DRAYTON SOUTH

Geochemistry Impact Assessment

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RGS

Drayton South Coal Project

Geochemical Impact Assessment of Overburden and Coal Reject Materials

Final report prepared for:

Hansen Bailey Environmental Consultants
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EXECUTIVE SUMMARY

ES1 Background

RGS Environmental Pty Ltd (RGS) was commissioned by Hansen Bailey Environmental Consultants (Hansen Bailey), on behalf of Anglo American Metallurgical Coal Pty Ltd (Anglo American) to complete a geochemical impact assessment of the overburden and coal reject material associated with the Drayton South Coal Project (the Project). Anglo American is seeking Project Approval under Part 3A of the *Environmental Planning & Assessment Act 1979* to facilitate the extraction of coal within Exploration Licence 5460 for a period of 27 years. For the purpose of this assessment, both overburden and interburden materials are generally termed overburden.

The Project will allow for the continuation of mining at Drayton Mine by the development of open cut and highwall mining operations within the Drayton South area, whilst continuing to utilise the existing infrastructure and equipment from Drayton Mine.

ES2 Scope of Work

The scope of work for this Project was to complete a geochemical impact assessment to address the geochemical characteristics of overburden and coal reject material within the study area. The scope of work included:

- A review of any existing geological/geochemical assessments/data in the area and delineation of additional overburden sampling and testing requirements;
- Design of a suitable geochemical sampling and testing program for overburden and coal reject materials. The program utilised exploration drill core samples derived from ongoing drilling programs;
- Coordination of static laboratory analysis of samples delivered to ALS Brisbane;
- Completion of kinetic leach column tests at the RGS in-house laboratory; and
- Preparation of a geochemical impact assessment report specific to the Project.

ES3 Sampling and Testing Program

Thirty overburden samples and six potential coal reject (coal seam roof and floor) samples were obtained from five drill holes selected to provide lateral and vertical coverage of the overburden and potential coal reject materials likely to be generated by the Project. In addition, a further two composite samples of roof and floor materials and coal reject materials were obtained from the coal quality laboratory and represented composite drill core material from four boreholes spanning the five target seams planned to be mined. The sampling strategy was based on existing knowledge of the geology/stratigraphy of the site and from the results of previous geochemical assessment work. All overburden samples were transferred to ALS Brisbane laboratory by Anglo American personnel for sample preparation and geochemical characterisation tests as described below.

A series of static geochemical tests were completed on individual and composite overburden and coal reject samples at ALS Brisbane as coordinated by RGS. Five composite overburden samples were then subjected to kinetic leach column tests over a period of 12 weeks at the RGS in-house laboratory in Brisbane. All leachate collected from the kinetic leach column tests was analysed at ALS Brisbane.

ES4 Conclusions

RGS has completed a geochemical impact assessment of representative overburden and coal reject materials for the Project. The findings of the assessment align well with those of a previous desktop geochemical assessment completed in January 2010. It is concluded that:

- Overburden and most coal reject materials are expected to have very low oxidisable sulfur content, significant excess Acid Neutralising Capacity, and be classified as Non-Acid Forming;
- Overburden and most coal reject materials are likely to have a high factor of safety with respect to potential acid generation;
- The concentration of total metals in overburden materials is well below applied guideline criteria for soils and is unlikely to present any environmental issues associated with revegetation and rehabilitation;
- Overburden and coal reject materials reporting to emplacement areas will generate pH neutral to slightly alkaline run-off/seepage with low and moderate salinity values, respectively, following surface exposure. The salinity of run-off/seepage from these materials is expected to decrease with time;
- The concentration of trace metals in run-off and seepage from most overburden and coal reject material is likely to be low with some minor exceptions (molybdenum and selenium);
- Overall, the risk of potentially significant water quality impacts from overburden and coal reject materials is low;
- Some overburden and most coal reject materials may be sodic and have structural stability problems related to potential dispersion and erosion; and
- There is a low probability of spontaneous combustion either in situ or for coal, overburden and coal reject materials at Drayton South.

ES5 Potential Management Measures

The ongoing management of overburden and coal reject materials for 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 management measures include:

- Pre-stripping topsoil from areas to be disturbed for use in final rehabilitation activities (surface cover or vegetation growth medium); and
- Implementing practical site rehabilitation practices for potentially sodic overburden and coal reject materials to limit the risk of dispersion and erosion of surface materials at emplacement areas (*e.g.* utilise a topsoil cover as part of final rehabilitation).

Surface water and seepage from overburden and coal reject emplacement areas should be monitored to ensure that key water quality parameters remain within appropriate criteria. It is therefore suggested that:

- Monitoring of surface run-off and seepage from the proposed overburden and coal reject emplacement areas for pH, electrical conductivity, total suspended solids on a quarterly basis and dissolved trace metals and sulfate on an annual basis.

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GLOSSARY OF TERMS

Acid	A measure of hydrogen ion (H^+) concentration; generally expressed as pH.
ABA	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 concentrations, high sulfate concentrations and high salinity.
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 µS/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.
Overburden	Material that overlies a coal resource and must be removed to mine the coal.
PAF	Potentially Acid Forming. Geochemical classification criterion for a sample that has the potential to generate acid conditions.
(Coal) Reject	Mixture of coarse and finely ground materials from which the desired mineral (coal) values have been largely extracted.
Static test	Procedure for characterising the geochemical nature of a sample at one point in time. Static tests may include measurements of mineral and chemical composition of a sample and the Acid Base Account.
(Coal) Tailing	Finely ground materials from which the desired mineral (coal) values have been largely extracted.
Total Sulfur	Total sulfur content of a sample generally measured using a 'Leco' analyser expressed as % S.

1.0 INTRODUCTION

RGS Environmental Pty Ltd (RGS) was commissioned by Hansen Bailey Environmental Consultants (Hansen Bailey), on behalf of Anglo American Metallurgical Coal Pty Ltd (Anglo American) to complete a geochemical impact assessment of the overburden and coal reject material associated with the Drayton South Coal Project (the Project). The purpose of the assessment is to form part of an Environmental Assessment (EA) being prepared by Hansen Bailey to support an application for a contemporary Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to facilitate the continuation of the existing Drayton Mine by the development of an open cut and highwall coal mining operation and associated infrastructure within the Drayton South area.

In October 2011, Part 3A of the EP&A Act was repealed. However, the Project has been granted the benefit of transitional provisions, and as such, is a development to which Part 3A applies.

The scope of work completed by RGS for this assessment included:

- A review of any existing geological/geochemical assessments/data in the area and delineation of additional overburden sampling and testing requirements;
- Design of a suitable geochemical sampling and testing program for overburden and coal reject materials. The program utilised exploration drill core samples derived from ongoing drilling programs;
- Coordination of static laboratory analysis of samples delivered to ALS Brisbane;
- Completion of kinetic leach column (KLC) tests at the RGS in-house laboratory; and
- Preparation of a geochemical impact assessment report specific to the Project.

1.1 Project Description

Drayton Mine is managed by Anglo Coal (Drayton Management) Pty Ltd which is owned by Anglo American. Drayton Mine commenced production in 1983 and currently holds Project Approval 06_0202 (dated 1 February 2008) thatexpires in 2017 at which time the operation will have to close.

The Project will allow for the continuation of mining at Drayton Mine by the development of open cut and highwall mining operations within the Drayton South mining area while continuing to utilise the existing infrastructure and equipment from Drayton Mine.

The Project is located approximately 10 km north west of the village of Jerrys Plains and approximately 13 km south of the township of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW). The Project is predominately situated within the Muswellbrook Shire Local Government Area (LGA), with the south west portion falling within the Singleton LGA. **Attachment A (Figure 1)** illustrates the location of the Project. The Project is located within close proximity to two thoroughbred horse studs, two power stations and several existing coal mines.

The Project will extend the life of Drayton Mine by a further 27 years ensuring the continuity of employment for its workforce, the ongoing utilisation of its infrastructure and the orderly rehabilitation of Drayton Mine's completed mine areas.

Anglo American is seeking Project Approval under Part 3A of the EP&A Act to facilitate the extraction of coal by both open cut and highwall mining methods within Exploration Licence (EL) 5460 for a period of 27 years. The Project Application Boundary (Project Boundary) is shown in **Attachment A (Figure 1)**.

The Project generally comprises:

- The continuation of operations at Drayton Mine as presently approved with minor additional mining areas within the East, North and South Pits;
- The development of an open cut and highwall mining operation extracting up to 7 Mtpa of ROM coal over a period of 27 years;
- The utilisation of the existing Drayton Mine workforce and equipment fleet (with an addition of a highwall miner and coal haulage fleet);
- The Drayton Mine fleet consists of at least a dragline, excavators, fleet of haul trucks, dozers, graders, water carts and associated supporting equipment.
- The use of Drayton Mine's existing voids for rejects and tailings disposal and water storage to allow for the optimisation of the Drayton Mine final landform;
- The utilisation of the existing Drayton Mine infrastructure including the Coal Handling and Preparation Plant (CHPP), rail loop and associated loadout infrastructure, workshops, bath houses and administration offices;
- The construction of a transport corridor between Drayton South and Drayton Mine;
- The utilisation of the Antiene Rail Spur off the Main Northern Railway to transport product coal to the Port of Newcastle for export (120km haul distance by rail);
- The diversion of a section of Edderton Road; and
- The installation of water management and power reticulation infrastructure for Drayton South.

All access to the Project will continue to be via the Drayton Mine Access Road off Thomas Mitchell Drive and will use the transport corridor to travel between Drayton Mine and Drayton South. An emergency entry / exit will be required to be developed and maintained off Edderton Road for health and safety purposes only.

The conceptual layout of the Project is shown in **Attachment A (Figure 2)**.

1.2 Study Area

The study area includes the proposed mining areas at Drayton South (see **Attachment A, Figure 2**), which builds upon a previously completed desktop assessment completed in 2010 (RGS 2010b). This assessment does not address Drayton Mine.

1.3 Report Structure

The report structure is as follows:

- **Section 2.0** describes the existing geology within the study area;
- **Section 3.0** outlines the methodology adopted for the desktop review and the sampling and testing program;
- **Section 4.0** provides a summary of the main findings of the desktop assessment;
- **Section 5.0** outlines the geochemical results obtained for overburden and coal reject testing;
- **Section 6.0** describes the potential implications for overburden management;
- **Section 7.0** provides the main conclusions and potential management measures for overburden and coal reject materials generated from the Project;
- **Section 8.0** lists the references used in the assessment: and

- **Section 9.0** outlines the limitations of the assessment.

1.4 Related Studies

The studies which are to be read in conjunction with this assessment include the following:

- The EA soil and land capability impact assessment;
- The EA surface water impact assessment;
- The EA groundwater impact assessment; and
- The EA stygofauna impact assessment.

2.0 GEOLOGY

The Project will target five main coal seams as part of a proposed open cut and highwall mining program. The typical stratigraphic profile of the key mining areas associated with the Project, as indicated from the geological model is provided in **Attachment A (Figure 3)**. The five coal seams are listed in order of increasing depth as the Whybrow, Redbank Creek, Wambo, Whynot and Blakefield seams, respectively. These seams are located in the upper part of the Jerrys Plains Subgroup of the Wittingham Coal Measures. The Whybrow seam is part of the Mt Leonard Formation and the remaining four seams form part of the Malabar Formation. The Mt Leonard Formation is a mainly coarse classic unit with lithologies ranging from massive sandstone to conglomerate with intercalated thin coal seams. The Malabar Formation is about 160 m thick and typically consists of sandstone, siltstone, conglomerate, coal and minor claystone (Pratt, 1995; SCJV, 2005). A brief description of the five coal seams targeted by the Project is provided below.

2.1 Whybrow Seam

The Whybrow seam typically occurs as a single horizon immediately below the Denman Formation and is characterised by an approximately 0.25 m thick tuffaceous claystone band in the centre of the seam. The seam can vary in thickness from 2.5 to 4 m and is intruded throughout the eastern limb of the Calool Syncline. The overburden/interburden lithology associated with the seam is mainly sandstone.

2.2 Redbank Creek Seam

The Redbank Creek seam is located immediately below the Althorpe Claystone and contains two major tuff bands, which can divide the seam into three recognisable plies, the lowest of which ('C' ply) is the most prospective. The overall thickness of the seam is generally between 4 and 6 m, but in some cases up to 20 m. The interburden lithology below this seam is typically sandstone.

2.3 Wambo Seam

The Wambo Creek seam typically occurs midway between the overlying Redbank Creek seam and underlying Whynot seam. It is generally less than 0.5 m thick, but where split, the lower split can be up to 0.8 m thick. Some intrusion occurs in the western part of the study area. The interburden lithology associated with this seam is typically characterised by sandstone, siltstone and shale.

2.4 Whynot Seam

The Whynot seam is a low ash thermal coal seam averaging about 2 m in thickness and lying approximately 15 to 25 m below the Redbank Creek seam. The Whynot seam contains no characteristic stone bands. The resource area is divided by an extensive north west to south east trending intrusion and thins eastwards. The interburden lithology associated with this seam is typically characterised by sandstone, siltstone, mudstone and shale.

2.5 Blakefield Seam

The Blakefield seam typically occurs 20 m below the Whynot seam and has an average thickness of 2.2 m. The north eastern part of the study area is characterised by seam intrusion. The interburden lithology associated with this seam is typically characterised by sandstone, mudstone and tuff.

As stated above, the Project target seams are located within the upper part of the Jerrys Plains Subgroup of the Wittingham Coal Measures. Other mining operations in the vicinity of the Project area generally mine seams either from the stratigraphically deeper Greta Coal Measures such as Drayton Mine and Bayswater No. 2 Pit (AGE, 2009) or from deeper seams in the Wittingham Coal Measures such as Mt Arthur Coal, Bayswater No. 3 and Bengalla Mine (Hansen Bailey, 2009).

