

Sub-Matrix: **PULP** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				MU1386-65 RC1305-4157	MU1386-66 RC1305-4158	MU1386-67 RC1305-1473	MU1386-68 RC1305-4155	MU1386-69 RC1305-4172
				12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00	12-MAR-2013 15:00
Compound	CAS Number	LOR	Unit	EB1307848-011	EB1307848-012	EB1307848-013	EB1307848-014	EB1307848-015
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.009	0.034	0.639	0.103	0.432



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

				Client sample ID				
				Client sampling date / time	MU1386-70 RC1305-4174	MU1386-71 RC1305-4175	MU1386-72 RC1306-2001	MU1386-76 RC1306-2014
					12-MAR-2013 15:00	12-MAR-2013 15:00	15-MAR-2013 15:00	15-MAR-2013 15:00
Compound	CAS Number	LOR	Unit		EB1307848-016	EB1307848-017	EB1307848-018	EB1307848-019
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%		3.25	1.21	0.009	0.025

Page : 7 of 7
 Work Order : EB1307848 Amendment 1
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 Bylong



Analytical Results

Sub-Matrix: **PULP** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				MU1386-78 RC1306-2016	MU1386-79 RC1306-2017	MU1386-80 RC1306-2018	MU1386-81 RC1306-2019	----
				15-MAR-2013 15:00	15-MAR-2013 15:00	15-MAR-2013 15:00	15-MAR-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1307848-021	EB1307848-022	EB1307848-023	EB1307848-024	----
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.006	0.015	0.350	0.258	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1311473	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 Bylong Coal	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 13-MAY-2013
Sampler	: Alan Robertson	Issue Date	: 21-MAY-2013
Site	: ----		
Quote number	: BN/413/12	No. of samples received	: 22
		No. of samples analysed	: 4

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



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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
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics



Page : 2 of 4
Work Order : EB1311473
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 Bylong Coal

General Comments

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

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LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- EG005T (Total Metals) : Sample EB1311496-002 shows poor duplicate results due to sample heterogeneity. Confirmed by re-extraction and re-analysis.

Page : 3 of 4
 Work Order : EB1311473
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 Bylong Coal



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

Client sampling date / time

				11 COMPOSITE	12 COMPOSITE	13 COMPOSITE	14 COMPOSITE	----
				01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1311473-019	EB1311473-020	EB1311473-021	EB1311473-022	----
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	328	25	296	82	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	328	25	296	82	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	<1	<1	<1	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	710	1190	890	540	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	140	210	50	40	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	220	210	380	120	----
Magnesium	7439-95-4	10	mg/kg	80	120	90	40	----
Sodium	7440-23-5	10	mg/kg	120	100	20	30	----
Potassium	7440-09-7	10	mg/kg	40	30	20	10	----
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	220	240	70	80	----
Potassium	7440-09-7	50	mg/kg	460	270	260	130	----
Calcium	7440-70-2	50	mg/kg	7760	4980	4380	1140	----
Magnesium	7439-95-4	50	mg/kg	3970	2840	1600	540	----
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	<1	2	<1	<1	----
Antimony	7440-36-0	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Arsenic	7440-38-2	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Boron	7440-42-8	1	mg/kg	<1	<1	<1	<1	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Chromium	7440-47-3	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Cobalt	7440-48-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Copper	7440-50-8	0.1	mg/kg	<0.1	<0.1	<0.1	0.1	----
Iron	7439-89-6	1	mg/kg	<1	34	<1	<1	----
Lead	7439-92-1	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Manganese	7439-96-5	0.1	mg/kg	0.8	24.7	1.0	4.9	----
Molybdenum	7439-98-7	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Nickel	7440-02-0	0.1	mg/kg	<0.1	0.2	<0.1	0.1	----
Selenium	7782-49-2	0.1	mg/kg	0.1	<0.1	<0.1	<0.1	----
Zinc	7440-66-6	0.1	mg/kg	<0.1	7.3	4.1	89.6	----

Page : 4 of 4
 Work Order : EB1311473
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 Bylong Coal



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID	11 COMPOSITE	12 COMPOSITE	13 COMPOSITE	14 COMPOSITE	----
Client sampling date / time					01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	----
Compound	CAS Number	LOR	Unit		EB1311473-019	EB1311473-020	EB1311473-021	EB1311473-022	----
EG005S : Soluble Metals by ICPAES - Continued									
Phosphorus	7723-14-0	10	mg/kg		<10	<10	<10	<10	----
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		4490	3680	2080	2050	----
Antimony	7440-36-0	5	mg/kg		<5	<5	<5	<5	----
Arsenic	7440-38-2	5	mg/kg		10	<5	<5	<5	----
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	----
Cadmium	7440-43-9	1	mg/kg		<1	1	<1	<1	----
Chromium	7440-47-3	2	mg/kg		4	3	10	4	----
Cobalt	7440-48-4	2	mg/kg		2	<2	3	<2	----
Copper	7440-50-8	5	mg/kg		20	24	78	48	----
Iron	7439-89-6	50	mg/kg		60100	146000	21600	20200	----
Lead	7439-92-1	5	mg/kg		36	14	21	14	----
Manganese	7439-96-5	5	mg/kg		1470	3490	320	370	----
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	<2	----
Nickel	7440-02-0	2	mg/kg		11	<2	16	3	----
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	----
Zinc	7440-66-6	5	mg/kg		59	58	368	426	----
Phosphorus	7723-14-0	50	mg/kg		80	150	<50	130	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1313877	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Bylong Project 111211	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 07-JUN-2013
C-O-C number	: ----	Issue Date	: 14-JUN-2013
Sampler	: ----	No. of samples received	: 8
Site	: Bylong	No. of samples analysed	: 8
Quote number	: BN/057/11 V2		

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

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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
SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils



Page : 2 of 4
Work Order : EB1313877
Client : RGS ENVIRONMENTAL PTY LTD
Project : Bylong Project 111211

General Comments

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LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

				Client sample ID	GC_004 BY0172CH	GC_010 BY0172CH	GC_005 BY0175CH	GC_003 BY0178CH	GC_009 BY0180CH
				Client sampling date / time	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit		EB1313877-001	EB1313877-002	EB1313877-003	EB1313877-004	EB1313877-005
EA026 : Chromium Reducible Sulfur									
Chromium Reducible Sulphur	----	0.005	%		0.201	0.044	0.146	0.263	0.275



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID	GC_019 BY0180CH	GC_021 BY0180CH	GC_025 BY0180CH	----	----
				Client sampling date / time	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	----	----
Compound	CAS Number	LOR	Unit		EB1313877-006	EB1313877-007	EB1313877-008	----	----
EA026 : Chromium Reducible Sulfur									
Chromium Reducible Sulphur	----	0.005	%		0.105	0.328	0.292	----	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1233397	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 21-DEC-2012
Sampler	: Mandie Matheson	Issue Date	: 04-JAN-2013
Site	: ----		
Quote number	: BN/413/12	No. of samples received	: 4
		No. of samples analysed	: 4

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Signatories

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Signatories	Position	Accreditation Category
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics

Page : 2 of 4
Work Order : EB1233397
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG



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Page : 3 of 4
 Work Order : EB1233397
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
				21-DEC-2012 15:00	21-DEC-2012 15:00	21-DEC-2012 15:00	21-DEC-2012 15:00	----
Compound	CAS Number	LOR	Unit	EB1233397-001	EB1233397-002	EB1233397-003	EB1233397-004	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.46	7.46	3.71	8.16	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	512	215	596	213	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	33	15	<1	46	----
Total Alkalinity as CaCO ₃	----	1	mg/L	33	15	<1	46	----
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	5	2	40	2	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	200	63	245	34	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	6	3	5	6	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	24	<1	42	6	----
Magnesium	7439-95-4	1	mg/L	6	<1	20	3	----
Sodium	7440-23-5	1	mg/L	59	38	14	27	----
Potassium	7440-09-7	1	mg/L	9	3	7	7	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.01	0.04	1.21	0.07	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Arsenic	7440-38-2	0.001	mg/L	0.003	0.007	0.003	0.002	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0020	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.005	<0.001	----
Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.056	0.001	----
Cobalt	7440-48-4	0.001	mg/L	0.009	<0.001	0.116	<0.001	----
Nickel	7440-02-0	0.001	mg/L	0.009	<0.001	0.164	<0.001	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.006	<0.001	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.423	<0.005	----
Manganese	7439-96-5	0.001	mg/L	0.278	0.003	1.60	0.056	----
Molybdenum	7439-98-7	0.001	mg/L	0.020	0.091	0.001	0.014	----
Selenium	7782-49-2	0.01	mg/L	0.02	0.02	<0.01	<0.01	----



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)				Client sample ID	Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
				Client sampling date / time	21-DEC-2012 15:00	21-DEC-2012 15:00	21-DEC-2012 15:00	21-DEC-2012 15:00	----
Compound	CAS Number	LOR	Unit		EB1233397-001	EB1233397-002	EB1233397-003	EB1233397-004	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	----
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	8.35	<0.05	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1300266	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 04-JAN-2013
Sampler	: ----	Issue Date	: 10-JAN-2013
Site	: ----		
Quote number	: BN/413/12	No. of samples received	: 4
		No. of samples analysed	: 4

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.

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Signatories

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Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

Page : 2 of 4
Work Order : EB1300266
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG



General Comments

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Page : 3 of 4
 Work Order : EB1300266
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
				04-JAN-2013 15:00	04-JAN-2013 15:00	04-JAN-2013 15:00	04-JAN-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1300266-001	EB1300266-002	EB1300266-003	EB1300266-004	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.89	7.30	3.93	8.77	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	288	180	334	197	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	12	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	4	8	<1	9	----
Total Alkalinity as CaCO ₃	ALK_TOTAL	1	mg/L	4	8	<1	21	----
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	2	2	16	<1	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	116	62	140	50	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	8	1	1	5	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	10	2	23	6	----
Magnesium	7439-95-4	1	mg/L	3	<1	12	3	----
Sodium	7440-23-5	1	mg/L	40	32	6	26	----
Potassium	7440-09-7	1	mg/L	4	2	2	5	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.02	0.06	0.37	0.08	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	0.0003	0.0001	0.0018	0.0004	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.016	0.008	----
Cobalt	7440-48-4	0.001	mg/L	0.008	0.002	0.098	0.014	----
Nickel	7440-02-0	0.001	mg/L	0.010	0.003	0.139	0.020	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L	0.007	<0.005	0.268	0.041	----
Manganese	7439-96-5	0.001	mg/L	0.136	0.035	2.18	0.290	----
Molybdenum	7439-98-7	0.001	mg/L	0.003	0.028	0.002	0.016	----
Selenium	7782-49-2	0.01	mg/L	<0.01	0.01	<0.01	0.02	----

Page : 4 of 4
 Work Order : EB1300266
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

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

Client sample ID

Client sampling date / time

				Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
				04-JAN-2013 15:00	04-JAN-2013 15:00	04-JAN-2013 15:00	04-JAN-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1300266-001	EB1300266-002	EB1300266-003	EB1300266-004	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	2.57	0.29	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1301128	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 111211		
C-O-C number	: ----	Date Samples Received	: 19-JAN-2013
Sampler	: ----	Issue Date	: 29-JAN-2013
Site	: ----		
Quote number	: BN/413/12	No. of samples received	: 4
		No. of samples analysed	: 4

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.

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- Analytical Results



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Signatories

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

Signatories	Position	Accreditation Category
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics



Page : 2 of 4
Work Order : EB1301128
Client : RGS ENVIRONMENTAL PTY LTD
Project : BYLONG

General Comments

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Page : 3 of 4
 Work Order : EB1301128
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : BYLONG



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
				18-JAN-2013 15:00	18-JAN-2013 15:00	18-JAN-2013 15:00	18-JAN-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1301128-001	EB1301128-002	EB1301128-003	EB1301128-004	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.07	7.34	3.69	8.04	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	373	171	387	179	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	5	11	<1	22	----
Total Alkalinity as CaCO ₃	ALK_TOTAL	1	mg/L	5	11	<1	22	----
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	5	2	27	3	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	151	49	150	45	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	5	1	1	3	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	14	2	24	5	----
Magnesium	7439-95-4	1	mg/L	4	<1	13	3	----
Sodium	7440-23-5	1	mg/L	49	29	5	22	----
Potassium	7440-09-7	1	mg/L	6	2	2	5	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.17	0.16	0.48	0.02	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	<0.001	0.002	----
Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	0.0018	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.037	<0.001	----
Cobalt	7440-48-4	0.001	mg/L	0.012	<0.001	0.110	<0.001	----
Nickel	7440-02-0	0.001	mg/L	0.022	<0.001	0.167	0.002	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L	0.032	<0.005	0.294	<0.005	----
Manganese	7439-96-5	0.001	mg/L	0.210	0.006	2.63	0.009	----
Molybdenum	7439-98-7	0.001	mg/L	0.002	0.034	<0.001	0.019	----
Selenium	7782-49-2	0.01	mg/L	<0.01	0.01	<0.01	0.02	----



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

				Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
Client sampling date / time				18-JAN-2013 15:00	18-JAN-2013 15:00	18-JAN-2013 15:00	18-JAN-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1301128-001	EB1301128-002	EB1301128-003	EB1301128-004	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----
Iron	7439-89-6	0.05	mg/L	0.09	<0.05	3.17	<0.05	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1302358	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 01-FEB-2013
Sampler	: Mandie Matheson	Issue Date	: 11-FEB-2013
Site	: ----		
Quote number	: BN/413/12	No. of samples received	: 4
		No. of samples analysed	: 4

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

Page : 2 of 4
Work Order : EB1302358
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG



General Comments

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

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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 4
 Work Order : EB1302358
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
				01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1302358-001	EB1302358-002	EB1302358-003	EB1302358-004	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.05	7.82	3.50	7.71	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	412	198	459	211	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	16	<1	17	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	16	<1	17	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	8	2	27	3	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	175	66	177	58	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	3	1	1	6	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	15	2	28	6	----
Magnesium	7439-95-4	1	mg/L	5	<1	15	3	----
Sodium	7440-23-5	1	mg/L	50	34	5	26	----
Potassium	7440-09-7	1	mg/L	5	2	2	5	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.26	0.13	0.65	<0.01	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.001	<0.001	0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0022	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	0.002	<0.001	0.041	<0.001	----
Cobalt	7440-48-4	0.001	mg/L	0.011	<0.001	0.093	<0.001	----
Nickel	7440-02-0	0.001	mg/L	0.026	<0.001	0.153	0.002	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L	0.043	<0.005	0.285	<0.005	----
Manganese	7439-96-5	0.001	mg/L	0.218	0.002	3.28	0.008	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.053	<0.001	0.034	----
Selenium	7782-49-2	0.01	mg/L	<0.01	0.01	<0.01	0.03	----