Table 1

Typical Overburden and Coal Seam Thickness within the Study Area

Coal Seam (splits)	Typical Coal Seam Thickness (m)	Overburden / Interburden Thickness (m)
Whybrow	2.5-4	50
Redbank Creek	4-6	15–20
Wambo	0.5	20
Whynot	2	15
Blakefield	2.2	20–30

3.0 METHODOLOGY

3.1 Desktop Review

RGS has worked closely with Hansen Bailey/Anglo American personnel to develop an appropriate sampling and testing program for representative samples of overburden and coal reject materials as part of the geochemical impact assessment. A sampling and geochemical testing protocol report was provided to Hansen Bailey in January 2011 (RGS, 2011) prior to the site visit and sampling taking place. The detailed methodology used for the sampling and testing program is described at **Section 3.3**. RGS personnel coordinated the sampling program with Anglo American personnel and representative (drill core) samples of overburden and coal reject materials were collected and transferred to ALS Brisbane laboratory for static geochemical testing. Selected samples of overburden and coal reject materials were also subjected to kinetic leach column testing at RGS' in-house laboratory and collected leachates were tested at ALS Brisbane laboratory. All geochemical test work programs completed on the overburden and coal reject samples were co-ordinated by RGS personnel.

RGS has previously completed a review of available geochemical, geological and water quality data associated with the Project. Relevant information was supplied to RGS by Hansen Bailey and Anglo American personnel. Supplied information was used in the current assessment for the development of an overburden and coal reject sampling and geochemical testing program. This process enabled RGS to make efficient use of existing data as well as current exploration drilling programs to develop an effective sampling and geochemical testing program for the Project.

3.2 Site Visit

RGS personnel (Alan Robertson) completed a site visit to the study area on 14 January 2011. This included meetings with key Project geological (exploration) personnel, and providing supervision of the initial drill core sampling program. The site visit enabled RGS to gain an understanding of the Project layout and proposed overburden and coal reject emplacement strategy. The site visit also provided additional rigour to the geochemical assessment process and ensured that results interpretation and final conclusions were robust and based on a sound sampling and testing methodology.

3.3 Sampling and Testing Program

3.3.1 Sampling Program

There are no specific regulatory requirements regarding the number of samples required to be obtained and tested for overburden materials at coal mines in NSW. As such, existing technical guidelines for geochemical assessment of mine waste in Australia (AMIRA, 2002; DITR, 2007 and ACARP, 2008) and worldwide (INAP, 2009) have been used by RGS as a framework for developing the sampling (and testing) program for the Project.

Thirty overburden samples and six potential coal reject (coal seam roof and floor) samples were obtained from five drill holes selected to provide lateral and vertical coverage of the overburden and potential coal reject materials likely to be generated by the Project. In addition, a further two composite samples of roof and floor materials and coal reject materials were obtained from the coal quality laboratory (ALS Maitland) and represented composite drill core material from four boreholes spanning the five target seams planned to be mined. The two composite samples were prepared in order to obtain sufficient sample mass for the required geochemical analysis. The location of the drill holes used for geochemical sampling is shown in **Attachment A (Figure 4)**.

The sampling strategy was based on existing knowledge of the geology/stratigraphy of the site and from the results of previous geochemical assessment work as described in **Section 4.0**. Additional sampling considerations included the potential for significant environmental or health impacts; size of operation; sample representation requirements; material volumes; level of confidence in predictive ability; and cost. Anglo American provided a suitably qualified person (Senior Geologist) to supervise the collection of representative samples of the required range of overburden and coal reject materials. RGS provided the relevant laboratory chain of custody documentation and instructions to allow Anglo

American personnel to collect and dispatch of the relevant drill core samples to ALS Brisbane laboratory for geochemical characterisation tests as described in **Section 3.3.2**.

3.3.2 Geochemical Testing Program

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 leaching of soluble metals and salts. The assessment also included characterisation of standard soil parameters including salinity, cation exchange capacity, and major metal compositions. A summarised overview of a typical geochemical assessment program for mine waste materials is provided in **Attachment B.**

All of the 38 samples collected were subjected to initial Acid Base Account (ABA) geochemical testing as part of an initial screening process. Specifically, each sample was tested for:

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

Eight selected samples were also tested for sulfur speciation (Chromium Reducible Sulfur) tests. After the results of the ABA tests were received and reviewed, 15 samples were chosen for multi-element testing that was completed on solid and soluble fractions of pulverised composite samples. Composite samples were tested for:

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

KLC Tests

A total of five KLC tests were completed on various overburden and coal reject materials obtained from the study area at the RGS in-house laboratory. For drill core samples, the KLC test material comprised crushed material passing nominal 10 mm sieve size. For other samples, the sample material was used in the KLC tests as received.

The KLC tests commenced in April 2011 and were completed July 2011. Approximately 1 to 2 kg dry weight of each sample was used in each of the KLC tests, which were operated with fortnightly deionised water addition and leachate collection for 12 weeks. 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 analysis of parameters including:

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

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

4.0 REVIEW OF EXISTING GEOCHEMICAL DATA

A recent desktop geochemical assessment of overburden and potential coal reject materials was completed for the Project (RGS, 2010b). The assessment relied upon a number of existing sources of information including Hansen Bailey (2009), Envirosciences (1992), and AGE (2009); and found that:

- Overburden material in the study area is likely to be geochemically benign, with very low total sulfur content, excess neutralising capacity and therefore, negligible acid generating potential. This material should contain low concentrations of total metals and is likely to generate alkaline surface runoff/seepage with relatively low concentrations of soluble salts and trace metals;
- Whilst it is possible that material associated with uneconomic coal seams could be less benign than bulk overburden of the Project, this material is likely to make up a very small proportion of the total overburden volume reporting to storage facilities;
- Some overburden is likely to be sodic, prone to dispersion and erosion, and unlikely to be suitable for rehabilitation purposes without amelioration measures;
- Coal rejects derived from the target seams are likely to contain relatively low concentrations of total sulfur, a significant proportion of which is likely to be present as (non-acid forming) organic sulfur. It is expected that the risk of acid generation from coal rejects will be low; and
- The concentration and solubility of environmentally significant metals in coal rejects is likely to be low and within applicable soil and water quality guideline concentrations.

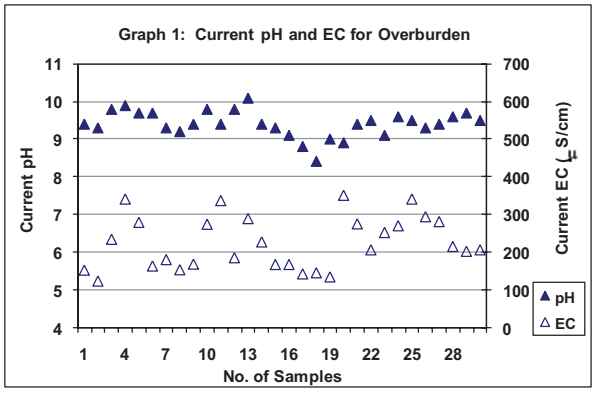
5.0 GEOCHEMICAL TEST RESULTS

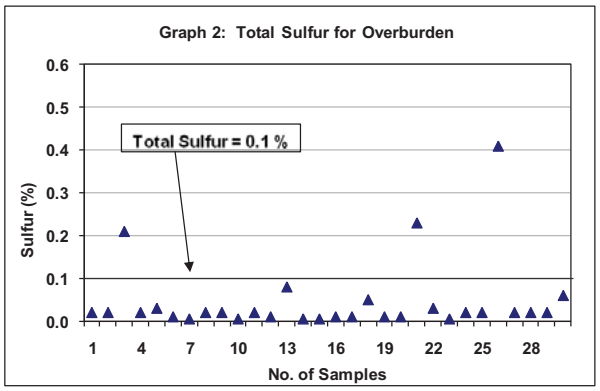
5.1 Acid Base Account Results

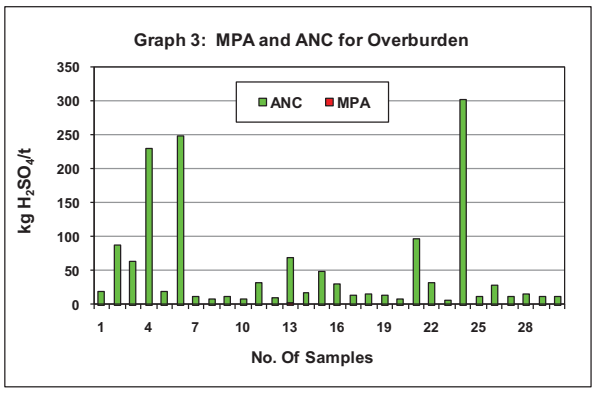
5.1.1 Overburden

Acid Base Account (ABA) test results for the 30 drill core samples representing overburden materials from Drayton South are summarised below and presented in **Table 2** and **Graphs 1, 2, 3** and **4**.

- **pH:** The current $pH_{1:5}$ of the overburden samples range from 8.4 to 10.1 and is moderately alkaline (median pH 9.4) (**Graph 1**).
- **EC:** The current $EC_{1:5}$ of the overburden samples range from 123 to 351 µS/cm and is typically low (median of 211 µS/cm) (**Graph 1**).
- **Total sulfur:** The total sulfur content of the overburden samples is typically very low and ranges from <0.01 to 0.41 % (median 0.02 %). All but three overburden samples have total sulfur values less than 0.1 % (**Graph 2**).
- **Chromium Reducible Sulfur**: The sulfidic sulfur content of a selection (3) of the overburden samples was determined using the Chromium Reducible Sulfur (CRS) test. The results shown in **Table 2** indicate that most of the total sulfur is non-sulfidic.
- **Maximum potential acidity (MPA):** Based on the total sulfur content and sulfidic sulfur content of the samples (where available), the MPA that could be generated by the overburden samples is negligible, ranging from 0.2 to 2.5 kg H_2SO_4/t (median 0.6 kg H_2SO_4/t) (**Graph 3**).
- **ANC:** The ANC value for the samples ranges from 6.6 to 303 kg H_2SO_4/t and is typically moderate (median 16.3 kg H_2SO_4/t) (**Graph 3**).
- **NAPP:** The calculated NAPP value for the samples ranges from -302.4 to -6.4 kg H_2SO_4/t and is typically negative (median -15.9 kg H_2SO_4/t).







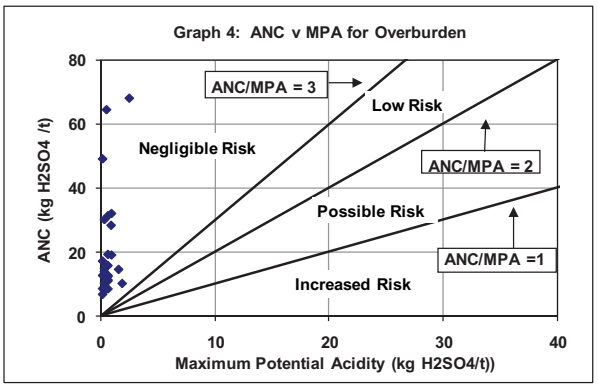


Table 2: Acid-Base Account Results for Overburden Materials

ALS Laboratory Sample ID	Date	Sample Name	Sample Interval (m)			Lithology	Sample Type	pH[1]	EC[1]	Total Sulfur	CRS	MPA[2]	ANC[2]	NAPP[2]	ANC/MPA ratio	Sample Classification[3]
			From	To	Depth				(µS/cm)	(%)		(kg H_2SO_4/t)				
Overburden																
EB1104975-001	2/03/11	DD1158 EO 001	28.25	28.81	0.56	Sandstone	Interburden	9.4	152	0.020	-	0.6	19.1	-18.5	31.2	Non-Acid Forming (Barren)
EB1104975-002	2/03/11	DD1158 EO 002	37.09	37.44	0.35	Sandstone	Interburden	9.3	123	0.020	-	0.6	87	-86.4	142.0	Non-Acid Forming (Barren)
EB1104975-003	2/03/11	DD1158 EO 003	60.23	60.62	0.39	Sandstone/Silt	Interburden	9.8	234	0.210	0.016	0.5	64.4	-63.9	131.4	Non-Acid Forming (Barren)
EB1104975-004	2/03/11	DD1158 EO 004	66.59	67.10	0.51	Tuff	Interburden	9.9	341	0.020	-	0.6	230	-229.4	375.5	Non-Acid Forming (Barren)
EB1104975-005	2/03/11	DD1158 EO 005	78.26	78.70	0.44	Sandstone	Interburden	9.7	279	0.030	-	0.9	18.9	-18.0	20.6	Non-Acid Forming (Barren)
EB1104975-006	2/03/11	DD1158 EO 006	94.06	94.53	0.47	Sandstone	Interburden	9.7	163	0.010	-	0.3	248	-247.7	809.8	Non-Acid Forming (Barren)
EB1104977-001	2/03/11	DD1156 EO 001	53.69	54.09	0.40	Sandstone	Interburden	9.3	180	0.005	-	0.2	12.5	-12.3	81.6	Non-Acid Forming (Barren)
EB1104977-002	2/03/11	DD1156 EO 002	62.83	63.15	0.32	Sandstone	Interburden	9.2	153	0.020	-	0.6	8.3	-7.7	13.6	Non-Acid Forming (Barren)
EB1104977-003	2/03/11	DD1156 EO 003	68.69	69.10	0.41	Claystone	Interburden	9.4	168	0.020	-	0.6	10.8	-10.2	17.6	Non-Acid Forming (Barren)
EB1104977-004	2/03/11	DD1156 EO 004	83.46	83.79	0.33	Tuff	Interburden	9.8	274	0.005	-	0.2	8.4	-8.2	54.9	Non-Acid Forming (Barren)
EB1104977-005	2/03/11	DD1156 EO 005	104.72	105.21	0.49	Claystone	Interburden	9.4	337	0.020	-	0.6	31.2	-30.6	50.9	Non-Acid Forming (Barren)
EB1104977-006	2/03/11	DD1156 EO 006	123.91	124.28	0.37	Sandstone/Siltstone	Interburden	9.8	185	0.010	-	0.3	10.1	-9.8	33.0	Non-Acid Forming (Barren)
EB1104977-007	2/03/11	DD1156 EO 007	138.65	139.02	0.37	Dolorite	Interburden	10.1	289	0.080	-	2.5	68	-65.6	27.8	Non-Acid Forming (Barren)
EB1104981-001	2/03/11	DD1163 EO 001	17.46	17.88	0.42	Sandstone	Interburden	9.4	227	0.005	-	0.2	17	-16.8	111.0	Non-Acid Forming (Barren)
EB1104981-002	2/03/11	DD1163 EO 002	25.02	25.37	0.35	Sandstone	Interburden	9.3	167	0.005	-	0.2	49	-48.8	320.0	Non-Acid Forming (Barren)
EB1104981-003	2/03/11	DD1163 EO 003	28.71	29.11	0.40	Sandstone	Interburden	9.1	167	0.010	-	0.3	30	-29.7	98.0	Non-Acid Forming (Barren)
EB1104981-004	2/03/11	DD1163 EO 004	39.76	40.07	0.31	Siltstone	Interburden	8.8	142	0.010	-	0.3	14.7	-14.4	48.0	Non-Acid Forming (Barren)
EB1104981-005	2/03/11	DD1163 EO 005	54.08	54.44	0.36	Sandstone	Interburden	8.4	145	0.050	-	1.5	14.4	-12.9	9.4	Non-Acid Forming (Barren)
EB1104981-006	2/03/11	DD1163 EO 006	60.81	61.24	0.43	Sandstone	Interburden	9.0	134	0.010	-	0.3	13.7	-13.4	44.7	Non-Acid Forming (Barren)
EB1104978-001	15/03/11	DD1151 EO 001	15.42	15.83	0.41	Claystone	WA1 Overburden	8.9	351	0.010	-	0.3	7.9	-7.6	25.8	Non-Acid Forming (Barren)
EB1104978-002	15/03/11	DD1151 EO 002	20.27	20.96	0.69	Sandstone	WA1 Overburden	9.4	275	0.230	0.006	0.2	96.8	-96.6	526.8	Non-Acid Forming (Barren)
EB1104978-003	15/03/11	DD1151 EO 003	23.76	24.30	0.54	Siltstone/Sandstone	WA1 Overburden	9.5	206	0.030	-	0.9	31.9	-31.0	34.7	Non-Acid Forming (Barren)
EB1104980-001	15/03/11	DD1150 EO 001	18.10	18.61	0.51	Sandstone/Siltstone	WA1 Overburden	9.1	252	0.005	-	0.2	6.6	-6.4	43.1	Non-Acid Forming (Barren)
EB1104980-004	15/03/11	DD1150 EO 004	25.53	25.82	0.29	Sandstone	WA2 Interburden	9.6	270	0.020	-	0.6	303	-302.4	494.7	Non-Acid Forming (Barren)
EB1104980-005	15/03/11	DD1150 EO 005	27.75	28.05	0.30	Claystone	WA2 Interburden	9.5	341	0.020	-	0.6	12.5	-11.9	20.4	Non-Acid Forming (Barren)
EB1104978-005	15/03/11	DD1151 EO 005	26.87	27.46	0.59	Sandstone	WA2 Overburden	9.3	294	0.410	0.029	0.9	28.2	-27.3	31.8	Non-Acid Forming (Barren)
EB1104978-006	15/03/11	DD1151 EO 006	31.58	31.95	0.37	Siltstone	WA2 Overburden	9.4	281	0.020	-	0.6	11.1	-10.5	18.1	Non-Acid Forming (Barren)
EB1104980-007	15/03/11	DD1150 EO 007	32.00	32.37	0.37	Siltstone	WN1 Interburden	9.6	215	0.020	-	0.6	15.6	-15.0	25.5	Non-Acid Forming (Barren)
EB1104980-008	15/03/11	DD1150 EO 008	38.50	39.00	0.50	Siltstone	WN1 Interburden	9.7	202	0.020	-	0.6	12.2	-11.6	19.9	Non-Acid Forming (Barren)
EB1104978-007	15/03/11	DD1151 EO 007	38.19	38.54	0.35	Claystone/Siltstone	WN3 Overburden	9.5	206	0.060	-	1.8	10	-8.2	5.4	Non-Acid Forming (Barren)

Notes

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

Graph 3 illustrates that the ANC value significantly exceeds the MPA value in all overburden samples tested and consequently, all of the overburden samples have negative NAPP values.

Graph 4 shows a plot of ANC versus MPA for the overburden samples. The ANC/MPA ratio of the samples ranges from 5.4 to 810 and is typically very high (median 122.2). ANC/MPA ratio lines have been plotted on the graph to illustrate the factor of safety associated with the samples. Generally those samples with an ANC/MPA ratio of greater than 2 are considered to have a low to negligible risk of acid generation and a high factor of safety in terms of potential for acid generation (DITR, 2007; INAP, 2009). The results indicate that 100% of the overburden samples tested have negligible risk of acid generation and a very high factor of safety.

The ABA results presented in this section have been used to classify the acid forming nature of the 30 overburden samples as shown in **Table 2**. The geochemical criteria used by RGS to classify the acid forming nature of the overburden samples are provided in **Table 3**.

Table 3

Geochemical Classification Criteria for Overburden Materials

Geochemical Classification	Total or Sulfidic Sulfur# (%)	NAPP (kg H_2SO_4/t)	ANC/MPA Ratio	Number of Samples	% of Total Samples
NAF - Barren[1]	≤ 0.1	-	-	30	100
Non Acid Forming (NAF)	≥ 0.1	< - 5	≥ 2	0	0
Uncertain	≥ 0.1	> - 5 and < +5	<2	0	0
Potentially Acid Forming	≥ 0.1	> +5	<2	0	0

Notes:
#If total sulphur or sulfidic 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 sulfur.

The results in **Table 3** indicate that all of the overburden samples tested fall in the NAF-Barren geochemical classification category. Overall, from an acid-base perspective, the overburden material tested can generally be regarded as a NAF-barren unit. Most overburden material also has significant excess buffering capacity that should be available to more than adequately buffer the negligible amount of acid that could theoretically be produced.

The results of the ABA tests on representative samples of overburden materials and any potential implications for overburden management at the Project are discussed further in **Section 6.0**.

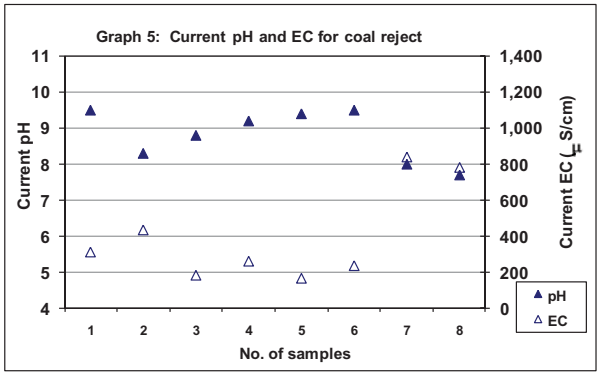
5.1.2 Coal Reject Material

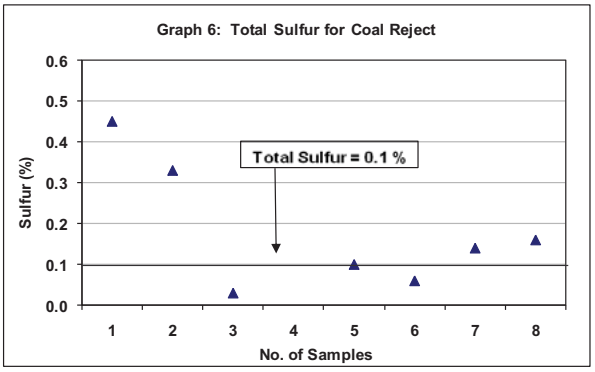
ABA test results for eight samples of coal reject material from Drayton South are summarised below and presented in **Table 4** and **Graphs 5, 6, 7** and **8**.

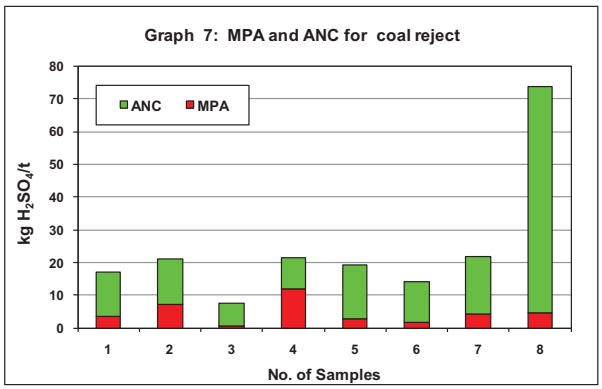
- **pH:** The current $pH_{1:5}$ of the potential reject samples range from was 7.7 to 9.5 and is moderately alkaline (median pH 9.0) (**Graph 5**).
- **EC:** The current $EC_{1:5}$ of the potential reject samples range from 167 to 842 µS/cm and is typically low (median 287.5 µS/cm) (**Graph 5**).
- **Sulfur:** The total sulfur content of the reject samples range from 0.03 to 0.86 %. The sulfidic sulfur content of a selection (3) of the coal reject samples was determined using the CRS test. The results shown in **Table 4** indicate that approximately half of the total sulfur is non-sulfidic.

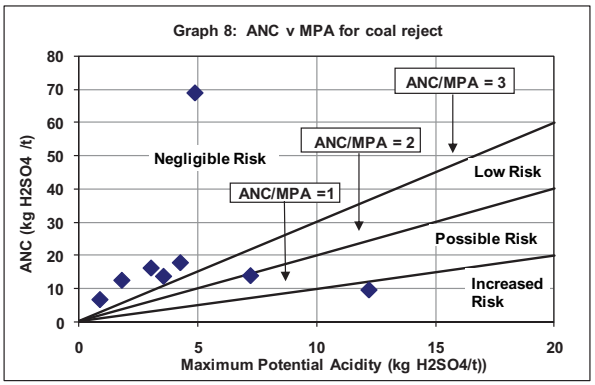
[1]A sample classified as NAF can be further described as 'barren' if the total sulfur content is less than or equal to 0.1 per cent, as the sample essentially has negligible acid generating capacity.

- **MPA:** Based on the total sulfur content, the MPA that could be generated by the coal reject samples range from 0.9 to 12.2 kg H_2SO_4/t and is low (median 2.8 kg H_2SO_4/t) (**Graph 7**).
- **ANC:** The ANC value for the potential reject samples range from 6.7 to 68.9 kg H_2SO_4/t and is moderate (median 13.8 kg H_2SO_4/t) (**Graph 7**).
- **NAPP:** The calculated NAPP value for the potential reject samples range from -66.3 to +2.6 kg H_2SO_4/t and are typically negative (median -10.4 kg H_2SO_4/t).









Graph 7 illustrates that the MPA value in most of the coal reject samples is low and six of the eight samples have an MPA value < 5 kg H_2SO_4/t. The ANC value exceeds the MPA value in all but one of the coal reject samples tested (sample DD1150 EO, 006 WA2 Floor) and consequently, seven out of eight coal reject samples have negative NAPP values. **Graph 8** shows a plot of ANC versus MPA for the coal reject samples. The ANC/MPA ratio of the samples ranges from 0.8 to 26.8 and is typically elevated (median 6.0). ANC/MPA ratio lines have been plotted on the graph to illustrate the factor of safety associated with the samples. Generally those samples with an ANC/MPA ratio of greater than 2 are considered to have a negligible risk of acid generation and a high factor of safety in terms of potential for acid generation (DITR, 2007; INAP, 2009). The results indicate that seven of the eight coal reject samples tested have a low to negligible risk of acid generation and a high factor of safety.

The eight individual coal reject samples tested have been classified according to the geochemical classification criteria previously presented in **Table 3,** as shown in the geochemical results presented at **Table 4**. The results show that seven of the eight samples are classified as NAF-Barren or NAF. One of the eight samples has been classified as Uncertain due to the slightly positive NAPP value and low ANC / MPA ratio.

Overall, from an acid-base perspective, the coal reject materials tested can generally be regarded as a NAF unit. Most coal reject material also has significant excess buffering capacity that should be

available to more than adequately buffer the low to negligible amount of acid that could theoretically be produced.

The results of the ABA tests on representative samples of coal reject materials and any potential implications for coal reject management at the Project are discussed further in **Section 6.0**.

Table 4: Acid-Base Account Results for Coal Reject Materials

ALS Laboratory Sample ID	Date	Sample Name	Sample Interval (m)			Lithology	Sample Type	pH[1]	EC[1]	Total Sulfur	CRS	MPA[2]	ANC[2]	NAPP[2]	ANC/MPA ratio	Sample Classification[3]
			From	To	Depth				(µS/cm)	(%)		(kg H_2SO_4/t)				
Coal Rejects																
EB1104978-004	15/03/11	DD1151 EO 004	25.00	25.39	0.39	Siltstone	WA1 Floor	9.5	313	0.45	0.117	3.6	13.7	-10.1	3.8	Non Acid Forming
EB1104980-003	15/03/11	DD1150 EO 003	20.93	21.28	0.35	Claystone	WA1 Floor	8.3	436	0.33	0.236	7.2	13.9	-6.7	1.9	Non Acid Forming
EB1104980-002	15/03/11	DD1150 EO 002	19.73	20.02	0.29	Claystone	WA1 Roof	8.8	184	0.03	-	0.9	6.7	-5.8	7.3	Non-Acid Forming (Barren)
EB1104980-006	15/03/11	DD1150 EO 006	29.47	29.81	0.34	Claystone	WA2 Floor	9.2	262	0.86	0.398	12.2	9.6	2.6	0.8	Uncertain
EB1104978-008	15/03/11	DD1151 EO 008	39.75	40.22	0.47	Siltstone/Sandstone	WN3 Floor	9.4	167	0.10	-	3.1	16.2	-13.1	5.3	Non-Acid Forming (Barren)
EB1104980-009	15/03/11	DD1150 EO 009	42.86	43.13	0.27	Carb. Claystone	WN3 Floor	9.5	237	0.06	-	1.8	12.5	-10.7	6.8	Non-Acid Forming (Barren)
EB1105959-001	23/03/11	Composite of DD1123, DD1126, DD1126A and DD1146					SCK Coal Reject	8.0	842	0.14	0.062	1.9	17.8	-15.9	9.4	Non-Acid Forming (Barren)
EB1105959-002	23/03/11	Composite of DD1123, DD1126, DD1126A and DD1146					SCK Roof/Floor	7.7	784	0.16	0.084	2.6	68.9	-66.3	26.8	Non-Acid Forming (Barren)

Notes

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

5.2 Multi-Element Concentration in Solids

Multi-element scans are completed to identify any elements (particularly metals) present in a mine waste material at concentrations that may be of environmental concern with respect to revegetation and surface water/seepage quality. The results are compared to relevant guideline criteria to determine any concerns related to mine operation and final rehabilitation so that management measures can be developed if required. For total metal concentrations in overburden or potential coal reject materials in NSW, there are no specific guidelines and/or regulatory criteria for metal concentrations in mine waste materials. In the absence of these and to provide relevant context, RGS has compared the total metal concentration in overburden and coal reject materials (solids) to health-based investigation levels (HIL(E)) that apply to soils in parks, recreational open spaces and playing fields (NEPC, 1999a). The applicability of this guideline stems from the potential final land use of the mine following closure (e.g. ecological values and agricultural activities).