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

				Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
Client sampling date / time				01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1302358-001	EB1302358-002	EB1302358-003	EB1302358-004	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----
Iron	7439-89-6	0.05	mg/L	0.11	<0.05	2.66	<0.05	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1303930	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 16-FEB-2013
Sampler	: Mandie Matheson	Issue Date	: 01-MAR-2013
Site	: ----		
Quote number	: BN/413/12	No. of samples received	: 4
		No. of samples analysed	: 4

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:

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- Analytical Results



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Signatories

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

Signatories	Position	Accreditation Category
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics



Page : 2 of 4
Work Order : EB1303930
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG

General Comments

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LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
				15-FEB-2013 15:00	15-FEB-2013 15:00	15-FEB-2013 15:00	15-FEB-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1303930-001	EB1303930-002	EB1303930-003	EB1303930-004	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.45	7.50	3.58	7.58	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	431	154	432	160	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	4	21	<1	28	----
Total Alkalinity as CaCO ₃	----	1	mg/L	4	21	<1	28	----
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	5	1	26	1	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	184	46	164	44	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	2	<1	<1	2	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	18	1	26	5	----
Magnesium	7439-95-4	1	mg/L	6	<1	15	3	----
Sodium	7440-23-5	1	mg/L	52	26	4	18	----
Potassium	7440-09-7	1	mg/L	6	2	2	4	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.23	1.00	0.47	0.09	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.001	<0.001	0.001	----
Cadmium	7440-43-9	0.0001	mg/L	0.0002	<0.0001	0.0019	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	0.002	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	0.002	<0.001	0.043	<0.001	----
Cobalt	7440-48-4	0.001	mg/L	0.012	0.001	0.092	<0.001	----
Nickel	7440-02-0	0.001	mg/L	0.028	0.002	0.148	0.002	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.002	<0.001	----
Zinc	7440-66-6	0.005	mg/L	0.048	<0.005	0.255	<0.005	----
Manganese	7439-96-5	0.001	mg/L	0.250	0.002	3.11	0.008	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.026	<0.001	0.018	----
Selenium	7782-49-2	0.01	mg/L	<0.01	0.01	<0.01	0.02	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

				Client sample ID	Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	
				Client sampling date / time	15-FEB-2013 15:00	15-FEB-2013 15:00	15-FEB-2013 15:00	15-FEB-2013 15:00	----
Compound	CAS Number	LOR	Unit		EB1303930-001	EB1303930-002	EB1303930-003	EB1303930-004	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	----
Iron	7439-89-6	0.05	mg/L		0.32	0.12	2.01	<0.05	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1305353	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 01-MAR-2013
Sampler	: Mandie Matheson	Issue Date	: 08-MAR-2013
Site	: ----		
Quote number	: BN/413/12	No. of samples received	: 4
		No. of samples analysed	: 4

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:

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- Analytical Results



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Signatories

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

Signatories	Position	Accreditation Category
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics



Page : 2 of 4
Work Order : EB1305353
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG

General Comments

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LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
				01-MAR-2013 12:40	01-MAR-2013 12:40	01-MAR-2013 12:40	01-MAR-2013 12:40	----
				EB1305353-001	EB1305353-002	EB1305353-003	EB1305353-004	----
Compound	CAS Number	LOR	Unit					
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.00	7.73	3.59	7.60	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	424	154	410	152	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	5	18	<1	68	----
Total Alkalinity as CaCO3	----	1	mg/L	5	18	<1	68	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	5	2	35	2	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	193	43	157	36	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	2	<1	<1	3	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	19	1	27	4	----
Magnesium	7439-95-4	1	mg/L	7	<1	15	2	----
Sodium	7440-23-5	1	mg/L	50	28	4	19	----
Potassium	7440-09-7	1	mg/L	6	2	1	4	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.11	1.11	0.56	0.06	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	0.001	----
Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	0.0021	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	0.002	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.021	<0.001	----
Cobalt	7440-48-4	0.001	mg/L	0.014	0.001	0.084	<0.001	----
Nickel	7440-02-0	0.001	mg/L	0.032	0.003	0.140	0.002	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.002	<0.001	----
Zinc	7440-66-6	0.005	mg/L	0.049	<0.005	0.233	<0.005	----
Manganese	7439-96-5	0.001	mg/L	0.313	0.001	3.74	0.007	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.049	<0.001	0.033	----
Selenium	7782-49-2	0.01	mg/L	<0.01	0.01	<0.01	0.02	----



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)				Client sample ID	Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
				Client sampling date / time	01-MAR-2013 12:40	01-MAR-2013 12:40	01-MAR-2013 12:40	01-MAR-2013 12:40	----
Compound	CAS Number	LOR	Unit		EB1305353-001	EB1305353-002	EB1305353-003	EB1305353-004	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	----
Iron	7439-89-6	0.05	mg/L		0.60	0.13	1.96	<0.05	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1306627	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 15-MAR-2013
C-O-C number	: ----	Issue Date	: 25-MAR-2013
Sampler	: Mandie Matheson	No. of samples received	: 4
Site	: ----	No. of samples analysed	: 4
Quote number	: BN/413/12		

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This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



Page : 2 of 4
 Work Order : EB1306627
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.
 Where moisture determination has been performed, results are reported on a dry weight basis.
 Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
 Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
 When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.
 Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 ^ = This result is computed from individual analyte detections at or above the level of reporting



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Signatories

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

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics Brisbane Inorganics Brisbane Inorganics Brisbane Inorganics Brisbane Inorganics Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics Brisbane Inorganics Brisbane Inorganics Brisbane Inorganics Brisbane Inorganics Brisbane Inorganics



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
				15-MAR-2013 11:00	15-MAR-2013 11:00	15-MAR-2013 11:00	15-MAR-2013 11:00	----
				EB1306627-001	EB1306627-002	EB1306627-003	EB1306627-004	----
Compound	CAS Number	LOR	Unit					
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.23	8.06	3.64	7.60	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	410	168	413	122	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	3	34	<1	17	----
Total Alkalinity as CaCO ₃	----	1	mg/L	3	34	<1	17	----
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	2	<1	32	<1	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	179	48	158	29	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	1	<1	<1	2	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	18	<1	26	3	----
Magnesium	7439-95-4	1	mg/L	8	<1	15	2	----
Sodium	7440-23-5	1	mg/L	44	32	3	15	----
Potassium	7440-09-7	1	mg/L	5	2	1	4	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.07	0.65	0.45	0.04	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0019	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.016	<0.001	----
Cobalt	7440-48-4	0.001	mg/L	0.011	<0.001	0.074	<0.001	----
Nickel	7440-02-0	0.001	mg/L	0.028	0.001	0.124	0.001	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L	0.039	<0.005	0.196	<0.005	----
Manganese	7439-96-5	0.001	mg/L	0.301	<0.001	3.72	0.004	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.058	<0.001	0.029	----
Selenium	7782-49-2	0.01	mg/L	<0.01	0.02	<0.01	0.02	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

				Client sample ID	Bylong KLC 1	Bylong KLC 2	Bylong KLC 3	Bylong KLC 4	----
				Client sampling date / time	15-MAR-2013 11:00	15-MAR-2013 11:00	15-MAR-2013 11:00	15-MAR-2013 11:00	----
Compound	CAS Number	LOR	Unit		EB1306627-001	EB1306627-002	EB1306627-003	EB1306627-004	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	----
Iron	7439-89-6	0.05	mg/L		0.22	0.06	0.83	<0.05	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1310616	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----		
Sampler	: Mandie Matheson	Date Samples Received	: 03-MAY-2013
Site	: ----	Issue Date	: 15-MAY-2013
Quote number	: BN/413/12	No. of samples received	: 3
		No. of samples analysed	: 3

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.

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- Analytical Results



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Signatories

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Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics



Page : 2 of 4
Work Order : EB1310616
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG

General Comments

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Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				03-MAY-2013 14:00	03-MAY-2013 14:00	03-MAY-2013 14:00	----	----
Compound	CAS Number	LOR	Unit	EB1310616-001	EB1310616-002	EB1310616-003	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.87	4.17	6.14	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1490	1310	1040	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	107	<1	6	----	----
Total Alkalinity as CaCO ₃	----	1	mg/L	107	<1	6	----	----
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	6	167	103	----	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	769	675	563	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	24	33	21	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	214	74	102	----	----
Magnesium	7439-95-4	1	mg/L	77	48	40	----	----
Sodium	7440-23-5	1	mg/L	18	78	33	----	----
Potassium	7440-09-7	1	mg/L	6	12	6	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	1.52	0.02	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0044	0.0168	0.0768	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	0.014	0.146	0.222	----	----
Cobalt	7440-48-4	0.001	mg/L	0.013	0.026	0.033	----	----
Nickel	7440-02-0	0.001	mg/L	0.053	0.179	0.124	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	0.002	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	0.754	1.72	57.0	----	----
Manganese	7439-96-5	0.001	mg/L	1.95	8.80	5.33	----	----
Molybdenum	7439-98-7	0.001	mg/L	0.012	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	0.05	0.03	0.05	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

				Client sample ID	Bylong KLC 5	Bylong KLC 6	Bylong KLC 7		
				Client sampling date / time	03-MAY-2013 14:00	03-MAY-2013 14:00	03-MAY-2013 14:00	----	----
Compound	CAS Number	LOR	Unit		EB1310616-001	EB1310616-002	EB1310616-003	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L		0.29	0.16	0.17	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	67.4	0.12	----	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1311894	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----		
Sampler	: Mandie Matheson	Date Samples Received	: 17-MAY-2013
Site	: ----	Issue Date	: 28-MAY-2013
		No. of samples received	: 3
Quote number	: BN/413/12	No. of samples analysed	: 3

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.

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Signatories

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Signatories	Position	Accreditation Category
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics



Page : 2 of 4
Work Order : EB1311894
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG

General Comments

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LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				17-MAY-2013 11:00	17-MAY-2013 11:00	17-MAY-2013 11:00	----	----
Compound	CAS Number	LOR	Unit	EB1311894-001	EB1311894-002	EB1311894-003	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.39	4.45	5.35	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	29	1400	1340	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	10	<1	<1	----	----
Total Alkalinity as CaCO ₃	----	1	mg/L	10	<1	<1	----	----
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	2	48	256	----	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	14	691	727	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	<1	33	7	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	8	112	139	----	----
Magnesium	7439-95-4	1	mg/L	1	78	47	----	----
Sodium	7440-23-5	1	mg/L	<1	52	14	----	----
Potassium	7440-09-7	1	mg/L	<1	9	3	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.02	0.31	0.22	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0001	0.0096	0.108	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	0.035	0.368	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.009	0.038	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	0.068	0.141	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	0.002	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	0.046	0.701	123	----	----
Manganese	7439-96-5	0.001	mg/L	0.013	17.8	7.83	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	0.03	0.03	----	----



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)				Client sample ID	Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				Client sampling date / time	17-MAY-2013 11:00	17-MAY-2013 11:00	17-MAY-2013 11:00	----	----
Compound	CAS Number	LOR	Unit	EB1311894-001	EB1311894-002	EB1311894-003	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L	<0.05	0.09	0.11	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	10.5	0.12	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1313073	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----		
Sampler	: Mandie Matheson	Date Samples Received	: 30-MAY-2013
Site	: ----	Issue Date	: 06-JUN-2013
		No. of samples received	: 3
Quote number	: BN/413/12	No. of samples analysed	: 3

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- Analytical Results



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Signatories

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



Page : 2 of 4
Work Order : EB1313073
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG

General Comments

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Page : 3 of 4
 Work Order : EB1313073
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				30-MAY-2013 15:00	30-MAY-2013 15:00	30-MAY-2013 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1313073-001	EB1313073-002	EB1313073-003	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.33	4.37	5.41	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	125	1100	758	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	12	<1	4	----	----
Total Alkalinity as CaCO ₃	----	1	mg/L	12	<1	4	----	----
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	1	41	100	----	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	42	547	345	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	<1	31	4	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	16	87	71	----	----
Magnesium	7439-95-4	1	mg/L	3	68	27	----	----
Sodium	7440-23-5	1	mg/L	<1	29	7	----	----
Potassium	7440-09-7	1	mg/L	<1	6	2	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.18	0.07	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0003	0.0063	0.0523	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	0.021	0.208	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.005	0.021	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	0.045	0.088	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	0.096	0.275	62.4	----	----
Manganese	7439-96-5	0.001	mg/L	0.017	16.3	5.98	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	0.02	0.01	----	----



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)				Client sample ID	Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				Client sampling date / time	30-MAY-2013 15:00	30-MAY-2013 15:00	30-MAY-2013 15:00	----	----
Compound	CAS Number	LOR	Unit		EB1313073-001	EB1313073-002	EB1313073-003	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L		<0.05	0.09	0.09	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	10.4	<0.05	----	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1314258	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 13-JUN-2013
Sampler	: Mandie Matherson	Issue Date	: 25-JUN-2013
Site	: ----		
Quote number	: BN/413/12	No. of samples received	: 3
		No. of samples analysed	: 3

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



Page : 2 of 4
 Work Order : EB1314258
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG

General Comments

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

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



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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
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics Brisbane Inorganics Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics Brisbane Inorganics Brisbane Inorganics



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				[14-JUN-2013]	[14-JUN-2013]	[14-JUN-2013]	----	----
Compound	CAS Number	LOR	Unit	EB1314258-001	EB1314258-002	EB1314258-003	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.58	4.40	5.43	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	352	1220	348	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	22	<1	4	----	----
Total Alkalinity as CaCO ₃	----	1	mg/L	22	<1	4	----	----
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	1	11	34	----	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	142	566	170	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	7	26	4	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	48	96	27	----	----
Magnesium	7439-95-4	1	mg/L	12	84	13	----	----
Sodium	7440-23-5	1	mg/L	1	25	3	----	----
Potassium	7440-09-7	1	mg/L	<1	5	<1	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0006	0.0049	0.0199	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	0.003	0.080	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.002	0.010	----	----
Nickel	7440-02-0	0.001	mg/L	0.002	0.031	0.040	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	0.136	0.064	25.5	----	----
Manganese	7439-96-5	0.001	mg/L	0.087	20.8	2.78	----	----
Molybdenum	7439-98-7	0.001	mg/L	0.003	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	0.01	<0.01	----	----

Page : 4 of 4
 Work Order : EB1314258
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

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

Client sample ID

Client sampling date / time

				Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				[14-JUN-2013]	[14-JUN-2013]	[14-JUN-2013]	----	----
Compound	CAS Number	LOR	Unit	EB1314258-001	EB1314258-002	EB1314258-003	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	0.40	<0.05	----	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1315545	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----		
Sampler	: Mandie Matheson	Date Samples Received	: 28-JUN-2013
Site	: ----	Issue Date	: 05-JUL-2013
Quote number	: BN/413/12	No. of samples received	: 3
		No. of samples analysed	: 3

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.