Seven individual overburden samples and eight coal reject samples were selected and subjected to multi-element test work.The list of theselected samples is provided at **Table 5**.

Table 5

Overburden and Coal Reject Samples Selected for Multi-Element Tests

ALS Laboratory Sample ID	Date	Sample Name	Sample Interval (m)			Lithology	Sample Type
			From	To	Depth		
EB1104975-001	2/03/11	DD1158 EO 001	28.25	28.81	0.56	Sandstone	Interburden
EB1104975-003	2/03/11	DD1158 EO 003	60.23	60.62	0.39	Sandstone/Silt	Interburden
EB1104977-003	2/03/11	DD1156 EO 003	68.69	69.10	0.41	Claystone	Interburden
EB1104977-004	2/03/11	DD1156 EO 004	83.46	83.79	0.33	Tuff	Interburden
EB1104978-002	15/03/11	DD1151 EO 002	20.27	20.96	0.69	Sandstone	WA1 Overburden
EB1104978-004	15/03/11	DD1151 EO 004	25.00	25.39	0.39	Siltstone	WA1 Floor
EB1104978-005	15/03/11	DD1151 EO 005	26.87	27.46	0.59	Sandstone	WA2 Overburden
EB1104978-008	15/03/11	DD1151 EO 008	39.75	40.22	0.47	Siltstone/Sandstone	WN3 Floor
EB1104980-002	15/03/11	DD1150 EO 002	19.73	20.02	0.29	Claystone	WA1 Roof
EB1104980-003	15/03/11	DD1150 EO 003	20.93	21.28	0.35	Claystone	WA1 Floor
EB1104980-006	15/03/11	DD1150 EO 006	29.47	29.81	0.34	Claystone	WA2 Floor
EB1104980-009	15/03/11	DD1150 EO 009	42.86	43.13	0.27	Carb. Claystone	WN3 Floor
EB1022785-033	2/03/11	DD1163 EO 003	28.71	29.11	0.40	Sandstone	Interburden
EB1105959-001	23/03/11	Composite of DD1123, DD1126, DD1126A and DD1146					SCK Coal Reject
EB1105959-002	23/03/11	Composite of DD1123, DD1126, DD1126A and DD1146					SCK Roof/Floor

The results from multi-element testing (total metals) of the overburden and coal reject samples are presented in **Table 6**. The acquired data indicates that the overburden materials have total metal concentrations in solids well within the applied NEPC guideline criteria for soils.

5.3 Effective Cation Exchange Capacity and Sodicity

The eCEC results presented in **Table 6** indicate that the eCEC of the overburden and coal reject samples is moderate to high and ranges from 7.5 to 42.6 meq/100g (median 23.9 meq/100g).

The ESP results presented in **Table 6** indicate that the sodicity of overburden samples is low in the sandstone material, but can be elevated in the mudstone and tuff. The ESP in the coal reject samples is relatively high and ranges from 10.8 to 24.3 % (median of 13.7 %).

The results of the eCEC and ESP tests on overburden and coal reject samples and any potential implications for management of these materials at Drayton South are discussed further in **Section 6.0**.

5.4 Multi-Elements in Water Extracts

5.4.1 Overburden

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

The results from multi-element (soluble metal) testing of water extracts (1:5 solid:water) from the 15 overburden and coal reject samples are presented at **Table 7**. The extracts are typically neutral to alkaline and range from pH 7.7 to 9.8. The samples have relatively low EC values (152 to 842 µS/cm) with a median EC of 262 µS/cm; generally indicating low salinity and low concentrations of dissolved solids.

The dominant major soluble cation is sodium and the dominant major soluble anions are typically bicarbonate, chloride and sulfate. The concentration of soluble sulfate is relatively low (4 to 122 mg/L) and remains well below the applied ANZECC (2000) water quality guideline criterion (1,000 mg/L).

The concentration of most trace metals tested in the water extracts is relatively low, predominantly below the analytical detection limit, and below the applied water quality guideline criteria where these exist. The exceptions are molybdenum (Mo) and Selenium (Se), which are present at a slightly elevated concentration in a few of the water extract samples, with respect to the applied Australian ANZECC (2000) water quality guideline value for livestock drinking water. The results indicate that most metals are sparingly soluble at the neutral to alkaline pH of the water extracts.

A review of available groundwater and surface water data at Saddlers Creek indicates that the water extract results described above are reasonably consistent with background water quality data.

Any implications of these results for management of overburden and coal reject materials at emplacement areas are discussed in **Section 6.0.**

Table 6: Multi-Element (Total Metal) Results for Overburden and Coal Reject Materials

			Overburden							Coal Reject							
	Material description -->		Sandstone Interburden (DD1158 EO 001)	Sandstone/Silt Interburden (DD1158 EO 003)	Claystone Interburden (DD1156 EO 003)	Tuff Interburden (DD1156 EO 004)	Sandstone Interburden (DD1163 EO 003)	Sandstone WA2 Overburden (DD1151 EO 005)	Sandstone WA1 Overburden (DD1151 EO 002)	Siltstone WA1 Floor (DD1151 EO 004)	Claystone WA1 Floor (DD1150 EO 003)	Claystone WA1 Roof (DD1150 EO 002)	Claystone WA2 Floor (DD1150 EO 006)	Siltstone/Sandstone WN3 Floor (DD1151 EO 008)	Carb. Claystone WN3 Floor (DD1150 EO 009)	SCK Coal Reject	SCK Roof/Floor
Parameters	Detection Limit	NEPC[1] Health-Based Investigation Level															
Elements	All units mg/kg																
Aluminium (Al)	50	-	2,920	3,740	3,530	4,230	4,030	3,620	6,480	4,190	9,940	12,400	6,280	6,220	12,200	3,940	3,950
Antimony (Sb)	5	-	<5	<5	<5	<5	<5	7	<5	<5	<5	<5	<5	<5	<5	<5	<5
Arsenic (As)	5	200	12	<5	<5	<5	14	6	17	8	7	<5	<5	<5	5	<5	17
Boron (B)	50	6,000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium (Cd)	1	40	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3	<1	<1	<1
Calcium (Ca)	10	-	6,260	32,800	3,820	2,790	1,170	9,720	38,600	9,370	3,790	2,330	1,570	6,380	1,250	5,460	16,800
Chromium (Cr) total	2	-*	14	8	9	<2	15	40	31	12	21	17	12	9	11	5	12
Cobalt (Co)	2	200	36	20	21	<2	18	74	13	15	24	17	9	19	4	2	9
Copper (Cu)	5	2,000	16	21	30	5	26	84	12	15	30	29	25	20	29	11	25
Iron (Fe)	50	-	51,000	22,500	110,000	1,110	20,500	6,060	17,400	5,860	12,800	17,400	13,000	163,000	18,200	25,500	46,400
Lead (Pb)	5	600	10	8	12	52	23	22	10	6	13	8	11	13	16	21	10
Magnesium (Mg)	10	-	3,800	9,870	4,540	1,540	2,290	2,180	3,750	2,340	5,470	4,990	3,160	8,250	5,060	3,620	9,430
Manganese (Mn)	5	3,000	837	367	2,200	<5	392	141	558	78	192	93	125	2,000	139	321	404
Molybdenum (Mo)	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Nickel (Ni)	2	600	36	28	24	<2	76	283	28	64	204	40	36	20	14	7	36
Potassium (K)	10	-	950	1,120	1,550	1,260	1,160	730	900	690	1,440	1,920	1,220	1,550	2,460	1,150	1,090
Selenium (Se)	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Sodium (Na)	10	-	340	880	470	1,300	40	720	900	1,000	1,410	960	690	820	1,150	990	1,330
Zinc (Zn)	5	14,000	64	67	132	104	105	150	41	41	109	42	60	144	105	64	62
Exchangeable Cations	All units meq/100g (except Exchangeable Sodium Percentage (%))																
Exch. Calcium	0.1	-	9.7	20.1	1.8	10.4	3.5	19.7	21.5	18.4	11.5	5.8	4.8	2.9	4.7	8.1	4.9
Exch. Magnesium	0.1	-	6	6.3	4.3	8.9	2.8	5.4	3.5	9.2	24.5	14.4	6.9	6	9.9	11.5	5.9
Exch. Potassium	0.1	-	0.6	0.5	0.8	1	1.1	0.4	0.5	0.4	1.0	1.2	0.7	0.7	1.6	0.7	0.6
Exch. Sodium	0.1	-	0.8	2.4	1.4	4.7	<0.1	2	1.6	3.4	5.6	3.6	2	2.6	4.2	3.6	3.7
Cation Exchange Capacity	0.1	-	17	29.3	8.4	25.1	7.5	27.4	27.2	31.4	42.6	25	14.3	12.2	20.4	23.9	15.1
Exchangeable Sodium Percentage	0.1 %	-	4.6	8.1	17.3	18.9	0.7	7.3	6	10.8	13.2	14.4	13.7	21.6	20.7	15.2	24.3
Calcium/Magnesium Ratio	0.1 %	-	1.6	3.2	0.4	1.2	1.3	3.6	6.1	2.0	0.5	0.4	0.7	0.5	0.5	0.7	0.8

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

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

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

Table 7: Multi-Element Results for Water Extracts from Overburden and Coal Reject Materials

			Overburden							Coal Reject							
	Material description -->		Sandstone Interburden (DD1158 EO 001)	Sandstone/Silt Interburden (DD1158 EO 003)	Claystone Interburden (DD1156 EO 003)	Tuff Interburden (DD1156 EO 004)	Sandstone Interburden (DD1163 EO 003)	Sandstone WA2 Overburden (DD1151 EO 005)	Sandstone WA1 Overburden (DD1151 EO 002)	Siltstone WA1 Floor (DD1151 EO 004)	Claystone WA1 Floor (DD1150 EO 003)	Claystone WA1 Roof (DD1150 EO 002)	Claystone WA2 Floor (DD1150 EO 006)	Siltstone/Sandstone WN3 Floor (DD1151 EO 008)	Carb. Claystone WN3 Floor (DD1150 EO 009)	SCK Coal Reject	SCK Roof/Floor
Parameters	Detection Limit	Guideline Levels[1]															
pH	0.1 pH unit	-	9.4	9.8	9.4	9.8	9.1	9.3	9.4	9.5	8.3	8.8	9.2	9.4	9.5	8.0	7.7
Electrical Conductivity	1 µS/cm	-	152	234	168	274	167	294	275	313	436	184	262	167	237	842	784
Total Alkalinity ($mgCaCO_3/L$)	0.2 mg/L	-	648	2,040	270	490	<1	938	7,860	1,202	552	510	476	366	510	404	1,380
Bicarbonate Alkalinity ($mgCaCO_3/$	0.2 mg/L	-	592	1,890	260	346	139	938	7,720	1,144	534	496	476	346	490	404	1,380
Carbonate Alkalinity ($mgCaCO_3/L$	0.2 mg/L	-	58	144	10	144	<0.2	<0.2	135	58	19	14	<0.2	19	19	<1	<1
Major Ions	All element concentrations in mg/L																
Calcium (Ca)	2	1,000	4	<2	<2	<2	4	14	<2	<2	<2	<2	2	<2	<2	16	10
Magnesium (Mg)	2	-	4	<2	<2	<2	<2	14	<2	2	<2	<2	4	<2	<2	16	10
Sodium (Na)	2	-	22	52	32	<2	<2	64	50	84	70	48	54	54	34	120	138
Potassium (K)	2	-	<2	4	<2	2	12	<2	6	<2	<2	2	6	2	2	14	10
Chloride (Cl)	2	-	10	8	<2	<2	<2	26	<2	<2	<2	<2	12	16	22	246	138
Sulfate (SO_4)	2	1,000	22	20	16	<2	38	100	30	54	100	46	54	42	34	22	122
Metals	All element concentrations in mg/L																
Aluminium (Al)	0.2	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.8	3.6	<0.2	<0.2
Antimony (Sb)	0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.020	<0.02
Arsenic (As)	0.02	0.5	0.240	0.040	0.020	0.040	<0.02	<0.02	<0.02	<0.02	0.060	<0.02	<0.02	0.040	0.200	<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	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium (Cd)	0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chromium (Cr)	0.02	1 / -	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cobalt (Co)	0.02	1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper (Cu)	0.02	1 / 0.5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Iron (Fe)	0.2	-	<0.2	<0.2	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.4	<0.2	<0.2
Lead (Pb)	0.02	0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Manganese (Mn)	0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.0	0.0
Molybdenum (Mo)	0.02	0.15	0.1	0.1	0.1	<0.02	<0.02	0.2	<0.02	0.02	0.04	<0.02	0.06	<0.02	<0.02	<0.02	<0.02
Nickel (Ni)	0.02	1	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Selenium (Se)	0.02	0.02	0.02	<0.02	0.04	<0.02	0.02	0.04	<0.02	0.02	0.04	0.26	<0.02	0.02	0.02	<0.02	0.04
Zinc (Zn)	0.02	20	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

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

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

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

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

5.5 KLC Tests

KLC tests were completed for three composite overburden samples and two coal reject samples using the methodology described in **Section 3.3.2**. The makeup of the three composite overburden samples and two coal reject samples is provided at **Table 8**. The composite reject samples for KLC tests (KLC4 and KLC5) were collected by Anglo American personnel from four boreholes DD1123, DD1126, DD1126A, DD1146 spanning the five target seams (Whybrow, Redbank Creek, Wambo, Whynot and Blakefield) planned to be mined at Drayton South. The samples were prepared at the ALS coal quality laboratory in Maitland, NSW. KLC4 is a composite of samples from within the seam and KLC5 is a composite of roof and floor samples from each seam.