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Signatories

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Signatories	Position	Accreditation Category
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics



Page : 2 of 4
Work Order : EB1315545
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG

General Comments

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LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Page : 3 of 4
 Work Order : EB1315545
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				28-JUN-2013 11:00	28-JUN-2013 11:00	28-JUN-2013 11:00	----	----
Compound	CAS Number	LOR	Unit	EB1315545-001	EB1315545-002	EB1315545-003	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.31	5.18	5.68	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	150	900	99	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	10	<1	<1	----	----
Total Alkalinity as CaCO3	----	1	mg/L	10	<1	<1	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	1	48	24	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	61	469	39	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	2	11	1	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	20	74	7	----	----
Magnesium	7439-95-4	1	mg/L	5	65	4	----	----
Sodium	7440-23-5	1	mg/L	<1	12	<1	----	----
Potassium	7440-09-7	1	mg/L	<1	4	<1	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.02	<0.01	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0033	0.0046	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	0.003	0.020	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.001	0.002	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	0.016	0.009	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	0.029	0.033	5.22	----	----
Manganese	7439-96-5	0.001	mg/L	0.022	12.8	0.851	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	0.01	<0.01	----	----



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)				Client sample ID	Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				Client sampling date / time	28-JUN-2013 11:00	28-JUN-2013 11:00	28-JUN-2013 11:00	----	----
Compound	CAS Number	LOR	Unit	EB1315545-001	EB1315545-002	EB1315545-003	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	1.79	<0.05	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1316701	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----		
Sampler	: Mandie Matheson	Date Samples Received	: 13-JUL-2013
Site	: ----	Issue Date	: 19-JUL-2013
Quote number	: BN/606/13	No. of samples received	: 3
		No. of samples analysed	: 3

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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
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics

Page : 2 of 4
Work Order : EB1316701
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG



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LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KCL 5	Bylong KCL 6	Bylong KCL 7	----	----
				12-JUL-2013 15:00	12-JUL-2013 15:00	12-JUL-2013 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1316701-001	EB1316701-002	EB1316701-003	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.71	5.40	5.44	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	989	912	457	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	36	4	4	----	----
Total Alkalinity as CaCO ₃	----	1	mg/L	36	4	4	----	----
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	4	7	41	----	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	353	235	188	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	18	13	4	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	155	77	40	----	----
Magnesium	7439-95-4	1	mg/L	44	69	22	----	----
Sodium	7440-23-5	1	mg/L	4	8	3	----	----
Potassium	7440-09-7	1	mg/L	1	3	<1	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.01	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0013	0.0027	0.0232	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	0.002	0.001	0.050	----	----
Cobalt	7440-48-4	0.001	mg/L	0.002	<0.001	0.012	----	----
Nickel	7440-02-0	0.001	mg/L	0.003	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	0.192	0.017	21.4	----	----
Manganese	7439-96-5	0.001	mg/L	0.212	11.3	6.65	----	----
Molybdenum	7439-98-7	0.001	mg/L	0.005	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	0.02	<0.01	<0.01	----	----

Page : 4 of 4
 Work Order : EB1316701
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

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

Client sample ID

				Bylong KCL 5	Bylong KCL 6	Bylong KCL 7	----	----
Client sampling date / time				12-JUL-2013 15:00	12-JUL-2013 15:00	12-JUL-2013 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1316701-001	EB1316701-002	EB1316701-003	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	0.75	<0.05	----	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1318003	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 26-JUL-2013
Sampler	: Mandie Matheson	Issue Date	: 01-AUG-2013
Site	: ----		
Quote number	: BN/413/12	No. of samples received	: 3
		No. of samples analysed	: 3

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This Certificate of Analysis contains the following information:

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- Analytical Results



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Signatories

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

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics



Page : 2 of 4
Work Order : EB1318003
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG

General Comments

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

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): LOR raised for sample EB1318003 (Bylong KLC 6) due to saline sample matrix.

Page : 3 of 4
 Work Order : EB1318003
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				26-JUL-2013 12:00	26-JUL-2013 12:00	26-JUL-2013 12:00	----	----
Compound	CAS Number	LOR	Unit	EB1318003-001	EB1318003-002	EB1318003-003	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.81	5.67	5.85	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	657	1000	578	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	85	4	4	----	----
Total Alkalinity as CaCO3	----	1	mg/L	85	4	4	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	4	7	43	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	239	490	266	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	5	19	8	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	99	88	49	----	----
Magnesium	7439-95-4	1	mg/L	29	76	29	----	----
Sodium	7440-23-5	1	mg/L	4	6	4	----	----
Potassium	7440-09-7	1	mg/L	<1	3	1	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.50	<0.01	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.010	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.050	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0006	<0.0050	0.0234	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.010	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	0.003	<0.050	0.032	----	----
Cobalt	7440-48-4	0.001	mg/L	0.001	<0.010	0.013	----	----
Nickel	7440-02-0	0.001	mg/L	0.002	<0.050	0.054	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.010	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	0.143	<0.050	22.5	----	----
Manganese	7439-96-5	0.001	mg/L	0.120	10.1	7.60	----	----
Molybdenum	7439-98-7	0.001	mg/L	0.006	<0.010	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.10	0.01	----	----

Page : 4 of 4
 Work Order : EB1318003
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

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

Client sample ID

Client sampling date / time

				Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				26-JUL-2013 12:00	26-JUL-2013 12:00	26-JUL-2013 12:00	----	----
Compound	CAS Number	LOR	Unit	EB1318003-001	EB1318003-002	EB1318003-003	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	0.11	<0.50	0.06	----	----
Iron	7439-89-6	0.05	mg/L	0.10	<0.50	0.06	----	----



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EB1328295	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 18-NOV-2013
Sampler	: Mandie Matheson	Issue Date	: 25-NOV-2013
Site	: ----		
Quote number	: BN/606/13	No. of samples received	: 3
		No. of samples analysed	: 3

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics

Address 2 Byth Street Stafford QLD Australia 4053 | PHONE **+61-7-3243 7222** | Facsimile **+61-7-3243 7218**
Environmental Division Brisbane ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company

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Page : 2 of 4
Work Order : EB1328295
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG

General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Page : 3 of 4
 Work Order : EB1328295
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				[18-NOV-2013]	[18-NOV-2013]	[18-NOV-2013]	----	----
Compound	CAS Number	LOR	Unit	EB1328295-001	EB1328295-002	EB1328295-003	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.96	4.39	5.22	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	618	1100	676	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	60	<1	3	----	----
Total Alkalinity as CaCO3	----	1	mg/L	60	<1	3	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	5	16	22	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	201	468	229	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	5	5	4	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	82	96	59	----	----
Magnesium	7439-95-4	1	mg/L	26	70	40	----	----
Sodium	7440-23-5	1	mg/L	3	4	4	----	----
Potassium	7440-09-7	1	mg/L	2	4	2	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.28	0.03	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0006	0.0033	0.0234	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	0.008	0.012	0.057	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.002	0.008	----	----
Nickel	7440-02-0	0.001	mg/L	0.002	0.012	0.037	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	0.084	0.064	10.6	----	----
Manganese	7439-96-5	0.001	mg/L	0.054	4.95	8.33	----	----
Molybdenum	7439-98-7	0.001	mg/L	0.005	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	0.02	<0.01	0.01	----	----

Page : 4 of 4
 Work Order : EB1328295
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

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

Client sample ID

Client sampling date / time

				Bylong KLC 5	Bylong KLC 6	Bylong KLC 7	----	----
				[18-NOV-2013]	[18-NOV-2013]	[18-NOV-2013]	----	----
Compound	CAS Number	LOR	Unit	EB1328295-001	EB1328295-002	EB1328295-003	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	0.16	0.06	0.08	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	30.1	0.08	----	----



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EB1326314	Page	: 1 of 10
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Bylong Project 111211	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 28-OCT-2013
C-O-C number	: ----	Issue Date	: 20-NOV-2013
Sampler	: A. Robertson	No. of samples received	: 39
Site	: Bylong	No. of samples analysed	: 39
Quote number	: BN/413/12		

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

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
SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics

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Page : 2 of 10
Work Order : EB1326314
Client : RGS ENVIRONMENTAL PTY LTD
Project : Bylong Project 111211

General Comments

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

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



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				GC_001 BY0273CH	GC_002 BY0273CH	GC_004 BY0273CH	GC_005 BY0273CH	GC_006 BY0273CH
				[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]
Compound	CAS Number	LOR	Unit	EB1326314-001	EB1326314-002	EB1326314-003	EB1326314-004	EB1326314-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.8	8.3	8.7	8.3	8.2
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	<0.5	0.6	0.9	0.9	17.1
Net Acid Production Potential	----	0.5	kg H2SO4/t	-96.5	-13.2	-52.3	-8.7	-42.0
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	163	114	161	118	517
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	96.5	13.8	53.2	9.6	59.1
ANC as CaCO3	----	0.1	% CaCO3	9.8	1.4	5.4	1.0	6.0
Fizz Rating	----	0	Fizz Unit	2	1	2	1	2
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.02	0.03	0.03	0.56
Sample Preparation Method								
Amount	----	0.01	kg	2.36	2.24	3.04	2.16	2.28



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID				
Client sampling date / time				GC_001 BY0288CH	GC_002 BY0288CH	GC_003 BY0288CH	GC_001 BY0291BH	GC_002 BY0291BH
				[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]
Compound	CAS Number	LOR	Unit	EB1326314-006	EB1326314-007	EB1326314-008	EB1326314-009	EB1326314-010
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.0	8.5	8.0	8.4	8.9
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	0.9	1.2	1.2	<0.5	1.2
Net Acid Production Potential	----	0.5	kg H2SO4/t	-142	-7.9	-10.2	-6.1	-14.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	193	165	167	311	247
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	143	9.1	11.4	6.1	15.7
ANC as CaCO3	----	0.1	% CaCO3	14.6	0.9	1.2	0.6	1.6
Fizz Rating	----	0	Fizz Unit	3	0	1	0	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.03	0.04	0.04	<0.01	0.04
Sample Preparation Method								
Amount	----	0.01	kg	2.76	2.28	2.20	3.34	2.72

Page : 5 of 10
 Work Order : EB1326314
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				GC_003 BY0291BH	GC_004 BY0291BH	GC_005 BY0291BH	GC_006 BY0291BH	GC_007 BY0291BH
				[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]
Compound	CAS Number	LOR	Unit	EB1326314-011	EB1326314-012	EB1326314-013	EB1326314-014	EB1326314-015
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.0	8.5	9.1	8.6	8.7
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	<0.5	<0.5	0.9	0.9	1.8
Net Acid Production Potential	----	0.5	kg H2SO4/t	-41.4	-32.4	-156	-17.1	<0.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	214	121	200	129	93
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	41.4	32.7	157	18.0	2.3
ANC as CaCO3	----	0.1	% CaCO3	4.2	3.3	16.0	1.8	0.2
Fizz Rating	----	0	Fizz Unit	2	2	3	1	0
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.01	0.03	0.03	0.06
Sample Preparation Method								
Amount	----	0.01	kg	2.44	3.18	3.74	2.36	2.32

Page : 6 of 10
 Work Order : EB1326314
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID				
Client sampling date / time				GC_008 BY0291BH	GC_001 BY0292CH	GC_002 BY0292CH	GC_003 BY0292CH	GC_004 BY0292CH
				[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]
Compound	CAS Number	LOR	Unit	EB1326314-016	EB1326314-017	EB1326314-018	EB1326314-019	EB1326314-020
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.8	8.0	8.4	8.6	8.6
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	4.9	<0.5	0.9	0.9	<0.5
Net Acid Production Potential	----	0.5	kg H2SO4/t	2.3	-2.0	-10.4	-14.6	-41.8
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	315	616	145	132	178
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.6	2.0	11.3	15.5	42.1
ANC as CaCO3	----	0.1	% CaCO3	0.3	0.2	1.2	1.6	4.3
Fizz Rating	----	0	Fizz Unit	0	0	1	1	2
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.16	<0.01	0.03	0.03	0.01
Sample Preparation Method								
Amount	----	0.01	kg	2.54	2.04	2.66	1.60	2.34

Page : 7 of 10
 Work Order : EB1326314
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				GC_005 BY0292CH	GC_001 BY0294CH	GC_002 BY0294CH	GC_003 BY0294CH	GC_004 BY0294CH
				[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]
Compound	CAS Number	LOR	Unit	EB1326314-021	EB1326314-022	EB1326314-023	EB1326314-024	EB1326314-025
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.9	8.3	8.9	8.8	8.9
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	0.9	1.2	0.9	1.2	0.9
Net Acid Production Potential	----	0.5	kg H2SO4/t	-5.2	-12.4	-76.8	-7.2	-16.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	119	184	173	128	118
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	6.1	13.6	77.7	8.4	17.0
ANC as CaCO3	----	0.1	% CaCO3	0.6	1.4	7.9	0.8	1.7
Fizz Rating	----	0	Fizz Unit	0	1	2	0	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.03	0.04	0.03	0.04	0.03
Sample Preparation Method								
Amount	----	0.01	kg	1.82	1.68	1.46	1.44	1.38



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	GC_005 BY0294CH	GC_006 BY0294CH	GC_007 BY0294CH	GC_001 BY0296CH	GC_002 BY0296CH
Client sampling date / time					[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]
Compound	CAS Number	LOR	Unit		EB1326314-026	EB1326314-027	EB1326314-028	EB1326314-029	EB1326314-030
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.4	7.8	7.2	9.0	8.6
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		0.9	<0.5	1.5	0.6	1.2
Net Acid Production Potential	----	0.5	kg H2SO4/t		-14.7	-4.0	0.8	-62.0	-11.1
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		96	65	103	291	113
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		15.6	4.3	0.7	62.6	12.3
ANC as CaCO3	----	0.1	% CaCO3		1.6	0.4	<0.1	6.4	1.2
Fizz Rating	----	0	Fizz Unit		1	0	0	2	1
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.01	0.05	0.02	0.04
Sample Preparation Method									
Amount	----	0.01	kg		2.14	1.18	1.00	1.04	1.64

Page : 9 of 10
 Work Order : EB1326314
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: **ROCK** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				GC_003 BY0296CH	GC_004 BY0296CH	GC_005 BY0296CH	GC_006 BY0296CH	GC_001 BY0302CH
				[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]
Compound	CAS Number	LOR	Unit	EB1326314-031	EB1326314-032	EB1326314-033	EB1326314-034	EB1326314-035
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.2	9.0	8.0	8.0	7.8
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	<0.5	<0.5	0.9	0.9	<0.5
Net Acid Production Potential	----	0.5	kg H2SO4/t	-3.4	-72.4	-9.1	-2.2	<0.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	78	148	116	82	70
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.4	72.4	10.0	3.1	<0.5
ANC as CaCO3	----	0.1	% CaCO3	0.4	7.4	1.0	0.3	<0.1
Fizz Rating	----	0	Fizz Unit	0	2	0	0	0
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	0.03	0.03	<0.01
Sample Preparation Method								
Amount	----	0.01	kg	1.72	1.14	1.42	1.74	2.10

Page : 10 of 10
 Work Order : EB1326314
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	GC_002 BY0302CH	GC_003 BY0302CH	GC_004 BY0302CH	GC_005 BY0302CH	----
Client sampling date / time					[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	----
Compound	CAS Number	LOR	Unit		EB1326314-036	EB1326314-037	EB1326314-038	EB1326314-039	----
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.9	7.8	8.0	8.2	----
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		0.9	1.2	1.2	2.1	----
Net Acid Production Potential	----	0.5	kg H2SO4/t		-13.9	-13.6	-4.5	-13.6	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		83	206	178	207	----
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		14.8	14.8	5.7	15.7	----
ANC as CaCO3	----	0.1	% CaCO3		1.5	1.5	0.6	1.6	----
Fizz Rating	----	0	Fizz Unit		1	1	0	1	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.04	0.04	0.07	----
Sample Preparation Method									
Amount	----	0.01	kg		2.54	2.22	2.42	2.16	----



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EB1329006	Page	: 1 of 5
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Bylong Project 111211	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 25-NOV-2013
C-O-C number	: ----	Issue Date	: 09-DEC-2013
Sampler	: C.McMeeken/M.Bacchus	No. of samples received	: 13
Site	: Bylong	No. of samples analysed	: 12
Quote number	: BN/413/12		

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



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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
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SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils

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Page : 2 of 5
Work Order : EB1329006
Client : RGS ENVIRONMENTAL PTY LTD
Project : Bylong Project 111211

General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

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

Page : 3 of 5
 Work Order : EB1329006
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				BY0318CH GC_001 12.20-12.38 [21-NOV-2013]	BY0318CH GC_002 14.40-14.63 [21-NOV-2013]	BY0318CH GC_003 20.61-20.89 [21-NOV-2013]	BY0318CH GC_004 27.24-27.38 [21-NOV-2013]	BY0320CH GC_001 10.76-10.98 [21-NOV-2013]
Compound	CAS Number	LOR	Unit	EB1329006-001	EB1329006-002	EB1329006-003	EB1329006-004	EB1329006-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.4	6.9	8.0	3.8	7.9
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	1.2	1.5	1.2	37.9	1.2
Net Acid Production Potential	----	0.5	kg H2SO4/t	-18.0	-14.3	-2.1	37.9	-14.2
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	165	94	93	362	108
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	19.2	15.8	3.3	<0.5	15.4
ANC as CaCO3	----	0.1	% CaCO3	2.0	1.6	0.3	<0.1	1.6
Fizz Rating	----	0	Fizz Unit	1	1	0	0	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.04	0.05	0.04	1.24	0.04
Sample Preparation Method								
Amount	----	0.01	kg	1.22	1.66	1.22	0.92	1.54

Page : 4 of 5
 Work Order : EB1329006
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BY0320CH GC_002 17.61-17.81	BY0320CH GC_003 19.42-19.61	BY0322CH GC_001 11.53-11.85	BY0322CH GC_002 17.63-17.92	BY0322CH GC_003 23.84-24.08
Client sampling date / time					[21-NOV-2013]	[21-NOV-2013]	[21-NOV-2013]	[21-NOV-2013]	[21-NOV-2013]
Compound	CAS Number	LOR	Unit		EB1329006-006	EB1329006-007	EB1329006-009	EB1329006-010	EB1329006-011
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.8	7.3	9.0	8.4	8.4
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		1.8	4.3	7.0	<0.5	<0.5
Net Acid Production Potential	----	0.5	kg H2SO4/t		-1.7	0.9	-162	-15.4	-3.5
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		40	145	509	99	37
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		3.5	3.4	169	15.7	3.8
ANC as CaCO3	----	0.1	% CaCO3		0.4	0.3	17.2	1.6	0.4
Fizz Rating	----	0	Fizz Unit		0	0	3	1	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.06	0.14	0.23	0.01	0.01
Sample Preparation Method									
Amount	----	0.01	kg		1.34	1.20	2.06	2.04	1.68

Page : 5 of 5
 Work Order : EB1329006
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

BY0322CH GC_004

BY0322CH GC_005

26.38-26.76

30.69-30.96

[21-NOV-2013]

[21-NOV-2013]

Client sampling date / time

Compound	CAS Number	LOR	Unit	EB1329006-012	EB1329006-013	----	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.6	5.4	----	----	----
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	<0.5	1.2	----	----	----
Net Acid Production Potential	----	0.5	kg H2SO4/t	-21.8	-2.4	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	117	352	----	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	21.8	3.6	----	----	----
ANC as CaCO3	----	0.1	% CaCO3	2.2	0.4	----	----	----
Fizz Rating	----	0	Fizz Unit	1	0	----	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.04	----	----	----
Sample Preparation Method								
Amount	----	0.01	kg	2.24	1.76	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1329921	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 03-DEC-2013
Sampler	: SGS Newcastle	Issue Date	: 16-DEC-2013
Site	: Bylong, NSW (Cockatoo Coal)		
Quote number	: BN/606/13	No. of samples received	: 10
		No. of samples analysed	: 10

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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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
Greg Vogel	Laboratory Manager	Brisbane Inorganics
SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils



Page : 2 of 4
Work Order : EB1329921
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211

General Comments

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

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

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Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

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

Page : 3 of 4
 Work Order : EB1329921
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: COAL (Matrix: SOIL)				Client sample ID	NC00675-001 BY0180CH W_0009_17	NC00675-002 BY0180CH W_0018	NC00675-003 BY0172CH W_0012	NC00675-004 BY0172CH W_0014_16	NC00675-005 BY0172CH W_0018
Client sampling date / time					[03-DEC-2013]	[03-DEC-2013]	[03-DEC-2013]	[03-DEC-2013]	[03-DEC-2013]
Compound	CAS Number	LOR	Unit		EB1329921-001	EB1329921-002	EB1329921-003	EB1329921-004	EB1329921-005
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		6.5	4.0	3.9	7.6	5.2
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-21.5	<0.5	-2.2	-112	<0.5
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		462	216	361	690	246
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		22.7	2.4	7.4	115	3.2
ANC as CaCO3	----	0.1	% CaCO3		2.3	0.2	0.8	11.8	0.3
Fizz Rating	----	0	Fizz Unit		1	0	1	2	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.04	0.08	0.17	0.10	0.11

Page : 4 of 4
 Work Order : EB1329921
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: COAL (Matrix: SOIL)

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	NC00675-006 BY0172CH W_0019_20 [03-DEC-2013] EB1329921-006	NCC13-00001-001 BY0175CH W_0012_15 [03-DEC-2013] EB1329921-007	NCC13-00001-002 BY0204CH W_0024_26 [03-DEC-2013] EB1329921-008	NCC13-00001-003 BY0204CH W_0035 [03-DEC-2013] EB1329921-009	NCC13-00001-004 BY0178CH W_0008_11 [03-DEC-2013] EB1329921-010
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	4.5	7.5	7.4	3.8	7.0
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-1.8	-37.4	-34.7	<0.5	-4.2
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	234	392	216	453	228
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	4.6	43.8	39.0	3.2	11.2
ANC as CaCO3	----	0.1	% CaCO3	0.5	4.5	4.0	0.3	1.1
Fizz Rating	----	0	Fizz Unit	0	2	2	0	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.09	0.21	0.14	0.09	0.23

CERTIFICATE OF ANALYSIS

Work Order	: EB1330966	Page	: 1 of 3
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 12-DEC-2013
C-O-C number	: ----	Issue Date	: 30-DEC-2013
Sampler	: SGS-Newcastle	No. of samples received	: 4
Site	: Bylong, NSW	No. of samples analysed	: 4
Quote number	: BN/606/13		

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



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Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils
SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics



General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

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

Page : 3 of 3
 Work Order : EB1330966
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	21 to 33 BY0185CH	1 to 12 BY0189CH	14 to 25 BY0206CH	0018 BY0285LD	----
Client sampling date / time					[12-DEC-2013]	[12-DEC-2013]	[12-DEC-2013]	[12-DEC-2013]	----
Compound	CAS Number	LOR	Unit		EB1330966-001	EB1330966-002	EB1330966-003	EB1330966-004	----
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		9.3	8.5	9.0	8.8	----
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-26.7	-2.2	-26.6	-11.8	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		96	83	117	77	----
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		32.2	10.2	32.4	15.8	----
ANC as CaCO3	----	0.1	% CaCO3		3.3	1.0	3.3	1.6	----
Fizz Rating	----	0	Fizz Unit		1	0	1	1	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.18	0.26	0.19	0.13	----



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EB1404773	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Bylong Project - 111211	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 27-FEB-2014
Sampler	: Cockatoo Coal Staff	Issue Date	: 06-MAR-2014
Site	: Bylong NSW		
Quote number	: BN/606/13	No. of samples received	: 7
		No. of samples analysed	: 7

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



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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
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Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

Address 2 Byth Street Stafford QLD Australia 4053 | PHONE +61-7-3243 7222 | Facsimile +61-7-3243 7218
Environmental Division Brisbane ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company

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Page : 2 of 4
Work Order : EB1404773
Client : RGS ENVIRONMENTAL PTY LTD
Project : Bylong Project - 111211



General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

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

Page : 3 of 4
 Work Order : EB1404773
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project - 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				CHPP reject - Ulan Seam BY0204CH	CHPP reject - Ulan Seam BY0285LD	CHPP reject - Coggan Seam BH0288LD	CHPP reject - Ulan Seam BH0173CH	CHPP reject - Ulan Seam BH0283LD
Client sampling date / time				27-FEB-2014 13:20	27-FEB-2014 13:20	27-FEB-2014 13:20	27-FEB-2014 13:20	27-FEB-2014 13:20
Compound	CAS Number	LOR	Unit	EB1404773-001	EB1404773-002	EB1404773-003	EB1404773-004	EB1404773-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.0	7.4	3.8	7.0	7.3
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	2.4	2.4	5.8	3.1	4.6
Net Acid Production Potential	----	0.5	kg H2SO4/t	-45.2	-38.6	2.3	-13.7	-28.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	407	705	419	597	480
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	47.6	41.0	3.5	16.8	33.2
ANC as CaCO3	----	0.1	% CaCO3	4.8	4.2	0.4	1.7	3.4
Fizz Rating	----	0	Fizz Unit	2	2	0	1	2
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.08	0.08	0.19	0.10	0.15

Page : 4 of 4
 Work Order : EB1404773
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project - 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	CHPP reject - Coggan Seam BH0283LD	CHPP reject BY0030LD	----	----	----
Client sampling date / time					27-FEB-2014 13:20	27-FEB-2014 13:20	----	----	----
Compound	CAS Number	LOR	Unit		EB1404773-006	EB1404773-007	----	----	----
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		4.0	4.7	----	----	----
EA009: Nett Acid Production Potential									
Acid Production Potential (APP)	----	0.5	kg H2SO4/t		35.8	1.8	----	----	----
Net Acid Production Potential	----	0.5	kg H2SO4/t		31.2	-6.2	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		1140	473	----	----	----
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		4.6	8.0	----	----	----
ANC as CaCO3	----	0.1	% CaCO3		0.5	0.8	----	----	----
Fizz Rating	----	0	Fizz Unit		0	1	----	----	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		1.17	0.06	----	----	----



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EB1407953	Page	: 1 of 3
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Bylong Project - 111211	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 01-APR-2014
Sampler	: Cockatoo Coal Staff	Issue Date	: 09-APR-2014
Site	: Bylong, NSW		
Quote number	: BN/606/13	No. of samples received	: 4
		No. of samples analysed	: 4

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

Address 2 Byth Street Stafford QLD Australia 4053 | PHONE +61-7-3243 7222 | Facsimile +61-7-3243 7218
Environmental Division Brisbane ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company

Environmental

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Page : 2 of 3
Work Order : EB1407953
Client : RGS ENVIRONMENTAL PTY LTD
Project : Bylong Project - 111211



General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

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

Page : 3 of 3
 Work Order : EB1407953
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project - 111211



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				Tailings Composite - Ulan Seam BY0232LD	Tailings Composite - Coggan Seam BY0030LD	Tailings Composite - Coggan Seam BY0283LD, BY0285LD + BY0288LD	Tailings Composite - Ulan Seam BY0283LD, BY0285LD + BY0288LD	----
Client sampling date / time				01-APR-2014 15:00	01-APR-2014 15:00	01-APR-2014 15:00	01-APR-2014 15:00	----
Compound	CAS Number	LOR	Unit	EB1407953-001	EB1407953-002	EB1407953-003	EB1407953-004	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.3	7.3	6.6	7.5	----
EA009: Nett Acid Production Potential								
Acid Production Potential (APP)	----	0.5	kg H2SO4/t	4.6	7.3	18.0	10.7	----
Net Acid Production Potential	----	0.5	kg H2SO4/t	-25.8	-2.8	8.0	-29.8	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	110	85	135	114	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	30.4	10.2	10.1	40.5	----
ANC as CaCO3	----	0.1	% CaCO3	3.1	1.0	1.0	4.1	----
Fizz Rating	----	0	Fizz Unit	2	0	1	2	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.15	0.24	0.59	0.35	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1400137	Page	: 1 of 7
Amendment	: 2		
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 123 WYNNE ST SUNNYBANK HILLS QLD, AUSTRALIA 4109	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3344 1222	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3344 1222	Facsimile	: +61 7 3243 7218
Project	: 111211	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ---		
C-O-C number	: ---	Date Samples Received	: 03-JAN-2014
Sampler	: Alan Robertson	Issue Date	: 28-APR-2014
Site	: Bylong		
Quote number	: BN/606/13	No. of samples received	: 27
		No. of samples analysed	: 11