Table 8

Overburden and Coal Reject Samples Selected for KLC Tests

ALS Laboratory Sample ID	Date	Sample Name	Sample Interval (m)			Lithology	Sample Type	KLC Test Number
			From	To	Depth			
Overburden								
EB1104975-001	2/03/11	DD1158 EO 001	28.25	28.81	0.56	Sandstone	Interburden	1
EB1104975-002	2/03/11	DD1158 EO 002	37.09	37.44	0.35	Sandstone	Interburden	
EB1104975-003	2/03/11	DD1158 EO 003	60.23	60.62	0.39	Sandstone/Silt	Interburden	
EB1104975-004	2/03/11	DD1158 EO 004	66.59	67.10	0.51	Tuff	Interburden	
EB1104975-005	2/03/11	DD1158 EO 005	78.26	78.70	0.44	Sandstone	Interburden	
EB1104975-006	2/03/11	DD1158 EO 006	94.06	94.53	0.47	Sandstone	Interburden	
EB1104977-001	2/03/11	DD1156 EO 001	53.69	54.09	0.40	Sandstone	Interburden	
EB1104977-002	2/03/11	DD1156 EO 002	62.83	63.15	0.32	Sandstone	Interburden	
EB1104978-003	15/03/11	DD1151 EO 003	23.76	24.30	0.54	Siltstone/Sandstone	WA1 Overburden	2
EB1104978-005	15/03/11	DD1151 EO 005	26.87	27.46	0.59	Sandstone	WA2 Overburden	
EB1104978-006	15/03/11	DD1151 EO 006	31.58	31.95	0.37	Siltstone	WA2 Overburden	
EB1104978-007	15/03/11	DD1151 EO 007	38.19	38.54	0.35	Claystone/Siltstone	WN3 Overburden	
EB1104981-001	2/03/11	DD1163 EO 001	17.46	17.88	0.42	Sandstone	Interburden	3
EB1104981-002	2/03/11	DD1163 EO 002	25.02	25.37	0.35	Sandstone	Interburden	
EB1104981-003	2/03/11	DD1163 EO 003	28.71	29.11	0.40	Sandstone	Interburden	
EB1104981-004	2/03/11	DD1163 EO 004	39.76	40.07	0.31	Siltstone	Interburden	
EB1104981-005	2/03/11	DD1163 EO 005	54.08	54.44	0.36	Sandstone	Interburden	
EB1104981-006	2/03/11	DD1163 EO 006	60.81	61.24	0.43	Sandstone	Interburden	
Coal Rejects								
EB1105959001	23/03/11	DD1123, DD1126, DD1126A,DD1146					SCK Coal Reject	4
EB1105959002	23/03/11	DD1123, DD1126, DD1126A,DD1146					SCK Roof/Floor	5

5.5.1 KLC Test Results

The geochemical results and trends obtained for the two KLC tests on composite overburden samples are presented in **Attachment C**. **Tables KLC1** to **KLC5** provide KLC test data, selected components of which are shown graphically in **Figures KLC1** to **KLC5**. The KLC test results obtained over the 12 week test period indicate that:

- Leachate from the KLC tests ranges from pH neutral (6.61) to moderately alkaline (9.55) and typically has excess alkalinity. Leachate from overburden generally has a more alkaline pH value than leachate from coal reject;
- The EC value of leachate from the KLC tests ranges from 48 to 4,140 µS/cm. Leachate from overburden typically has a low EC value (< 500 µS/cm) whilst leachate from coal rejects typically has a higher EC value (> 1000 µS/cm), although for all leachate samples the EC value tends to decrease with time;

- The acidity of leachate from the KLC tests is low and ranges from <1 to 5 mg $CaCO_3/L$[2]. The acidity of leachate from overburden is typically less than the analytical detection limit whereas the acidity from coal rejects is measurable.
- The alkalinity of leachate from the KLC tests on both overburden and coal reject ranges from 4 to 84 mg $CaCO_3/L$ and is fairly consistent over the 12 week test period;
- The concentrations of soluble calcium and magnesium in leachate from the KLC tests have been used to calculate the residual ANC in these KLC test materials. The results indicate that most of the originally measured ANC (≥ 96%) remains in the composite samples and should continue to provide excess alkalinity for a significant period of time;
- 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 ≥ 87 % of the total sulfur content of each sample remains in the samples after 12 weeks of leaching;
- The concentration of soluble sulfate in leachate from the KLC tests islow and for overburden remains at an order of magnitude lower than the applied ANZECC (2000) water quality guideline for this anion (1,000 mg/L). For coal reject, the sulfate concentration in leachate is higher but still remains within the guideline value; and
- The concentration of soluble trace metals in leachate from the KLC tests is low and remains well within applied (ANZECC (2000)/NEPC (1999b[3])) water quality guidelines for all metals tested for except for molybdenum and selenium concentration which are slightly elevated in leachate from some samples, although elevated concentrations tend to decrease over time.

Potential implications of these results with respect to management of overburden and coal reject materials at the Project are discussed in **Section 6.0.**

5.6 Spontaneous Combustion

Drayton Mine's operations are within the Greta Coal Measures, which occur several hundred metres below the Wittingham Coal Measures, which are present at Drayton South. There are several differences in the coal and sediments of these two coal measures, one of which is the amount of sulfur present, specifically pyritic sulfur.

For spontaneous combustion to occur, a heat source and fuel are required. The spontaneous combustion issues at Drayton Mine relate primarily to pyrite (iron sulphide) oxidising (exothermic reaction) in the presence of combustible material (coal and/or other highly carbonaceous material). At Drayton South the sulfur content is much lower (generally well under 0.5% as demonstrated by coal reject results in **Section 5.1.2**) than Drayton Mine and most of the sulfur is organic with very minor pyritic. Within the interburden / overburden there is very little sulfur with several samples returning results below the level of detection i.e. <0.01%. There is therefore very low probability for spontaneous combustion *in situ* or in spoil dumps.

Coal left in stockpiles for an extended period of time, especially if uncompacted and exposed to wind, is a separate issue. There is a low probability for coals to be stockpiled for extended periods, but excessive time periods and favourable conditions can lead to spontaneous combustion in most coals.

[2] The units of mg/L $CaCO_3$ have been used for both alkalinity and acidity results in this report to facilitate data comparison.

[3] There are no guidelines and regulatory criteria specifically related to runoff and seepage from overburden spoil and coal reject materials since guidelines (and regulatory criteria) will depend upon the end-use and receiving environment. Therefore, to provide relevant context, RGS has compared the soluble concentration of each element leached from KLC test materials to NEPC (1999b) investigation levels for groundwater and ANZECC (2000) livestock drinking water guidelines. These guidelines allow for concentrations of individual parameters appropriate for an industrial facility in a rural area and are more appropriate (in the context of the project) than guidelines designed for water to be used for human consumption or being directly discharged into an aquatic environment (*e.g.* stream, river or lake).

6.0 DISCUSSION

6.1 Acid Base Account Test Results

The results of the ABA tests presented in **Section 5.1**, indicate that all (100%) of overburden material tested is NAF and has a high factor of safety with respect to potential acid generation. The overburden samples tested have very low (≤0.1%) total oxidisable sulfur content and are therefore classified as NAF-barren. Most overburden materials also appear to have a significant acid buffering capacity (moderate to high ANC value), which is more than enough to buffer the negligible amount of acidity that could theoretically be generated from these materials. Overall, from an acid-base perspective, the overburden material tested can be regarded as a NAF unit containing excess neutralising capacity.

The results of the ABA tests indicate that the overwhelming majority of the coal reject material tested is NAF and has a high factor of safety with respect to potential acid generation. In particular, the composite coal reject samples, which provide the most representative samples of coal reject material, have very low total oxidisable sulphur content (<0.1 %). The composite samples also have significant acid buffering capacity (moderate to high ANC value), which is more than enough to buffer the negligible amount of acidity that could theoretically be generated from these materials. Overall, from an acid-base perspective, the coal reject material tested can also be regarded as a NAF unit containing excess neutralising capacity.

Calculation of residual ANC remaining in the composite overburden and coal reject materials used in KLC tests indicates that much of the original measured ANC remains in these materials and is likely to continue to provide excess alkalinity for a significant period of time.

The concentration of soluble sulfate in leachate from the KLC tests is lower in the overburden samples than the coal reject samples and the sulfate generation rate shows some variability but is relatively consistent over the 12 week test period. The sulfate generation rate for each of the composite overburden and coal reject samples used in the KLC tests has been calculated as shown in **Table 9**.

Table 9

Oxidation Rates for Overburden and Potential Coal Reject Materials

KLC Sample Name	Sulfate Generation Rate (mg/kg/week)	Oxidation Rate (kg $O_2/m^3/s$)
Composite Overburden(KLC1)	15.6	2.3×10^{-8}
Composite Overburden(KLC2)	18.2	2.7×10^{-8}
Composite Overburden(KLC3)	8.1	1.2×10^{-8}
Composite Coal reject (KLC4)	15.5	2.3×10^{-8}
Composite Coal reject (KLC5)	63.1	9.3×10^{-8}

The sulfate generation rate from the overburden KLC samples ranges from 8.1 to 63.1 mg/kg/week which suggests that the rate of sulfide oxidation is low to moderate in these materials (equivalent to an oxidation rate ranging from 1.2 to 9.3×10^{-8} kg $O_2/m^3/s$). Results of previous KLC test work completed as part of a mining industry sponsored study program (AMIRA, 1995) indicate that mine materials with an oxidation rate of $<5 \times 10^{-8}$kg $O_2/m^3/s$ and low to moderate ANC levels have a high factor of safety and are likely to generate pH neutral to alkaline leachate. Hence, of the five composite overburden and coal reject samples tested, only sample KLC5 has a slightly higher oxidation rate than the value

described above. However, the oxidation rate in this material appears to be diminishing with time and this material also has a high ANC value and is therefore extremely unlikely to generate acid leachate.

Overall it is expected that the overburden and coal reject materials generated at Drayton South will have a very low risk of generating Acid and Metalliferous Drainage (AMD).

6.2 Multi-Element Composition and Water Quality

6.2.1 Multi-Element Composition

The multi-element compositions of overburden and coal reject samples are presented at **Section 5.2**, along with a comparison with applied guideline concentrations. The acquired data indicate that all total metal concentrations in overburden and coal reject samples are well below the applied NEPC (1999a) HIL(E) guideline values, where such guideline values exist. Hence, overburden and coal reject materials represented by the samples should not present a significant risk to the environment with respect to total metal concentrations in solids.

6.2.2 Water Quality

Static and KLC test results indicate that initial and ongoing surface run-off/seepage from overburden and coal reject materials is likely to be pH neutral to slightly alkaline. The dominant major soluble cation is sodium and the dominant major soluble anions are typically bicarbonate, chloride and sulfate. The concentration of all of these ions in run-off and seepage is expected to decrease over time. In addition, the salinity of surface run-off and seepage from overburden is expected to be low and from coal reject is expected to be elevated, although the salinity of surface run-off and seepage from both materials is likely to decrease with time. The concentration of soluble sulfate in surface run-off and seepage is expected to be low for overburden and remain well within the applied water quality guideline (ANZECC, 2000) concentration for this anion. For coal reject, the sulfate concentration in surface runoff and seepage is expected to be higher, but still remain within the guideline value. Hence, the risk of potential impact on the quality of surface and groundwater from the Project should be low for overburden and coal reject materials, although this finding should be confirmed by the ongoing water quality monitoring program for surface water and groundwater at Drayton South.

Most trace metals in overburden and coal reject are 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 water quality guideline criteria (ANZECC, 2000; and NEPC, 1999b) livestock drinking water guidelines. Minor exceptions include soluble molybdenum and selenium concentrations, which could be slightly elevated in initial surface runoff and seepage from overburden and coal reject materials. It is therefore recommended that these elements are included in the water quality monitoring program for overburden and coal reject emplacement areas.

A review of available groundwater and surface water data at Saddlers Creek indicates that the water extract results described above are reasonably consistent with background water quality data.

6.3 Revegetation and Rehabilitation

The following discussion provides some context to the soil chemistry of overburden materials, should these report to final overburden and coal reject emplacement surfaces. From a soil chemistry view point, the overburden and potential coal reject materials are likely to be pH neutral to slightly alkaline. The overburden materials will generally have low salinity levels compared to coal reject materials, although salinity levels in coal reject should diminish over time. Both overburden and coal reject materials display moderate to high eCEC values, which should not hinder revegetation.

The ESP results presented in **Table 6** indicate that the sodicity of overburden samples is low in the sandstone material, but can be elevated in the mudstone and tuff. The ESP in the coal reject samples is relatively high and ranges from 10.8 to 24.3 % (median 13.7 %).