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Satish Trivedi	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils



General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Amendment 2 (28/4/14): This report has been amended and re-released to allow the reporting of additional analytical data. Total and soluble uranium and thorium has now been included.**
- **This report has been amended and re-released to allow the reporting of additional analytical data. Alkalinity has now been reported as it was initially overlooked at initial login.**

Page : 3 of 7
 Work Order : EB1400137 Amendment 2
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211



Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Client sample ID

GC_006 BY0273CH 41.49-41.82 EB1326314-005	GC_008 BY0291CH 55.85-56.25 EB1326314-016	GC_004 BY0318CH 27.24-27.38 EB1329006-004	GC_003 BY0320CH 19.42-19.61 EB1329006-007	GC_001 BY0322CH 11.53-11.85 EB1329006-009
28-OCT-2013 15:00	28-OCT-2013 15:00	21-NOV-2013 15:00	21-NOV-2013 15:00	21-NOV-2013 15:00
EB1400137-004	EB1400137-005	EB1400137-014	EB1400137-017	EB1400137-018

Client sampling date / time

Compound	CAS Number	LOR	Unit					
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.385	0.120	0.774	0.027	0.005



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				COMPOSITE 15	COMPOSITE 16	COMPOSITE 17	COMPOSITE 18	COMPOSITE 19
				[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[21-NOV-2013]	[21-NOV-2013]
Compound	CAS Number	LOR	Unit	EB1400137-022	EB1400137-023	EB1400137-024	EB1400137-025	EB1400137-026
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	3.3	1.5	3.7	1.3	1.1
Exchangeable Magnesium	----	0.1	meq/100g	3.2	2.6	4.7	1.9	2.0
Exchangeable Potassium	----	0.1	meq/100g	0.5	0.6	0.5	0.3	0.4
Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	----	0.1	meq/100g	7.1	4.8	8.9	3.5	3.6
Exchangeable Sodium Percent	----	0.1	%	0.5	1.3	0.3	0.3	0.6
ED037: Alkalinity								
Total Alkalinity as CaCO ₃	----	1	mg/kg	270	154	308	92	154
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/kg	240	154	278	92	154
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/kg	30	<1	30	<1	<1
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO ₄ 2-	14808-79-8	10	mg/kg	90	80	80	610	170
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	10	20	20	20
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	20	<10	20	60	10
Magnesium	7439-95-4	10	mg/kg	20	<10	30	70	20
Sodium	7440-23-5	10	mg/kg	50	50	40	60	40
Potassium	7440-09-7	10	mg/kg	60	40	60	70	60
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	130	120	100	100	80
Potassium	7440-09-7	50	mg/kg	1100	1220	1120	1060	1200
Calcium	7440-70-2	50	mg/kg	5970	1400	6650	1400	1050
Magnesium	7439-95-4	50	mg/kg	3620	2720	3800	2230	1530
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	<1	<1	<1	<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	0.2	0.1	0.1	<0.1	<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	0.3	<0.1
Copper	7440-50-8	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1



Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Client sample ID

Client sampling date / time

				COMPOSITE 15	COMPOSITE 16	COMPOSITE 17	COMPOSITE 18	COMPOSITE 19
				[28-OCT-2013]	[28-OCT-2013]	[28-OCT-2013]	[21-NOV-2013]	[21-NOV-2013]
Compound	CAS Number	LOR	Unit	EB1400137-022	EB1400137-023	EB1400137-024	EB1400137-025	EB1400137-026
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	1.1	0.2
Molybdenum	7439-98-7	0.1	mg/kg	0.2	0.2	0.2	<0.1	0.5
Nickel	7440-02-0	0.1	mg/kg	<0.1	<0.1	<0.1	0.8	<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
Phosphorus	7723-14-0	10	mg/kg	<10	<10	<10	<10	<10
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	3220	3580	3720	3510	3930
Antimony	7440-36-0	5	mg/kg	<5	<5	<5	<5	<5
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cobalt	7440-48-4	2	mg/kg	10	10	12	12	15
Iron	7439-89-6	50	mg/kg	19400	20400	13900	22100	15500
Manganese	7439-96-5	5	mg/kg	376	294	273	356	328
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	<2
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Phosphorus	7723-14-0	50	mg/kg	160	120	100	190	100
Arsenic	7440-38-2	5	mg/kg	8	6	7	19	7
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	42	39	42	34	66
Copper	7440-50-8	5	mg/kg	22	22	18	24	21
Lead	7439-92-1	5	mg/kg	16	17	12	18	17
Nickel	7440-02-0	2	mg/kg	56	59	45	52	40
Zinc	7440-66-6	5	mg/kg	66	84	44	74	82
EG020S: Soluble Metals by ICPMS								
Uranium	7440-61-1	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	7440-29-1	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
EG020T: Total Metals by ICP-MS								
Thorium	7440-29-1	0.1	mg/kg	6.3	6.4	4.7	5.3	4.4
Uranium	7440-61-1	0.1	mg/kg	0.7	0.8	0.5	0.7	0.7



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

COMPOSITE 20

Client sampling date / time

[21-NOV-2013]

EB1400137-027

Compound	CAS Number	LOR	Unit					
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	23.4	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	2.7	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	0.4	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	26.5	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	0.2	----	----	----	----
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	370	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	324	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	46	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	90	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	60	----	----	----	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	40	----	----	----	----
Magnesium	7439-95-4	10	mg/kg	20	----	----	----	----
Sodium	7440-23-5	10	mg/kg	90	----	----	----	----
Potassium	7440-09-7	10	mg/kg	60	----	----	----	----
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	160	----	----	----	----
Potassium	7440-09-7	50	mg/kg	1060	----	----	----	----
Calcium	7440-70-2	50	mg/kg	18000	----	----	----	----
Magnesium	7439-95-4	50	mg/kg	3650	----	----	----	----
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	<1	----	----	----	----
Antimony	7440-36-0	0.1	mg/kg	<0.1	----	----	----	----
Arsenic	7440-38-2	0.1	mg/kg	0.1	----	----	----	----
Boron	7440-42-8	1	mg/kg	<1	----	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	----	----	----	----
Chromium	7440-47-3	0.1	mg/kg	<0.1	----	----	----	----
Cobalt	7440-48-4	0.1	mg/kg	<0.1	----	----	----	----
Copper	7440-50-8	0.1	mg/kg	<0.1	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	COMPOSITE 20	----	----	----	----
Client sampling date / time					[21-NOV-2013]	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1400137-027	----	----	----	----
EG005S : Soluble Metals by ICPAES - Continued									
Iron	7439-89-6	1	mg/kg		<1	----	----	----	----
Lead	7439-92-1	0.1	mg/kg		<0.1	----	----	----	----
Manganese	7439-96-5	0.1	mg/kg		<0.1	----	----	----	----
Molybdenum	7439-98-7	0.1	mg/kg		0.2	----	----	----	----
Nickel	7440-02-0	0.1	mg/kg		<0.1	----	----	----	----
Selenium	7782-49-2	0.1	mg/kg		<0.1	----	----	----	----
Zinc	7440-66-6	0.1	mg/kg		<0.1	----	----	----	----
Phosphorus	7723-14-0	10	mg/kg		<10	----	----	----	----
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		3490	----	----	----	----
Antimony	7440-36-0	5	mg/kg		<5	----	----	----	----
Boron	7440-42-8	50	mg/kg		<50	----	----	----	----
Cobalt	7440-48-4	2	mg/kg		8	----	----	----	----
Iron	7439-89-6	50	mg/kg		18700	----	----	----	----
Manganese	7439-96-5	5	mg/kg		298	----	----	----	----
Molybdenum	7439-98-7	2	mg/kg		<2	----	----	----	----
Selenium	7782-49-2	5	mg/kg		<5	----	----	----	----
Phosphorus	7723-14-0	50	mg/kg		130	----	----	----	----
Arsenic	7440-38-2	5	mg/kg		10	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		54	----	----	----	----
Copper	7440-50-8	5	mg/kg		19	----	----	----	----
Lead	7439-92-1	5	mg/kg		13	----	----	----	----
Nickel	7440-02-0	2	mg/kg		43	----	----	----	----
Zinc	7440-66-6	5	mg/kg		53	----	----	----	----
EG020S: Soluble Metals by ICPMS									
Uranium	7440-61-1	0.01	mg/kg		<0.01	----	----	----	----
Thorium	7440-29-1	0.01	mg/kg		<0.01	----	----	----	----
EG020T: Total Metals by ICP-MS									
Thorium	7440-29-1	0.1	mg/kg		3.9	----	----	----	----
Uranium	7440-61-1	0.1	mg/kg		0.8	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1313877	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Bylong Project 111211	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 07-JUN-2013
Sampler	: ----	Issue Date	: 14-JUN-2013
Site	: Bylong		
Quote number	: BN/057/11 V2	No. of samples received	: 8
		No. of samples analysed	: 8

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



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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
SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils



Page : 2 of 4
Work Order : EB1313877
Client : RGS ENVIRONMENTAL PTY LTD
Project : Bylong Project 111211

General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

				Client sample ID	GC_004 BY0172CH	GC_010 BY0172CH	GC_005 BY0175CH	GC_003 BY0178CH	GC_009 BY0180CH
				Client sampling date / time	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00
Compound	CAS Number	LOR	Unit		EB1313877-001	EB1313877-002	EB1313877-003	EB1313877-004	EB1313877-005
EA026 : Chromium Reducible Sulfur									
Chromium Reducible Sulphur	----	0.005	%		0.201	0.044	0.146	0.263	0.275



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID	GC_019 BY0180CH	GC_021 BY0180CH	GC_025 BY0180CH	----	----
				Client sampling date / time	17-MAY-2013 15:00	17-MAY-2013 15:00	17-MAY-2013 15:00	----	----
Compound	CAS Number	LOR	Unit		EB1313877-006	EB1313877-007	EB1313877-008	----	----
EA026 : Chromium Reducible Sulfur									
Chromium Reducible Sulphur	----	0.005	%		0.105	0.328	0.292	----	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1311473	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 111211 Bylong Coal	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 13-MAY-2013
Sampler	: Alan Robertson	Issue Date	: 21-MAY-2013
Site	: ----		
Quote number	: BN/413/12	No. of samples received	: 22
		No. of samples analysed	: 4

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics



Page : 2 of 4
Work Order : EB1311473
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 Bylong Coal

General Comments

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

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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

- EG005T (Total Metals) : Sample EB1311496-002 shows poor duplicate results due to sample heterogeneity. Confirmed by re-extraction and re-analysis.

Page : 3 of 4
 Work Order : EB1311473
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 Bylong Coal



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

Client sampling date / time

				11 COMPOSITE	12 COMPOSITE	13 COMPOSITE	14 COMPOSITE	----
				01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1311473-019	EB1311473-020	EB1311473-021	EB1311473-022	----
ED037: Alkalinity								
Total Alkalinity as CaCO ₃	----	1	mg/kg	328	25	296	82	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/kg	328	25	296	82	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/kg	<1	<1	<1	<1	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO ₄ 2-	14808-79-8	10	mg/kg	710	1190	890	540	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	140	210	50	40	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	220	210	380	120	----
Magnesium	7439-95-4	10	mg/kg	80	120	90	40	----
Sodium	7440-23-5	10	mg/kg	120	100	20	30	----
Potassium	7440-09-7	10	mg/kg	40	30	20	10	----
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	220	240	70	80	----
Potassium	7440-09-7	50	mg/kg	460	270	260	130	----
Calcium	7440-70-2	50	mg/kg	7760	4980	4380	1140	----
Magnesium	7439-95-4	50	mg/kg	3970	2840	1600	540	----
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	<1	2	<1	<1	----
Antimony	7440-36-0	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Arsenic	7440-38-2	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Boron	7440-42-8	1	mg/kg	<1	<1	<1	<1	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Chromium	7440-47-3	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Cobalt	7440-48-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Copper	7440-50-8	0.1	mg/kg	<0.1	<0.1	<0.1	0.1	----
Iron	7439-89-6	1	mg/kg	<1	34	<1	<1	----
Lead	7439-92-1	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Manganese	7439-96-5	0.1	mg/kg	0.8	24.7	1.0	4.9	----
Molybdenum	7439-98-7	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Nickel	7440-02-0	0.1	mg/kg	<0.1	0.2	<0.1	0.1	----
Selenium	7782-49-2	0.1	mg/kg	0.1	<0.1	<0.1	<0.1	----
Zinc	7440-66-6	0.1	mg/kg	<0.1	7.3	4.1	89.6	----

Page : 4 of 4
 Work Order : EB1311473
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 Bylong Coal



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID	11 COMPOSITE	12 COMPOSITE	13 COMPOSITE	14 COMPOSITE	----
Client sampling date / time					01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	01-FEB-2013 15:00	----
Compound	CAS Number	LOR	Unit		EB1311473-019	EB1311473-020	EB1311473-021	EB1311473-022	----
EG005S : Soluble Metals by ICPAES - Continued									
Phosphorus	7723-14-0	10	mg/kg		<10	<10	<10	<10	----
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		4490	3680	2080	2050	----
Antimony	7440-36-0	5	mg/kg		<5	<5	<5	<5	----
Arsenic	7440-38-2	5	mg/kg		10	<5	<5	<5	----
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	----
Cadmium	7440-43-9	1	mg/kg		<1	1	<1	<1	----
Chromium	7440-47-3	2	mg/kg		4	3	10	4	----
Cobalt	7440-48-4	2	mg/kg		2	<2	3	<2	----
Copper	7440-50-8	5	mg/kg		20	24	78	48	----
Iron	7439-89-6	50	mg/kg		60100	146000	21600	20200	----
Lead	7439-92-1	5	mg/kg		36	14	21	14	----
Manganese	7439-96-5	5	mg/kg		1470	3490	320	370	----
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	<2	----
Nickel	7440-02-0	2	mg/kg		11	<2	16	3	----
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	----
Zinc	7440-66-6	5	mg/kg		59	58	368	426	----
Phosphorus	7723-14-0	50	mg/kg		80	150	<50	130	----



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EB1408909	Page	: 1 of 8
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 123 WYNNE ST SUNNYBANK HILLS QLD, AUSTRALIA 4109	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3344 1222	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3344 1222	Facsimile	: +61 7 3243 7218
Project	: 111211 Bylong Coal	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 10-APR-2014
Sampler	: Alan Robertson	Issue Date	: 28-APR-2014
Site	: ----		
Quote number	: BN/606/13	No. of samples received	: 17
		No. of samples analysed	: 10

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

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Signatories

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

Signatories	Position	Accreditation Category
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics
Satish Trivedi	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils

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Environmental Division Brisbane ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company

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Page : 2 of 8
Work Order : EB1408909
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 Bylong Coal



General Comments

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **EK040T (Total Fluoride): Sample EB1408909-014 (COMPOSITE 3) shows poor matrix spike recovery due to matrix interference. Confirmed by re-extraction and re-analysis.**



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

Client sampling date / time

				CHPP reject - Coggan Seam BY0288LD	CHPP reject - Coggan Seam BY0283LD	Tailing Composite - Coggan Sea BY0030LD ("HAZ")3	Tailings Composite-Coggan Seam (Open Cut area) BY0283LD. BY0285LD + BY0288LD	COMPOSITE 1
				27-FEB-2014 13:20	27-FEB-2014 13:20	01-APR-2014 15:00	01-APR-2014 15:00	27-FEB-2014 13:20
Compound	CAS Number	LOR	Unit	EB1408909-003	EB1408909-006	EB1408909-009	EB1408909-010	EB1408909-012
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.187	0.767	0.016	0.444	----
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	----	----	----	----	404
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	----	----	----	----	404
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	----	----	----	----	<1
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	----	----	----	----	20
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	----	----	----	----	1330
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	----	----	----	----	390
Magnesium	7439-95-4	10	mg/kg	----	----	----	----	120
Sodium	7440-23-5	10	mg/kg	----	----	----	----	160
Potassium	7440-09-7	10	mg/kg	----	----	----	----	90
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	----	----	----	----	320
Potassium	7440-09-7	50	mg/kg	----	----	----	----	680
Calcium	7440-70-2	50	mg/kg	----	----	----	----	15500
Magnesium	7439-95-4	50	mg/kg	----	----	----	----	6030
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	----	----	----	----	<1
Antimony	7440-36-0	0.1	mg/kg	----	----	----	----	<0.1
Arsenic	7440-38-2	0.1	mg/kg	----	----	----	----	<0.1
Boron	7440-42-8	1	mg/kg	----	----	----	----	<1
Cadmium	7440-43-9	0.1	mg/kg	----	----	----	----	<0.1
Chromium	7440-47-3	0.1	mg/kg	----	----	----	----	<0.1
Cobalt	7440-48-4	0.1	mg/kg	----	----	----	----	<0.1
Copper	7440-50-8	0.1	mg/kg	----	----	----	----	<0.1
Iron	7439-89-6	1	mg/kg	----	----	----	----	<1



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID	CHPP reject - Coggan Seam BY0288LD	CHPP reject - Coggan Seam BY0283LD	Tailing Composite - Coggan Sea BY0030LD ("HAZ")3	Tailings Composite-Coggan Seam (Open Cut area) BY0283LD. BY0285LD + BY0288LD	COMPOSITE 1
Client sampling date / time					27-FEB-2014 13:20	27-FEB-2014 13:20	01-APR-2014 15:00	01-APR-2014 15:00	27-FEB-2014 13:20
Compound	CAS Number	LOR	Unit		EB1408909-003	EB1408909-006	EB1408909-009	EB1408909-010	EB1408909-012
EG005S : Soluble Metals by ICPAES - Continued									
Lead	7439-92-1	0.1	mg/kg	----	----	----	----	----	<0.1
Manganese	7439-96-5	0.1	mg/kg	----	----	----	----	----	0.2
Molybdenum	7439-98-7	0.1	mg/kg	----	----	----	----	----	0.2
Nickel	7440-02-0	0.1	mg/kg	----	----	----	----	----	<0.1
Selenium	7782-49-2	0.1	mg/kg	----	----	----	----	----	0.2
Zinc	7440-66-6	0.1	mg/kg	----	----	----	----	----	<0.1
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	----	----	----	----	----	2100
Antimony	7440-36-0	5	mg/kg	----	----	----	----	----	<5
Arsenic	7440-38-2	5	mg/kg	----	----	----	----	----	<5
Boron	7440-42-8	50	mg/kg	----	----	----	----	----	<50
Cadmium	7440-43-9	1	mg/kg	----	----	----	----	----	<1
Chromium	7440-47-3	2	mg/kg	----	----	----	----	----	7
Cobalt	7440-48-4	2	mg/kg	----	----	----	----	----	<2
Copper	7440-50-8	5	mg/kg	----	----	----	----	----	12
Iron	7439-89-6	50	mg/kg	----	----	----	----	----	48000
Lead	7439-92-1	5	mg/kg	----	----	----	----	----	19
Manganese	7439-96-5	5	mg/kg	----	----	----	----	----	1280
Molybdenum	7439-98-7	2	mg/kg	----	----	----	----	----	<2
Nickel	7440-02-0	2	mg/kg	----	----	----	----	----	3
Selenium	7782-49-2	5	mg/kg	----	----	----	----	----	<5
Zinc	7440-66-6	5	mg/kg	----	----	----	----	----	28
EG020S: Soluble Metals by ICPMS									
Uranium	7440-61-1	0.01	mg/kg	----	----	----	----	----	<0.01
Thorium	7440-29-1	0.01	mg/kg	----	----	----	----	----	<0.01
EG020T: Total Metals by ICP-MS									
Thorium	7440-29-1	0.1	mg/kg	----	----	----	----	----	10.5
Uranium	7440-61-1	0.1	mg/kg	----	----	----	----	----	1.2
EK040S: Fluoride Soluble									
Fluoride	16984-48-8	1	mg/kg	----	----	----	----	----	7

Page : 5 of 8
 Work Order : EB1408909
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 Bylong Coal



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

				CHPP reject - Coggan Seam BY0288LD	CHPP reject - Coggan Seam BY0283LD	Tailing Composite - Coggan Sea BY0030LD ("HAZ")3	Tailings Composite-Coggan Seam (Open Cut area) BY0283LD. BY0285LD + BY0288LD	COMPOSITE 1
Client sampling date / time				27-FEB-2014 13:20	27-FEB-2014 13:20	01-APR-2014 15:00	01-APR-2014 15:00	27-FEB-2014 13:20
Compound	CAS Number	LOR	Unit	EB1408909-003	EB1408909-006	EB1408909-009	EB1408909-010	EB1408909-012
EK040S: Fluoride Soluble - Continued								
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	----	----	----	----	150
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	2	mg/kg	----	----	----	----	392
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.1	mg/kg	----	----	----	----	<0.1



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID	COMPOSITE 2	COMPOSITE 3	COMPOSITE 4	----	----
Client sampling date / time					27-FEB-2014 13:20	01-APR-2014 15:00	01-APR-2014 15:00	----	----
Compound	CAS Number	LOR	Unit		EB1408909-013	EB1408909-014	EB1408909-015	----	----
ED037: Alkalinity									
Total Alkalinity as CaCO ₃	----	1	mg/kg		<1	177	189	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/kg		<1	177	189	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/kg		<1	<1	<1	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO ₄ 2-	14808-79-8	10	mg/kg		1870	60	210	----	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		810	20	20	----	----
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		380	60	120	----	----
Magnesium	7439-95-4	10	mg/kg		240	20	30	----	----
Sodium	7440-23-5	10	mg/kg		30	40	30	----	----
Potassium	7440-09-7	10	mg/kg		20	50	20	----	----
ED093T: Total Major Cations									
Sodium	7440-23-5	50	mg/kg		130	80	90	----	----
Potassium	7440-09-7	50	mg/kg		230	900	240	----	----
Calcium	7440-70-2	50	mg/kg		3300	9660	2770	----	----
Magnesium	7439-95-4	50	mg/kg		1270	3590	840	----	----
EG005S : Soluble Metals by ICPAES									
Aluminium	7429-90-5	1	mg/kg		20	<1	<1	----	----
Antimony	7440-36-0	0.1	mg/kg		0.1	<0.1	<0.1	----	----
Arsenic	7440-38-2	0.1	mg/kg		0.1	<0.1	<0.1	----	----
Boron	7440-42-8	1	mg/kg		<1	<1	<1	----	----
Cadmium	7440-43-9	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
Chromium	7440-47-3	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
Cobalt	7440-48-4	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
Copper	7440-50-8	0.1	mg/kg		0.7	<0.1	<0.1	----	----
Iron	7439-89-6	1	mg/kg		273	<1	<1	----	----
Lead	7439-92-1	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
Manganese	7439-96-5	0.1	mg/kg		89.4	<0.1	<0.1	----	----
Molybdenum	7439-98-7	0.1	mg/kg		<0.1	0.1	<0.1	----	----
Nickel	7440-02-0	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
Selenium	7782-49-2	0.1	mg/kg		<0.1	<0.1	0.2	----	----
Zinc	7440-66-6	0.1	mg/kg		0.7	<0.1	<0.1	----	----

Page : 7 of 8
 Work Order : EB1408909
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 Bylong Coal



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

Client sampling date / time

				COMPOSITE 2	COMPOSITE 3	COMPOSITE 4	----	----
				27-FEB-2014 13:20	01-APR-2014 15:00	01-APR-2014 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1408909-013	EB1408909-014	EB1408909-015	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	3130	3750	2440	----	----
Antimony	7440-36-0	5	mg/kg	<5	<5	<5	----	----
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	----	----
Boron	7440-42-8	50	mg/kg	<50	<50	<50	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg	2	7	12	----	----
Cobalt	7440-48-4	2	mg/kg	<2	<2	<2	----	----
Copper	7440-50-8	5	mg/kg	27	21	32	----	----
Iron	7439-89-6	50	mg/kg	69300	15200	12100	----	----
Lead	7439-92-1	5	mg/kg	15	35	17	----	----
Manganese	7439-96-5	5	mg/kg	1940	202	240	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	----	----
Nickel	7440-02-0	2	mg/kg	<2	8	3	----	----
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	----	----
Zinc	7440-66-6	5	mg/kg	15	116	102	----	----
EG020S: Soluble Metals by ICPMS								
Uranium	7440-61-1	0.01	mg/kg	0.02	<0.01	<0.01	----	----
Thorium	7440-29-1	0.01	mg/kg	<0.01	<0.01	<0.01	----	----
EG020T: Total Metals by ICP-MS								
Thorium	7440-29-1	0.1	mg/kg	9.8	21.8	8.3	----	----
Uranium	7440-61-1	0.1	mg/kg	1.1	2.1	1.0	----	----
EK040S: Fluoride Soluble								
Fluoride	16984-48-8	1	mg/kg	5	8	5	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	110	260	100	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	2	mg/kg	419	281	414	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.1	mg/kg	<0.1	<0.1	<0.1	----	----

Page : 8 of 8
 Work Order : EB1408909
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 Bylong Coal



Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Client sample ID

GC_013 BY0172CH
EB1312228-013

GC_020 BY01080CH
EB1312228-045

Client sampling date / time

17-MAR-2014 15:00

17-MAR-2014 15:00

Compound	CAS Number	LOR	Unit	EB1408909-016	EB1408909-017	----	----	----
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.433	0.387	----	----	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1233255	Page	: 1 of 11
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Bylong Project 111211	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 19-DEC-2012
Sampler	: Alan Robertson	Issue Date	: 08-JAN-2013
Site	: ----		
Quote number	: BN/057/11 V2	No. of samples received	: 85
		No. of samples analysed	: 26

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics



Page : 2 of 11
Work Order : EB1233255
Client : RGS ENVIRONMENTAL PTY LTD
Project : Bylong Project 111211

General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

00514 BY0118CH 67.00-67.38 EB1230893064	00512 BY0118CH 64.30-64.50 EB1230893062	00914 BY0071CH 32.54-33.00 EB1230893014	00941 BY0118CH 481.48-81.79 EB1230893075	00926 BY0034 28.00-33.00 EB1230893026
02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
EB1233255-002	EB1233255-003	EB1233255-005	EB1233255-011	EB1233255-012

EA026 : Chromium Reducible Sulfur				
Chromium Reducible Sulphur	----	0.005	%	0.0130.008<0.0050.7910.197



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID		00925 BY0034 25.00-27.00 EB1230893025	00920 BY0070CH 24.00-26.00 EB1230893020	00523 BY0118CH 77.00-77.30 EB1230893073	00913 BY0071CH 30.53-30.83 EB1230893013	00524 BY0118CH 79.98-80.32 EB1230893074
Client sampling date / time						02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit			EB1233255-037	EB1233255-042	EB1233255-043	EB1233255-044	EB1233255-045
EA026 : Chromium Reducible Sulfur										
Chromium Reducible Sulphur	----	0.005	%			0.185	0.016	0.006	0.098	0.376



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

Client sampling date / time				00516 BY0118CH 69.50-69.85 EB1230893066	00509 BY0118CH 60.43-60.95 EB1230893059	00936 BY0118CH 35.09-35.35 EB1230893036	00943 BY0118CH 43.54-44.16 EB1230893043	00502 BY0118CH 53.47-53.96 EB1230893052
				02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00	02-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	EB1233255-050	EB1233255-051	EB1233255-064	EB1233255-065	EB1233255-067
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.036	<0.005	0.006	0.006	<0.005

Page : 6 of 11
 Work Order : EB1233255
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