Where the EC is relatively low, such as in the overburden samples, soils are considered sodic if the ESP value is between 6% and 14%, and strongly sodic if the ESP is 15% or more (Isbell, 2002; and Northcote and Skene, 1972). Materials classified as sodic may be prone to dispersion and erosion. Hence, some overburden materials (mudstone and tuff) likely to report to overburden emplacement areas at Drayton South may have structural stability problems related to potential dispersion. The ESP values indicate that sandstone is less sodic and may be more suitable for revegetation and rehabilitation activities (in final landform surfaces or as a growth medium) for the Project. It is therefore recommended that sandstone be preferentially placed at the outer surfaces of overburden emplacement areas. If it is not practical for this to occur, it is recommended that the rehabilitation practices for potentially sodic overburden at Drayton South include a topsoil cover as part of final rehabilitation to limit the risk of dispersion and erosion of surface materials.

Coal reject materials are likely to be sodic and prone to dispersion and erosion. However, it is understood that these materials will report to the North Void area at Drayton Mine and will be covered with spoil as part of final rehabilitation to limit the risk of dispersion and erosion of surface materials.

6.4 Spontaneous Combustion

There is a very low probability of spontaneous combustion *in situ* or in spoil dumps at Drayton South. Coal rejects also have a low propensity to spontaneously combust and will be used to backfill the North Void area at Drayton Mine. There is a low probability for coals to be stockpiled for extended periods, however excessive time periods and favourable conditions can lead to spontaneous combustion in most coals.

7.0 CONCLUSIONS AND POTENTIAL MANAGEMENT MEASURES

7.1 Conclusions

RGS has completed a geochemical impact assessment of representative overburden and coal reject materials for the Project. The findings of the assessment align well with those of the previous desktop geochemical assessment completed by RGS in January 2010. It is concluded that:

- Overburden and most coal reject materials are expected to have very low oxidisable sulfur content, significant excess ANC, and be classified as NAF;
- Overburden and most coal reject materials are likely to have a high factor of safety with respect to potential acid generation;
- The concentration of total metals in overburden materials is well below applied guideline criteria for soils and is unlikely to present any environmental issues associated with revegetation and rehabilitation;
- Overburden and coal reject materials reporting to emplacement areas will generate pH neutral to slightly alkaline run-off/seepage with low and moderate salinity values, respectively, following surface exposure. The salinity of run-off/seepage from these materials is expected to decrease with time;
- The concentration of trace metals in run-off and seepage from most overburden and coal reject material is likely to be low with some minor exceptions (molybdenum and selenium);
- Overall, the risk of potentially significant water quality impacts from overburden and coal reject materials is low;
- Some overburden and most coal reject materials may be sodic and have structural stability problems related to potential dispersion and erosion; and
- There is a low probability of spontaneous combustion either *in situ* or for coal, overburden and coal reject materials at Drayton South.

7.2 Management Recommendations

The ongoing management of overburden and coal reject materials at Drayton South 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. As such the following recommendations are put forward:

- Pre-stripping topsoil from areas to be disturbed for use in final rehabilitation activities (surface cover or vegetation growth medium); and
- Implementing practical site rehabilitation practices for potentially sodic overburden and coal reject materials to limit the risk of dispersion and erosion of surface materials at emplacement areas (e.g. utilise a topsoil cover as part of final rehabilitation).

Surface water and seepage from overburden and coal reject emplacement areas should be monitored to ensure that key water quality parameters remain within appropriate criteria. It is therefore recommended that:

- Monitoring of surface run-off and seepage from the proposed overburden and coal reject emplacement areas for pH, EC, TSS be undertaken on a quarterly basis and for dissolved trace metals and sulphate on an annual basis.

8.0 REFERENCES

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

AGE (2009). *Report on Mt Arthur Coal Consolidation Project. Groundwater Impact Assessment.* Australian Groundwater and Environmental Consultants Pty Ltd Project No. G1446. Prepared for Hansen Bailey Pty Ltd, June 2009.

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

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

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

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

Hansen Bailey (2009). Mount Arthur Coal Consolidation Project. Environmental Assessment. Report prepared by Hansen Bailey Pty Ltd for Hunter Valley Energy Coal Pty Ltd, November 2009.

Envirosciences Pty Limited (1992). *Environmental Impact Statement for Drayton South Coal Mine*, Document F156, Volume 4, Appendix 15 Chemical Characteristics of Overburden).

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

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

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

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

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

Pratt W. (1995). *Geology and Coal Resources of the Saddlers Creek Area.* Department of Mineral Resources Coal and Petroleum Geology Branch Report. Volume 1 Report, Appendix I – Seam Resource Detail Tables and Appendix III – Mining Potential. CGB Report No. 95/006, June 1995.

RGS (2010a). *Proposal to complete a Geochemical Assessment of Overburden and Coal Reject Materials*. RGS Proposal Number 091018, submitted to Hansen Bailey on 2 December 2010.

RGS (2010b). Drayton South Project. Desktop Geochemical Assessment of Overburden and Potential Coal Reject & Proposal to Undertake a Geochemical Assessment as part of a Future Environmental Assessment. RGS Project No. 091018,January 2010.

RGS (2011). Drayton South Project. Geochemical Assessment of Overburden and Potential Coal Reject. Sampling and Testing Protocol. RGS Project No. 091018, January 2011.

SCJV (2005). *Saddlers Creek Coal Development Area EL5460. Underground resources of the Woodlands Hill, Arrowfield, Bowfield & Warkworth Seams. Geological Report.* Saddlers Creek Joint Venture, August 2005.

9.0 LIMITATIONS

RGS has prepared this report for the use of Hansen Bailey and Anglo American. It is based on accepted consulting practices and standards and no other warranty is made as to the professional advice included in this assessment. It is prepared in accordance with the scope of work and for the purpose outlined in RGS Proposal Number 091018, submitted to Hansen Bailey on 2 December 2010.

This assessment was prepared from February 2011 to April 2012 and is based on the information provided by Hansen Bailey and Anglo American at the time of preparation. RGS disclaims responsibility for any changes that may have occurred after this time.

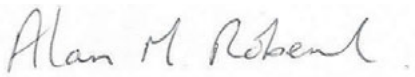
The sources of information and methodology used by RGS are outlined in this report and no independent verification of this information has been made. RGS assumes no responsibility for any inaccuracies or omissions, although no indication was found that any information contained in this assessment as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

This assessment should be read in full. No responsibility is accepted for use of any part of this assessment in any other context or for any other purpose or by third parties. This assessment 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 under signed on (+617) 3856 5591 or (+61) 431 620 623.

Yours sincerely,

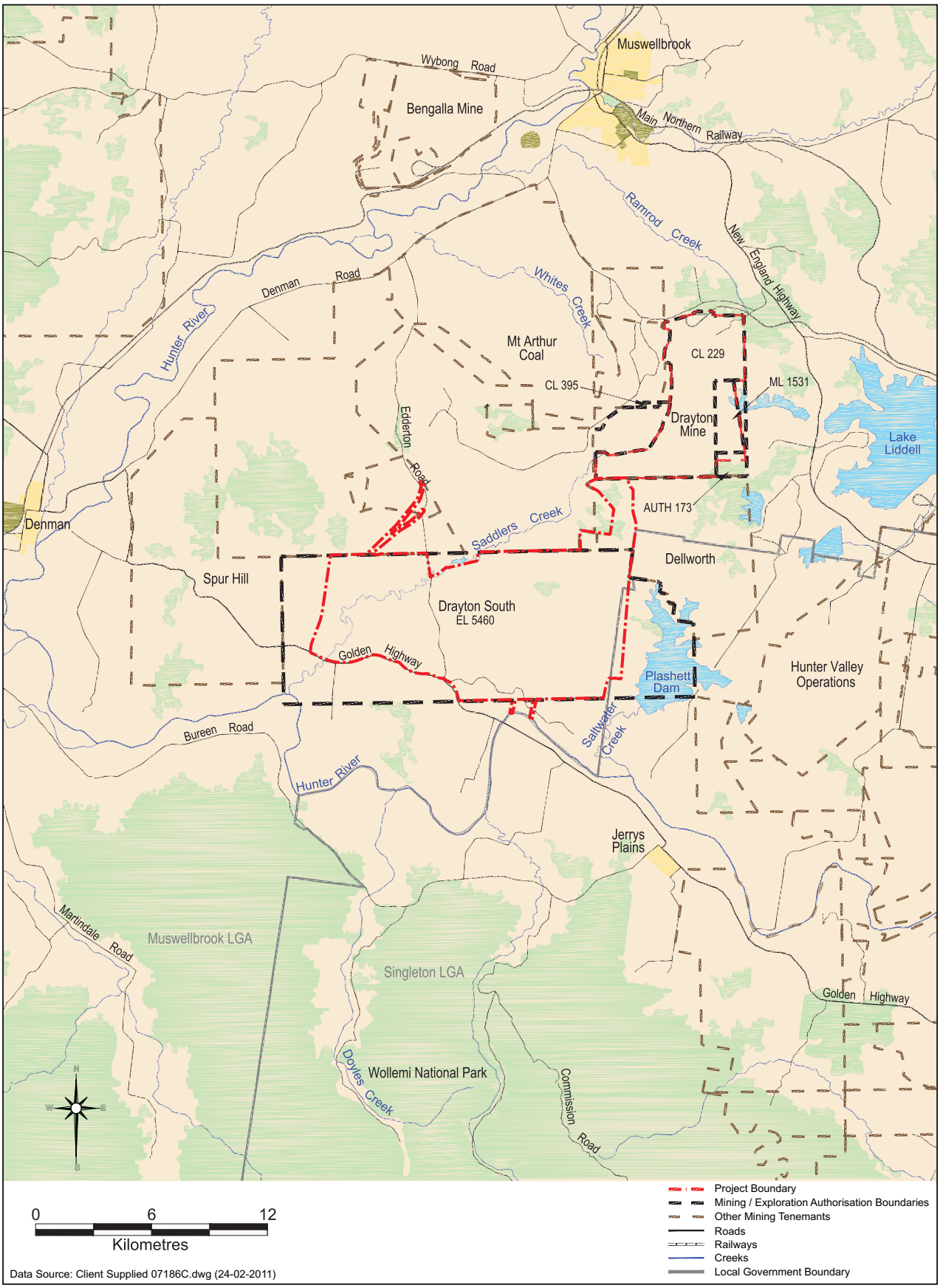
RGS ENVIRONMENTAL PTY LTD



Dr. Alan M. Robertson
Principal Geochemist/Director

ATTACHMENT A

Figures



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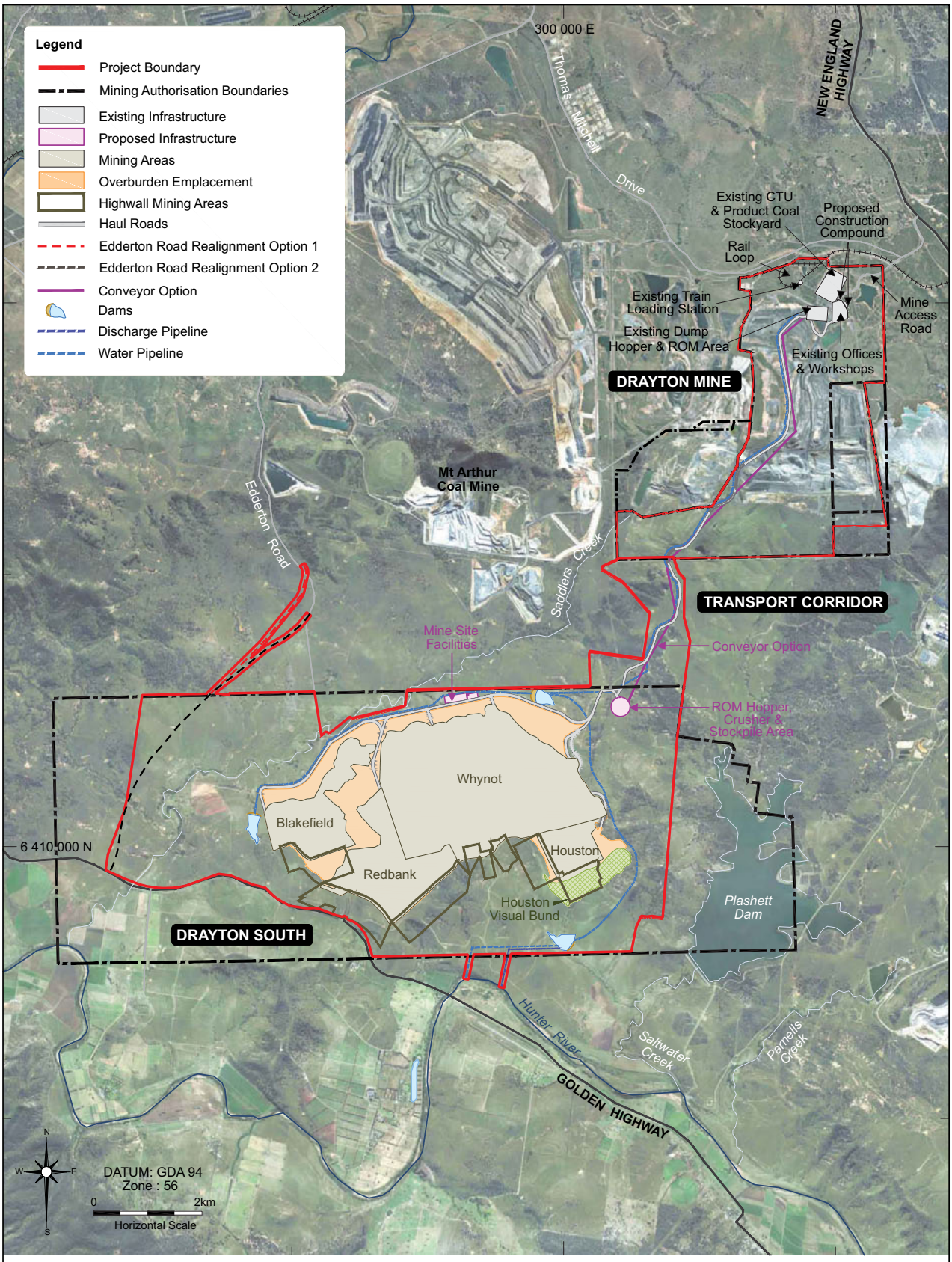
HANSEN BAILEY ENVIRONMENTAL CONSULTANTS