				00939 BY0118CH 36.52-36.90 EB1230893039	COMPOSITE 1	COMPOSITE 2	COMPOSITE 3	COMPOSITE 4
Client sampling date / time				02-NOV-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00
Compound	CAS Number	LOR	Unit	EB1233255-069	EB1233255-076	EB1233255-077	EB1233255-078	EB1233255-079
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.007	----	----	----	----
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	----	628	641	410	320
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	----	628	641	410	320
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	----	<1	<1	<1	<1
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	----	150	860	290	40
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	----	<10	20	10	170
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	----	<10	100	30	<10
Magnesium	7439-95-4	10	mg/kg	----	<10	30	10	<10
Sodium	7440-23-5	10	mg/kg	----	200	320	250	190
Potassium	7440-09-7	10	mg/kg	----	20	120	70	60
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	----	830	810	580	360
Potassium	7440-09-7	50	mg/kg	----	1240	1390	1300	1320
Calcium	7440-70-2	50	mg/kg	----	1740	9540	9430	4930
Magnesium	7439-95-4	50	mg/kg	----	2130	4480	1500	3520
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	----	<1	<1	<1	1
Antimony	7440-36-0	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Arsenic	7440-38-2	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Boron	7440-42-8	1	mg/kg	----	<1	<1	<1	<1
Cadmium	7440-43-9	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Iron	7439-89-6	1	mg/kg	----	<1	<1	<1	<1
Lead	7439-92-1	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Molybdenum	7439-98-7	0.1	mg/kg	----	0.2	0.1	0.4	<0.1

Page : 7 of 11
 Work Order : EB1233255
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

00939 BY0118CH
 36.52-36.90
 EB1230893039

COMPOSITE 1

COMPOSITE 2

COMPOSITE 3

COMPOSITE 4

Client sampling date / time

02-NOV-2012 15:00

20-DEC-2012 15:00

20-DEC-2012 15:00

20-DEC-2012 15:00

20-DEC-2012 15:00

Compound	CAS Number	LOR	Unit	EB1233255-069	EB1233255-076	EB1233255-077	EB1233255-078	EB1233255-079
EG005S : Soluble Metals by ICPAES - Continued								
Nickel	7440-02-0	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.1	mg/kg	----	0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Phosphorus	7723-14-0	10	mg/kg	----	<10	<10	<10	<10
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	4260	5310	5250	5000
Antimony	7440-36-0	5	mg/kg	----	<5	<5	<5	<5
Arsenic	7440-38-2	5	mg/kg	----	5	10	5	8
Boron	7440-42-8	50	mg/kg	----	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg	----	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	----	11	36	18	31
Cobalt	7440-48-4	2	mg/kg	----	16	9	11	7
Copper	7440-50-8	5	mg/kg	----	30	18	17	15
Iron	7439-89-6	50	mg/kg	----	33300	21900	18500	18900
Lead	7439-92-1	5	mg/kg	----	16	16	17	18
Manganese	7439-96-5	5	mg/kg	----	818	387	518	221
Molybdenum	7439-98-7	2	mg/kg	----	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg	----	77	48	38	40
Selenium	7782-49-2	5	mg/kg	----	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg	----	56	58	58	42
Phosphorus	7723-14-0	50	mg/kg	----	90	110	110	160



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID	COMPOSITE 5	COMPOSITE 6	COMPOSITE 7	COMPOSITE 8	COMPOSITE 9
Client sampling date / time					20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00
Compound	CAS Number	LOR	Unit		EB1233255-080	EB1233255-081	EB1233255-082	EB1233255-083	EB1233255-084
ED037: Alkalinity									
Total Alkalinity as CaCO ₃	----	1	mg/kg		487	64	397	500	743
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/kg		487	64	397	500	743
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/kg		<1	<1	<1	<1	<1
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO ₄ 2-	14808-79-8	10	mg/kg		90	1300	90	130	20
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		80	20	20	20	10
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		<10	320	50	<10	30
Magnesium	7439-95-4	10	mg/kg		<10	120	40	<10	20
Sodium	7440-23-5	10	mg/kg		290	40	110	260	230
Potassium	7440-09-7	10	mg/kg		50	60	80	20	40
ED093T: Total Major Cations									
Sodium	7440-23-5	50	mg/kg		610	80	330	2170	1080
Potassium	7440-09-7	50	mg/kg		1780	640	1400	1890	720
Calcium	7440-70-2	50	mg/kg		4770	930	17600	2870	32700
Magnesium	7439-95-4	50	mg/kg		4080	500	4720	4790	10300
EG005S : Soluble Metals by ICPAES									
Aluminium	7429-90-5	1	mg/kg		<1	<1	<1	<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	<0.1	1.5	0.1
Boron	7440-42-8	1	mg/kg		<1	<1	<1	<1	2
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	0.3	<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		<0.1	6.5	<0.1	<0.1	<0.1
Molybdenum	7439-98-7	0.1	mg/kg		<0.1	<0.1	0.1	0.7	0.1
Nickel	7440-02-0	0.1	mg/kg		0.2	0.4	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.1	mg/kg		<0.1	<0.1	<0.1	0.2	<0.1
Zinc	7440-66-6	0.1	mg/kg		<0.1	0.3	<0.1	<0.1	<0.1



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

Client sampling date / time

				COMPOSITE 5	COMPOSITE 6	COMPOSITE 7	COMPOSITE 8	COMPOSITE 9
				20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00	20-DEC-2012 15:00
				EB1233255-080	EB1233255-081	EB1233255-082	EB1233255-083	EB1233255-084
Compound	CAS Number	LOR	Unit					
EG005S : Soluble Metals by ICPAES - Continued								
Phosphorus	7723-14-0	10	mg/kg	<10	<10	<10	<10	<10
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	6620	4040	5030	7110	3400
Antimony	7440-36-0	5	mg/kg	<5	<5	<5	<5	<5
Arsenic	7440-38-2	5	mg/kg	11	7	7	12	<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	37	29	8	10	5
Cobalt	7440-48-4	2	mg/kg	20	4	8	14	6
Copper	7440-50-8	5	mg/kg	33	11	16	17	9
Iron	7439-89-6	50	mg/kg	31600	11800	20400	41200	9770
Lead	7439-92-1	5	mg/kg	15	11	24	24	8
Manganese	7439-96-5	5	mg/kg	708	201	868	976	219
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg	104	6	25	58	35
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg	74	23	51	76	30
Phosphorus	7723-14-0	50	mg/kg	190	<50	70	220	220



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)				Client sample ID	COMPOSITE 10	----	----	----	----
				Client sampling date / time	20-DEC-2012 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1233255-085	----	----	----	----
ED037: Alkalinity									
Total Alkalinity as CaCO ₃	----	1	mg/kg		794	----	----	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/kg		794	----	----	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/kg		<1	----	----	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO ₄ 2-	14808-79-8	10	mg/kg		110	----	----	----	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		20	----	----	----	----
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		<10	----	----	----	----
Magnesium	7439-95-4	10	mg/kg		<10	----	----	----	----
Sodium	7440-23-5	10	mg/kg		350	----	----	----	----
Potassium	7440-09-7	10	mg/kg		30	----	----	----	----
ED093T: Total Major Cations									
Sodium	7440-23-5	50	mg/kg		2620	----	----	----	----
Potassium	7440-09-7	50	mg/kg		1690	----	----	----	----
Calcium	7440-70-2	50	mg/kg		5740	----	----	----	----
Magnesium	7439-95-4	50	mg/kg		3670	----	----	----	----
EG005S : Soluble Metals by ICPAES									
Aluminium	7429-90-5	1	mg/kg		2	----	----	----	----
Antimony	7440-36-0	0.1	mg/kg		<0.1	----	----	----	----
Arsenic	7440-38-2	0.1	mg/kg		0.7	----	----	----	----
Boron	7440-42-8	1	mg/kg		<1	----	----	----	----
Cadmium	7440-43-9	0.1	mg/kg		<0.1	----	----	----	----
Chromium	7440-47-3	0.1	mg/kg		<0.1	----	----	----	----
Cobalt	7440-48-4	0.1	mg/kg		<0.1	----	----	----	----
Copper	7440-50-8	0.1	mg/kg		<0.1	----	----	----	----
Iron	7439-89-6	1	mg/kg		<1	----	----	----	----
Lead	7439-92-1	0.1	mg/kg		<0.1	----	----	----	----
Manganese	7439-96-5	0.1	mg/kg		<0.1	----	----	----	----
Molybdenum	7439-98-7	0.1	mg/kg		0.2	----	----	----	----
Nickel	7440-02-0	0.1	mg/kg		<0.1	----	----	----	----
Selenium	7782-49-2	0.1	mg/kg		0.2	----	----	----	----
Zinc	7440-66-6	0.1	mg/kg		<0.1	----	----	----	----

Page : 11 of 11
 Work Order : EB1233255
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong Project 111211



Analytical Results

Sub-Matrix: PULP (Matrix: SOIL)

Client sample ID

COMPOSITE 10

Client sampling date / time

20-DEC-2012 15:00

Compound	CAS Number	LOR	Unit	EB1233255-085	----	----	----	----
EG005S : Soluble Metals by ICPAES - Continued								
Phosphorus	7723-14-0	10	mg/kg	<10	----	----	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	7020	----	----	----	----
Antimony	7440-36-0	5	mg/kg	<5	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	11	----	----	----	----
Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	19	----	----	----	----
Cobalt	7440-48-4	2	mg/kg	8	----	----	----	----
Copper	7440-50-8	5	mg/kg	25	----	----	----	----
Iron	7439-89-6	50	mg/kg	23600	----	----	----	----
Lead	7439-92-1	5	mg/kg	19	----	----	----	----
Manganese	7439-96-5	5	mg/kg	590	----	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	----	----	----	----
Nickel	7440-02-0	2	mg/kg	46	----	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
Zinc	7440-66-6	5	mg/kg	52	----	----	----	----
Phosphorus	7723-14-0	50	mg/kg	130	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1401952	Page	: 1 of 3
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 2 Byth 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 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Bylong 111211	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 29-JAN-2014
C-O-C number	: ----	Issue Date	: 06-FEB-2014
Sampler	: Alan Robertson	No. of samples received	: 4
Site	: ----	No. of samples analysed	: 4
Quote number	: BN/606/13		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils



Page : 2 of 3
Work Order : EB1401952
Client : RGS ENVIRONMENTAL PTY LTD
Project : Bylong 111211

General Comments

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

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

Page : 3 of 3
 Work Order : EB1401952
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : Bylong 111211



Analytical Results

Sub-Matrix: **PULP** (Matrix: **SOIL**)

Client sample ID

				1-12 BY0189CH EB1330966-002	NC00675-003 BY0172CH W_0012 EB1329921-003	NC00675-005 BY0172CH W_0018 EB1329921-005	NCC13-00001-004 BY0178CH W_0008_11 EB1329921-010	----
Client sampling date / time				12-DEC-2013 15:00	03-DEC-2013 15:00	03-DEC-2013 15:00	03-DEC-2013 15:00	----
Compound	CAS Number	LOR	Unit	EB1401952-001	EB1401952-002	EB1401952-003	EB1401952-004	----
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.042	0.074	0.005	0.026	----



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EB1409089	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 123 WYNNE ST SUNNYBANK HILLS QLD, AUSTRALIA 4109	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3344 1222	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3344 1222	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 14-APR-2014
Sampler	: Mandie Matherson	Issue Date	: 28-APR-2014
Site	: ----		
Quote number	: BN/606/13	No. of samples received	: 2
		No. of samples analysed	: 2

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Signatories	Position	Accreditation Category
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

Address 2 Byth Street Stafford QLD Australia 4053 | PHONE +61-7-3243 7222 | Facsimile +61-7-3243 7218
Environmental Division Brisbane ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company

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Page : 2 of 4
Work Order : EB1409089
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

Page : 3 of 4
 Work Order : EB1409089
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC # 8	Bylong KLC # 9	----	----	----
				12-APR-2014 15:00	12-APR-2014 15:00	----	----	----
				EB1409089-001	EB1409089-002	----	----	----
Compound	CAS Number	LOR	Unit					
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	3.38	8.17	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1280	466	----	----	----
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	85	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	85	----	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	335	5	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	537	138	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	85	22	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	54	47	----	----	----
Magnesium	7439-95-4	1	mg/L	44	18	----	----	----
Sodium	7440-23-5	1	mg/L	14	22	----	----	----
Potassium	7440-09-7	1	mg/L	6	3	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	2.19	<0.01	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0012	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	0.089	0.002	----	----	----
Cobalt	7440-48-4	0.001	mg/L	0.006	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.010	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	0.012	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.185	0.016	----	----	----
Manganese	7439-96-5	0.001	mg/L	15.4	0.223	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.004	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	0.02	----	----	----

Page : 4 of 4
 Work Order : EB1409089
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

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

Client sample ID

Bylong KLC # 8

Bylong KLC # 9

Client sampling date / time

12-APR-2014 15:00

12-APR-2014 15:00

Compound	CAS Number	LOR	Unit	EB1409089-001	EB1409089-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Thorium	7440-29-1	0.001	mg/L	0.002	<0.001	----	----	----
Uranium	7440-61-1	0.001	mg/L	0.005	0.001	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	0.09	----	----	----
Iron	7439-89-6	0.05	mg/L	124	<0.05	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.4	0.9	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	----	----	----



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EB1411422	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 123 WYNNE ST SUNNYBANK HILLS QLD, AUSTRALIA 4109	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3344 1222	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3344 1222	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 13-MAY-2014
Sampler	: Mandie Matheson	Issue Date	: 22-MAY-2014
Site	: ----		
Quote number	: BN/606/13	No. of samples received	: 2
		No. of samples analysed	: 2

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.

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- Analytical Results



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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
Greg Vogel	Laboratory Manager	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

Address 2 Byth Street Stafford QLD Australia 4053 | PHONE +61-7-3243 7222 | Facsimile +61-7-3243 7218
Environmental Division Brisbane ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company

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Page : 2 of 4
Work Order : EB1411422
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG



General Comments

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

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

Page : 3 of 4
 Work Order : EB1411422
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

BYLONG KLC#8

BYLONG KLC#9

Client sampling date / time

13-MAY-2014 15:00

13-MAY-2014 15:00

Compound	CAS Number	LOR	Unit	EB1411422-001	EB1411422-002	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	3.77	7.95	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1580	209	----	----	----
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	46	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	46	----	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	82	3	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	244	52	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	461	7	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	91	22	----	----	----
Magnesium	7439-95-4	1	mg/L	86	8	----	----	----
Sodium	7440-23-5	1	mg/L	13	5	----	----	----
Potassium	7440-09-7	1	mg/L	<1	1	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.37	0.02	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0024	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	0.033	<0.001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	0.006	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.010	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	0.002	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.065	0.005	----	----	----
Manganese	7439-96-5	0.001	mg/L	41.3	0.032	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.003	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----

Page : 4 of 4
 Work Order : EB1411422
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

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

Client sample ID

BYLONG KLC#8

BYLONG KLC#9

Client sampling date / time

13-MAY-2014 15:00

13-MAY-2014 15:00

Compound	CAS Number	LOR	Unit	EB1411422-001	EB1411422-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	----
Iron	7439-89-6	0.05	mg/L	14.6	<0.05	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.1	1.6	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	----	----	----



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EB1414297	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 123 WYNNE ST SUNNYBANK HILLS QLD, AUSTRALIA 4109	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3344 1222	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3344 1222	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 12-JUN-2014
Sampler	: Mandie Matheson	Issue Date	: 23-JUN-2014
Site	: ----		
Quote number	: BN/606/13	No. of samples received	: 2
		No. of samples analysed	: 2

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.