GEOCHEMICAL ASSESSMENT OF
OVERBURDEN AND COAL REJECT MATERIALS
DRAYTON SOUTH COAL PROJECT

Figure: **1**

REGIONAL LOCALITY



Data Source: Drayton South Conceptual Layout Plan.dwg

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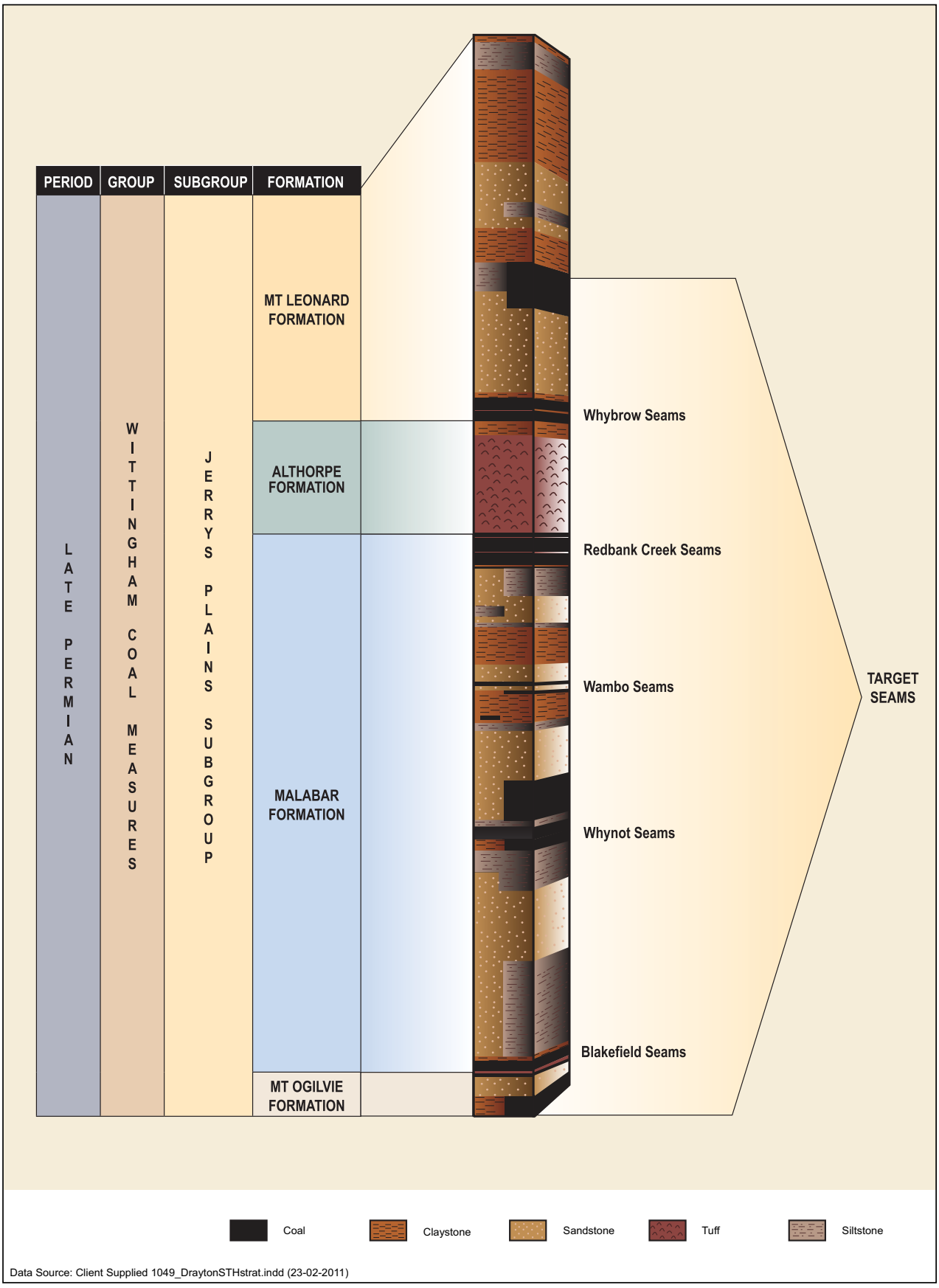
GEOCHEMICAL ASSESSMENT OF
OVERBURDEN AND COAL REJECT MATERIALS
DRAYTON SOUTH COAL PROJECT

Figure: **2**

CONCEPTUAL PROJECT LAYOUT



Data Source: Client Supplied 1049_DraytonSTHstrat.indd (23-02-2011)

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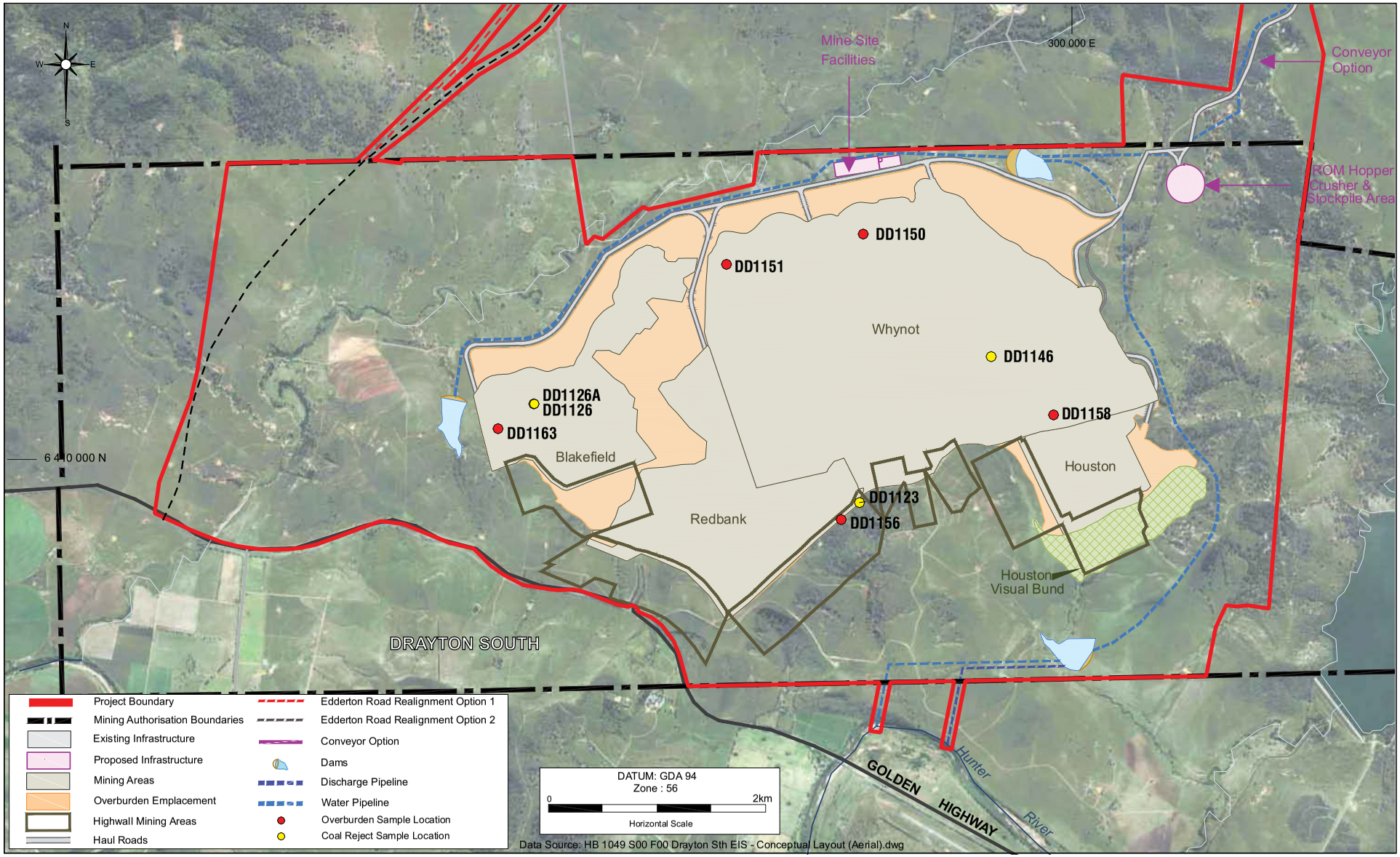
HANSEN BAILEY ENVIRONMENTAL CONSULTANTS

GEOCHEMICAL ASSESSMENT OF
OVERBURDEN AND COAL REJECT MATERIALS
DRAYTON SOUTH COAL PROJECT

Figure: **3**

INDICATIVE STRATIGRAPHIC COLUMN



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GEOCHEMICAL ASSESSMENT OF
OVERBURDEN AND COAL REJECT MATERIALS
DRAYTON SOUTH COAL PROJECT

Figure:**4**

DRILL HOLE LOCATIONS USED FOR GEOCHEMICAL SAMPLING PROGRAM

ATTACHMENT B

Geochemical Assessment of Mine Waste Materials

ATTACHMENT B

GEOCHEMICAL ASSESSMENT OF MINE WASTE MATERIALS

ACID GENERATION AND PREDICTION

Acid generation is caused by the exposure of 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:

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

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

Net Acid Producing Potential

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

Determination of pH and EC

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

Total Sulfur Content and Maximum Potential Acidity

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

Acid Neutralising Capacity

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

Net Acid Producing Potential

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

Net Acid Generation

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

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

Multi-element Composition of Water Extracts (1:5 sample:deionised water)

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

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

KINETIC LEACH COLUMN TESTS

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

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

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

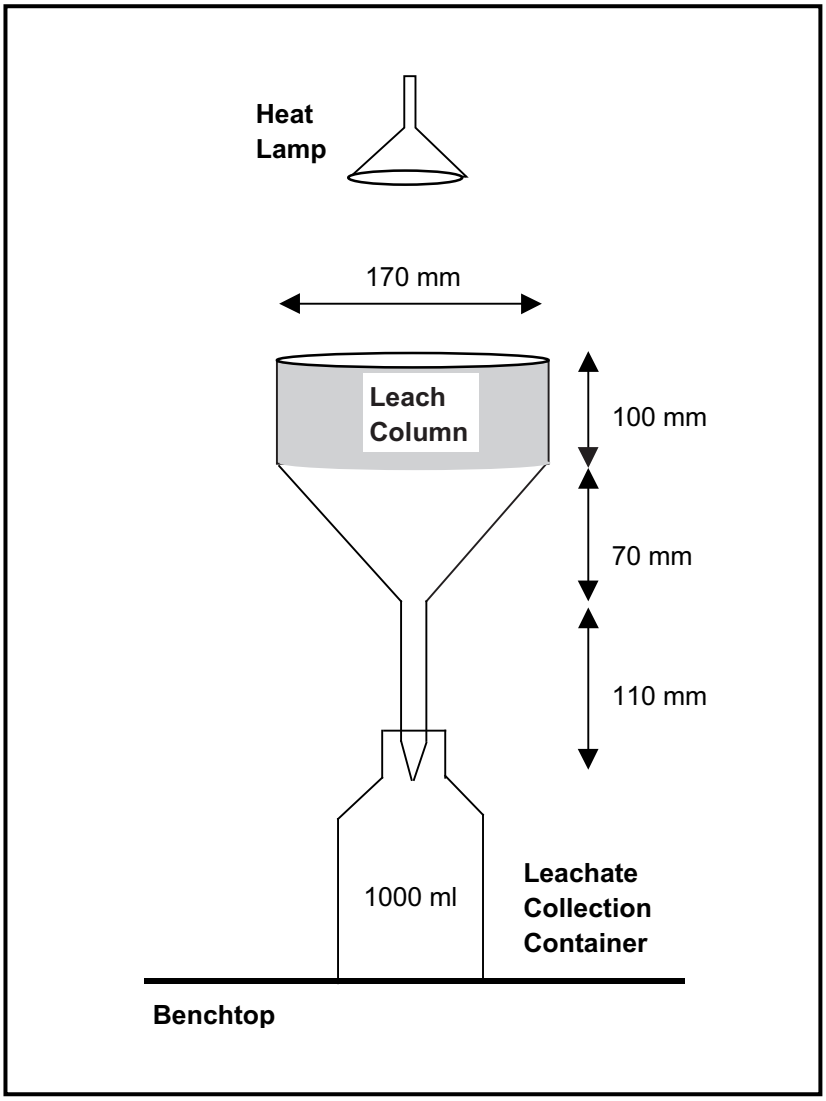
In kinetic column leach tests, water is added to a sample and the mixture allowed to leach products and by-products of acid producing and consuming reactions. Samples of leachate are then collected and analysed. Intermittent water application is applied to simulate rainfall and heat lamps are used to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

Figure 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 to ensure adequate oxygen ingress into the sample material.