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Signatories

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Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

Address 2 Byth Street Stafford QLD Australia 4053 | PHONE +61-7-3243 7222 | Facsimile +61-7-3243 7218
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Page : 2 of 4
Work Order : EB1414297
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG



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^ = This result is computed from individual analyte detections at or above the level of reporting

Page : 3 of 4
 Work Order : EB1414297
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC # 8	Bylong KLC # 9	----	----	----
				12-JUN-2014 15:00	12-JUN-2014 15:00	----	----	----
				EB1414297-001	EB1414297-002	----	----	----
Compound	CAS Number	LOR	Unit					
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.06	7.72	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	2480	213	----	----	----
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	43	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	43	----	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	95	<1	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	380	60	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	942	6	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	156	22	----	----	----
Magnesium	7439-95-4	1	mg/L	223	9	----	----	----
Sodium	7440-23-5	1	mg/L	26	4	----	----	----
Potassium	7440-09-7	1	mg/L	<1	<1	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.03	<0.01	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0039	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	0.009	<0.001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	0.005	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.018	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	0.006	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.015	<0.005	----	----	----
Manganese	7439-96-5	0.001	mg/L	129	0.009	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.004	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----

Page : 4 of 4
 Work Order : EB1414297
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

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

Client sample ID

Client sampling date / time

				Bylong KLC # 8	Bylong KLC # 9	----	----	----
				12-JUN-2014 15:00	12-JUN-2014 15:00	----	----	----
Compound	CAS Number	LOR	Unit	EB1414297-001	EB1414297-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	<0.05	0.06	----	----	----
Iron	7439-89-6	0.05	mg/L	2.41	<0.05	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	1.1	----	----	----



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EB1417155	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 123 WYNNE ST SUNNYBANK HILLS QLD, AUSTRALIA 4109	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3344 1222	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3344 1222	Facsimile	: +61 7 3243 7218
Project	: 111211 BYLONG	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 15-JUL-2014
Sampler	: Mandie Matheson	Issue Date	: 21-JUL-2014
Site	: ----		
Quote number	: BNBQ/218/14	No. of samples received	: 2
		No. of samples analysed	: 2

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

Address 2 Byth Street Stafford QLD Australia 4053 | PHONE +61-7-3243 7222 | Facsimile +61-7-3243 7218
Environmental Division Brisbane ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company

Environmental

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Page : 2 of 4
Work Order : EB1417155
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111211 BYLONG

General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

Page : 3 of 4
 Work Order : EB1417155
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

Sub-Matrix: LEACHATE (Matrix: WATER)

Client sample ID

Client sampling date / time

				Bylong KLC # 8	Bylong KLC # 9	----	----	----
				15-JUL-2014 15:00	15-JUL-2014 15:00	----	----	----
Compound	CAS Number	LOR	Unit	EB1417155-001	EB1417155-002	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.17	7.67	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	2000	174	----	----	----
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	38	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	38	----	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	69	<1	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	195	31	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	767	2	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	100	18	----	----	----
Magnesium	7439-95-4	1	mg/L	128	7	----	----	----
Sodium	7440-23-5	1	mg/L	14	3	----	----	----
Potassium	7440-09-7	1	mg/L	<1	<1	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0028	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	0.010	<0.001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	0.002	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.007	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	0.003	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
Manganese	7439-96-5	0.001	mg/L	67.3	0.012	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.004	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----

Page : 4 of 4
 Work Order : EB1417155
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111211 BYLONG



Analytical Results

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

Client sample ID

Bylong KLC # 8

Bylong KLC # 9

Client sampling date / time

15-JUL-2014 15:00

15-JUL-2014 15:00

Compound	CAS Number	LOR	Unit	EB1417155-001	EB1417155-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	----
Iron	7439-89-6	0.05	mg/L	0.75	<0.05	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.2	1.3	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: EB1440497	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services EB
Address	: 123 WYNNE ST SUNNYBANK HILLS QLD, AUSTRALIA 4109	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 3344 1222	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3344 1222	Facsimile	: +61-7-3243 7218
Project	: 111232 + 111211 HUME Coal + Bylong Coal	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 12-Aug-2014 18:30
C-O-C number	: ----	Issue Date	: 21-Aug-2014 08:52
Sampler	: MANDIE MATHESON	No. of samples received	: 5
Site	: ----	No. of samples analysed	: 5
Quote number	: ----		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Phillip Kennedy	Project Co-Ordinator	Brisbane Inorganics



Page : 2 of 4
Work Order : EB1440497
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111232 + 111211 HUME Coal + Bylong Coal

General Comments

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

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

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

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

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

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



Analytical Results

Sub-Matrix: LEACHATE
 (Matrix: WATER)

Client sample ID

Client sampling date / time				Hume # 7 (drift spoil)	Hume # 8 (drift spoil)	Hume # 9 (drift spoil)	Bylong # 8 (coarse reject)	Bylong # 9 (tailings)
12-Aug-2014 15:00				12-Aug-2014 15:00	12-Aug-2014 15:00	12-Aug-2014 15:00	12-Aug-2014 15:00	12-Aug-2014 15:00
Compound	CAS Number	LOR	Unit	EB1440497-001	EB1440497-002	EB1440497-003	EB1440497-004	EB1440497-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.97	6.63	6.20	4.20	7.45
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	94	129	89	1630	180
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	5	11	5	<1	49
Total Alkalinity as CaCO ₃	----	1	mg/L	5	11	5	<1	49
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	<1	<1	<1	50	<1
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	24	37	34	202	38
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	13	12	2	614	3
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	3	9	3	87	22
Magnesium	7439-95-4	1	mg/L	4	6	7	111	8
Sodium	7440-23-5	1	mg/L	8	10	2	13	3
Potassium	7440-09-7	1	mg/L	<1	<1	<1	<1	<1
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.005	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0029	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	0.004	<0.001
Cobalt	7440-48-4	0.001	mg/L	0.039	0.005	0.055	0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	0.039	0.005	0.044	0.006	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
Zinc	7440-66-6	0.005	mg/L	0.031	<0.005	<0.005	<0.005	<0.005
Manganese	7439-96-5	0.001	mg/L	0.416	0.090	0.240	59.0	0.014
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.019	<0.001	<0.001	0.004
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	0.07

Page : 4 of 4
 Work Order : EB1440497
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111232 + 111211 HUME Coal + Bylong Coal



Analytical Results

Sub-Matrix: LEACHATE
 (Matrix: WATER)

Client sample ID

				Hume # 7 (drift spoil)	Hume # 8 (drift spoil)	Hume # 9 (drift spoil)	Bylong # 8 (coarse reject)	Bylong # 9 (tailings)
Client sampling date / time				12-Aug-2014 15:00	12-Aug-2014 15:00	12-Aug-2014 15:00	12-Aug-2014 15:00	12-Aug-2014 15:00
Compound	CAS Number	LOR	Unit	EB1440497-001	EB1440497-002	EB1440497-003	EB1440497-004	EB1440497-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	0.81	<0.05
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.1	<0.1	1.4

CERTIFICATE OF ANALYSIS

Work Order	: EB1442286	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services EB
Address	: PO Box 3091 SUNNYBANK SOUTH QLD, AUSTRALIA 4109	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 3344 1222	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3344 1222	Facsimile	: +61-7-3243 7218
Project	: 111232 + 111211 HUME Coal + Bylong Coal	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 11-Sep-2014 18:10
C-O-C number	: ----	Issue Date	: 23-Sep-2014 18:11
Sampler	: MANDIE MATHESON	No. of samples received	: 5
Site	: ----	No. of samples analysed	: 5
Quote number	: ----		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics
Greg Vogel	Laboratory Manager	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics



Page : 2 of 4
Work Order : EB1442286
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111232 + 111211 HUME Coal + Bylong Coal

General Comments

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

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

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

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

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

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



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

Client sampling date / time				Hume # 7 (drift spoil)	Hume # 8 (drift spoil)	Hume # 9 (drift spoil)	Bylong # 8 (coarse reject)	Bylong # 9 (tailings)
[11-Sep-2014]				[11-Sep-2014]	[11-Sep-2014]	[11-Sep-2014]	[11-Sep-2014]	[11-Sep-2014]
Compound	CAS Number	LOR	Unit	EB1442286-001	EB1442286-002	EB1442286-003	EB1442286-004	EB1442286-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.37	6.64	7.95	4.03	7.56
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	50	120	102	1790	172
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	<1	2	6	<1	38
Total Alkalinity as CaCO ₃	----	1	mg/L	<1	2	6	<1	38
ED038A: Acidity								
Acidity as CaCO ₃	----	1	mg/L	3	3	3	47	<1
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	20	37	30	226	31
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	<1	6	1	561	2
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	2	8	3	92	18
Magnesium	7439-95-4	1	mg/L	3	5	7	112	6
Sodium	7440-23-5	1	mg/L	<1	5	1	13	2
Potassium	7440-09-7	1	mg/L	<1	1	<1	1	<1
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.005	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0034	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	0.004	<0.001
Cobalt	7440-48-4	0.001	mg/L	0.026	0.004	0.005	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	0.026	0.003	0.005	0.007	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
Zinc	7440-66-6	0.005	mg/L	0.023	<0.005	<0.005	0.007	<0.005
Manganese	7439-96-5	0.001	mg/L	0.247	0.059	0.062	56.3	0.011
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.023	0.001	<0.001	0.003
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Page : 4 of 4
 Work Order : EB1442286
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111232 + 111211 HUME Coal + Bylong Coal



Analytical Results

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

Client sample ID

				Hume # 7 (drift spoil)	Hume # 8 (drift spoil)	Hume # 9 (drift spoil)	Bylong # 8 (coarse reject)	Bylong # 9 (tailings)
Client sampling date / time				[11-Sep-2014]	[11-Sep-2014]	[11-Sep-2014]	[11-Sep-2014]	[11-Sep-2014]
Compound	CAS Number	LOR	Unit	EB1442286-001	EB1442286-002	EB1442286-003	EB1442286-004	EB1442286-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	0.92	<0.05
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	0.3	0.1	<0.1	1.5

CERTIFICATE OF ANALYSIS

Work Order	: EB1444311	Page	: 1 of 4
Client	: RGS ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services EB
Address	: PO Box 3091	Address	: 2 Byth Street Stafford QLD Australia 4053
	SUNNYBANK SOUTH QLD, AUSTRALIA 4109		
E-mail	: alan@rgsenv.com	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 3344 1222	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3344 1222	Facsimile	: +61-7-3243 7218
Project	: 111232 + 111211 HUME Coal + Bylong Coal	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 14-Oct-2014 15:15
C-O-C number	: ----	Date Analysis Commenced	: 15-Oct-2014
Sampler	: MANDIE MATHESON	Issue Date	: 21-Oct-2014 18:32
Site	: ----		
Quote number	: ----	No. of samples received	: 5
		No. of samples analysed	: 5

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

Page : 2 of 4
Work Order : EB1444311
Client : RGS ENVIRONMENTAL PTY LTD
Project : 111232 + 111211 HUME Coal + Bylong Coal



General Comments

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

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

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

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

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

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



Analytical Results

Sub-Matrix: LEACHATE
 (Matrix: WATER)

Client sample ID

Client sampling date / time				Hume # 7 (drift spoil)	Hume # 8 (drift spoil)	Hume # 9 (drift spoil)	Bylong # 8 (coarse reject)	Bylong # 9 (tailings)
[14-Oct-2014]				[14-Oct-2014]	[14-Oct-2014]	[14-Oct-2014]	[14-Oct-2014]	[14-Oct-2014]
Compound	CAS Number	LOR	Unit	EB1444311-001	EB1444311-002	EB1444311-003	EB1444311-004	EB1444311-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.73	7.07	6.90	4.08	7.68
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	126	109	106	1310	156
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	5	12	6	<1	42
Total Alkalinity as CaCO3	----	1	mg/L	5	12	6	<1	42
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	2	2	2	22	5
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	50	32	38	239	30
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	<1	5	1	337	2
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	3	7	3	80	18
Magnesium	7439-95-4	1	mg/L	11	5	9	83	6
Sodium	7440-23-5	1	mg/L	2	4	<1	9	2
Potassium	7440-09-7	1	mg/L	<1	1	<1	1	<1
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.03	<0.01	0.05	<0.01
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	0.006	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0029	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	0.005	0.001
Cobalt	7440-48-4	0.001	mg/L	0.065	0.002	0.010	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	0.070	0.003	0.008	0.004	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
Zinc	7440-66-6	0.005	mg/L	0.051	<0.005	<0.005	0.008	<0.005
Manganese	7439-96-5	0.001	mg/L	0.544	0.032	0.036	41.6	0.008
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.027	0.002	<0.001	0.003
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.01
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Page : 4 of 4
 Work Order : EB1444311
 Client : RGS ENVIRONMENTAL PTY LTD
 Project : 111232 + 111211 HUME Coal + Bylong Coal



Analytical Results

Sub-Matrix: LEACHATE
 (Matrix: WATER)

Client sample ID

				Hume # 7 (drift spoil)	Hume # 8 (drift spoil)	Hume # 9 (drift spoil)	Bylong # 8 (coarse reject)	Bylong # 9 (tailings)
Client sampling date / time				[14-Oct-2014]	[14-Oct-2014]	[14-Oct-2014]	[14-Oct-2014]	[14-Oct-2014]
Compound	CAS Number	LOR	Unit	EB1444311-001	EB1444311-002	EB1444311-003	EB1444311-004	EB1444311-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	1.89	<0.05
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	0.3	<0.1	<0.1	1.1