Approximately 2 to 3 kg of sample is generally used in the leach columns and depending on the physical nature of the material and particle size can be used on an as-received basis (*i.e.* no crushing as with process residues) or crushed to nominal 5 to 10 mm particle size (as with overburden). The sample in the column is initially leached with deionised water at a rate of about 500 ml/kg of sample and the initial leachate from the columns collected and analysed. Subsequent column leaching is carried out at a rate of about 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^{o}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 C

Kinetic Leach Column Test Results and Trends

Table KLC1

KLC1 Test Results: Overburden 1

Sample Weight (kg)	1.1	Total S (%)		0.042	ANC (kg H_2SO_4/t)		86	
pH(1:5)	9.5	S_{CR} (%)		0.016	NAPP (kg H_2SO_4/t)		-85.5	
EC(1:5) (µS/cm)	203	MPA (kg H_2SO_4/t)		0.5	ANC:MPA ratio		175.5	
Date	29-Apr-11	13-May-11	27-May-11	10-Jun-11	29-Jun-11	15-Jul-11	28-Jul-11	
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Volume Collected (L)	0.78	0.79	0.70	0.55	0.67	0.73	0.73	
Cum. Volume (L)	0.78	1.57	2.27	2.82	3.49	4.22	4.95	
Pore Volumes	0.6	1.2	1.7	2.1	2.6	3.1	3.7	
pH	9.52	9.27	9.29	9.55	9.44	9.24	9.53	
EC (µS/cm)	188	194	421	351	116	78	67	
Acidity (mg/L)*	<1	<1	<1	<1	<1	<1	<1	
Alkalinity (mg/L)*	46	31	67	84	43	24		
Net Alkalinity (mg/L)*	46	31	67	84	43	24		
Dissolved elements (mg/L)								**Guideline Levels[1]**
Al	0.16	0.28	0.02	0.12	1.11	0.77		5
As	0.036	0.016	0.107	0.083	0.019	0.009		0.5
B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		5
Ca	1	1	2	1	0.5	0.5		1000
Cd	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		0.01
Cl	12	15	33	14	4	2		-
Co	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		1
Cr	<0.001	<0.001	0.003	<0.001	<0.001	<0.001		1 / -
Cu	0.002	0.001	0.002	0.003	<0.001	<0.001		1 / 0.5
Fe	<0.05	<0.05	<0.05	<0.05	0.14	0.09		-
K	2	1	3	3	1	1		-
Mg	1	1	2	1	0.5	0.5		-
Mn	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		-
Mo	0.069	0.131	0.204	0.173	0.05	0.027		0.15
Na	36	37	90	77	28	15		-
Ni	0.003	0.002	0.003	0.004	0.002	0.001		1
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		0.1
SO_4	26	35	96	66	21	9		1,000
Sb	<0.001	<0.001	0.004	0.004	0.001	<0.001		-
Se	<0.01	0.01	0.03	0.02	<0.01	<0.01		0.02
Zn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		20
RESULTS**								
SO_4 Release Rate	18	25	61	33	13	6		
Cumulative SO_4 Release	18	44	104	138	150	156		
Ca Release Rate	1	1	1	1	0	0		
Cumulative Ca Release	1	1	3	3	4	4		
Mg Release Rate	0.7	0.7	1.3	1	0	0		
Cumulative Mg Release	0.7	1.4	3	3	4	4		
Residual ANC (%)	100.0	100.0	100.0	100.0	100.0	100.0		
Residual Sulfur (%)	98.5	96.5	91.7	89.1	88.0	87.6		
SO_4/(Ca+Mg) molar ratio	4.1	5.5	7.6	10.4	6.6	2.8		

< indicates less than the analytical detection limit.

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

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

Total S = Total Sulfur, S_{CR} = Chromium Reducible Sulfur, MPA = Maximum Potential Acidity, ANC = Acid Neutralising Capacity, and NAPP = Net Acid Producing Potential

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

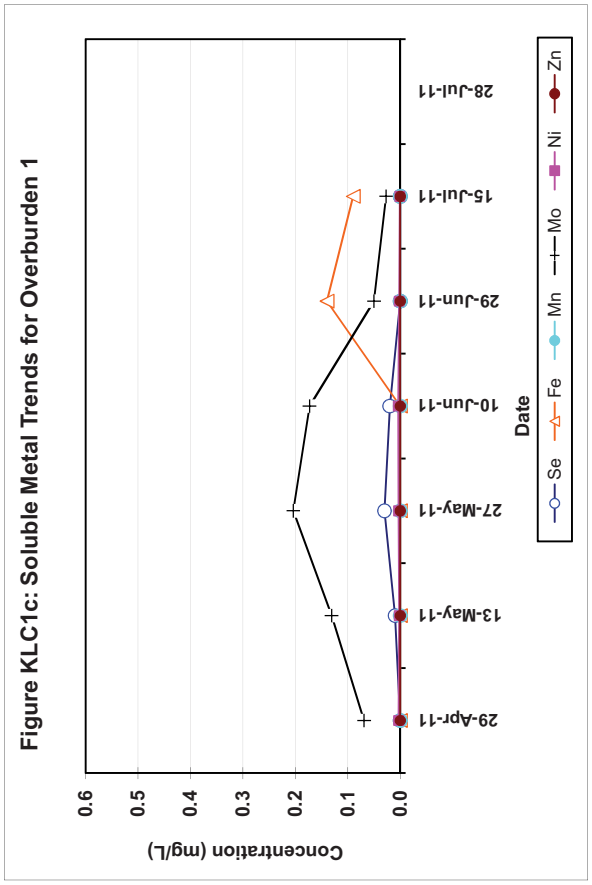


Figure KLC1c: Soluble Metal Trends for Overburden 1
Concentration (mg/L)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
Se
Fe
Mn
Mo
Ni
Zn

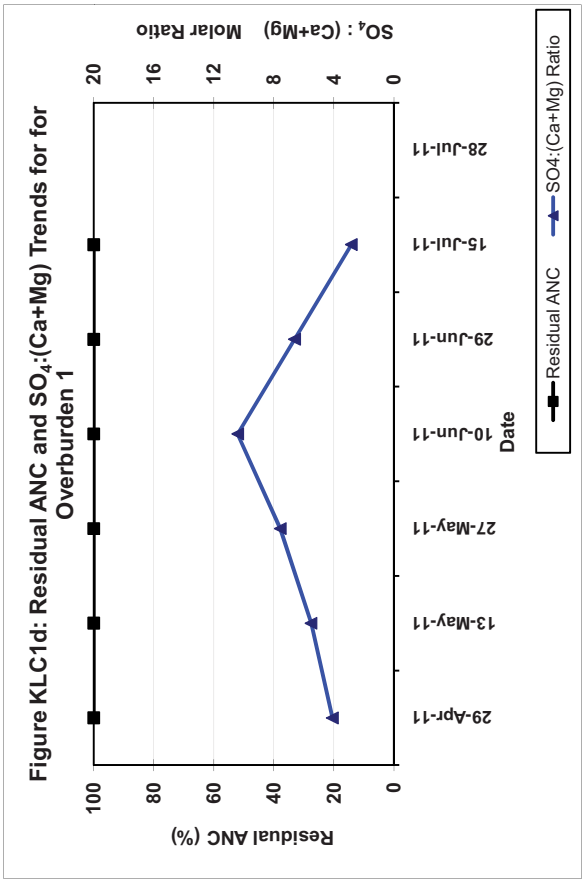


Figure KLC1d: Residual ANC and SO4:(Ca+Mg) Trends for for Overburden 1
Residual ANC (%)
0
20
40
60
80
100
SO4 : (Ca+Mg) Molar Ratio
0
4
8
12
16
20
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
Residual ANC
SO4:(Ca+Mg) Ratio

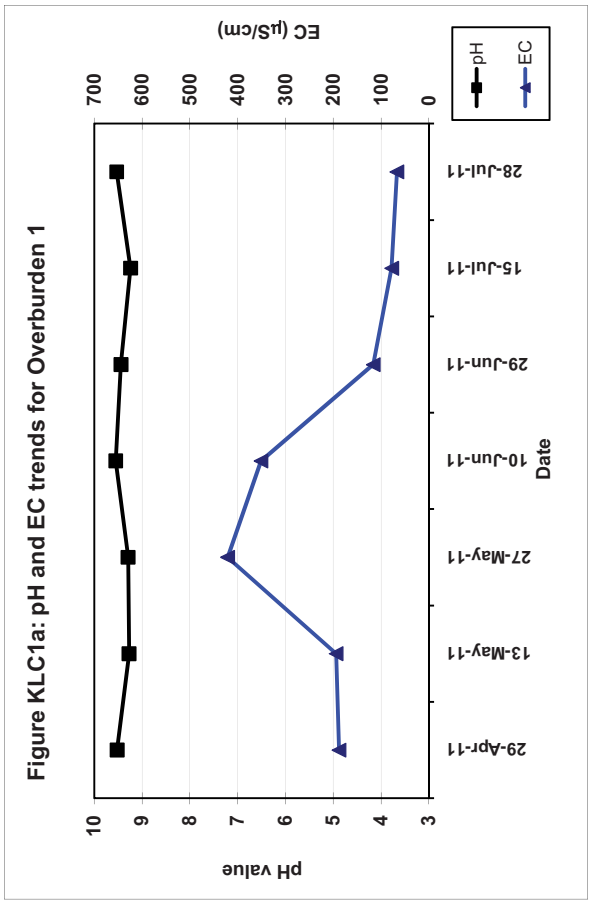


Figure KLC1a: pH and EC trends for Overburden 1
pH value
3
4
5
6
7
8
9
10
EC (µS/cm)
0
100
200
300
400
500
600
700
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
pH
EC

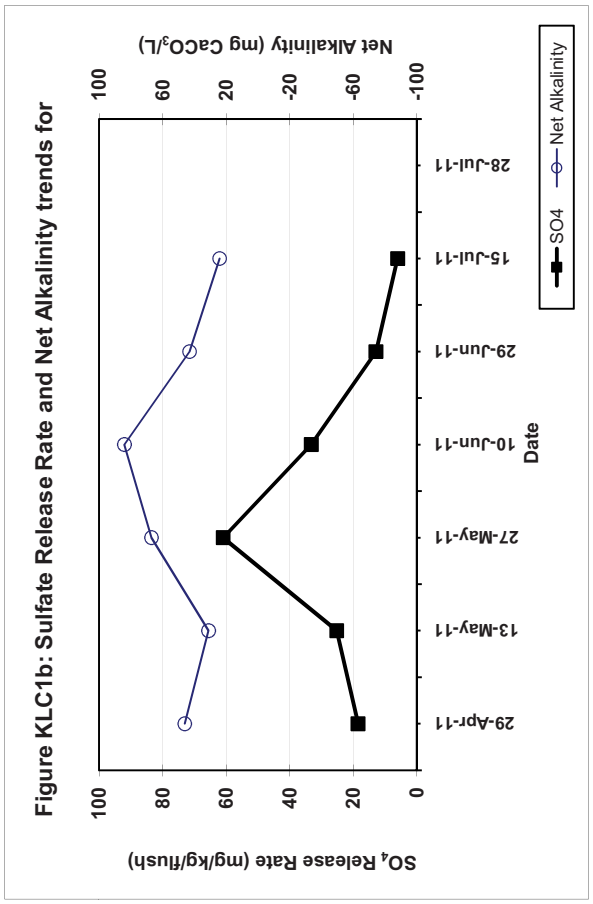


Figure KLC1b: Sulfate Release Rate and Net Alkalinity trends for
SO4 Release Rate (mg/kg/flush)
0
20
40
60
80
100
Net Alkalinity (mg CaCO3/L)
-100
-60
-20
20
60
100
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
SO4
Net Alkalinity

Table KLC2

KLC2 Test Results: Overburden 2

Sample Weight (kg)	1.4	Total S (%)		0.19	ANC ($kg H_2SO_4/t$)		18.9	
pH(1:5)	9.4	S_{CR} (%)		0.073	NAPP ($kg H_2SO_4/t$)		-16.7	
EC(1:5) (µS/cm)	260	MPA ($kg H_2SO_4/t$)		2.2	ANC:MPA ratio		8.5	
Date	29-Apr-11	13-May-11	27-May-11	10-Jun-11	29-Jun-11	15-Jul-11	28-Jul-11	
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Volume Collected (L)	0.78	0.80	0.71	0.60	0.63	0.65	0.71	
Cum. Volume (L)	0.78	1.58	2.29	2.89	3.52	4.17	4.88	
Pore Volumes	0.6	1.2	1.7	2.1	2.6	3.1	3.6	
pH	7.86	9.12	8.77	9.34	9.09	8.35	8.99	
EC (µS/cm)	239	405	470	354	320	278	179	
Acidity (mg/L)*	<1	<1	<1	<1	<1	1		
Alkalinity (mg/L)*	29	26	35	32	28	27		
Net Alkalinity (mg/L)*	29	26	35	32	28	26		
Dissolved elements (mg/L)								**Guideline Levels[1]**
Al	0.04	0.03	0.04	0.22	0.48	1.81		5
As	0.005	0.004	0.01	0.008	0.004	0.004		0.5
B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		5
Ca	3	3	3	2	1	0.5		1000
Cd	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001		0.01
Cl	26	65	70	44	42	23		-
Co	<0.001	<0.001	<0.001	<0.001	<0.001	0.001		1
Cr	<0.001	<0.001	0.002	<0.001	<0.001	0.002		1 / -
Cu	0.001	<0.001	<0.001	0.001	<0.001	0.002		1 / 0.5
Fe	<0.05	<0.05	<0.05	0.06	0.12	0.49		-
K	1	2	2	2	1	2		-
Mg	2	4	4	2	2	1		-
Mn	0.002	0.001	0.002	0.002	0.003	0.007		-
Mo	0.008	0.023	0.024	0.014	0.022	0.022		0.15
Na	40	72	88	71	69	50		-
Ni	0.003	<0.001	<0.001	<0.001	0.001	0.004		1
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		0.1
SO_4	32	57	82	71	73	58		1,000
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		-
Se	0.01	0.04	0.05	0.04	0.04	0.03		0.02
Zn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		20
RESULTS**								
SO_4 Release Rate	18	33	41	31	33	27		
Cumulative SO_4 Release	18	50	92	122	155	182		
Ca Release Rate	2	2	2	1	0	0		
Cumulative Ca Release	2	3	5	6	6	6		
Mg Release Rate	1	2	2	1	1	0		
Cumulative Mg Release	1	3	5	6	7	8		
Residual ANC (%)	100	100	100	100	100	100		
Residual Sulfur (%)	99.7	99.1	98.4	97.9	97.3	96.9		
SO_4/(Ca+Mg) molar ratio	2.1	2.5	3.6	5.6	7.1	11.3		

< indicates less than the analytical detection limit.

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

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

Total S = Total Sulfur, S_{CR} = Chromium Reducible Sulfur, MPA = Maximum Potential Acidity, ANC = Acid Neutralising Capacity, and NAPP = Net Acid Producing Potential

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

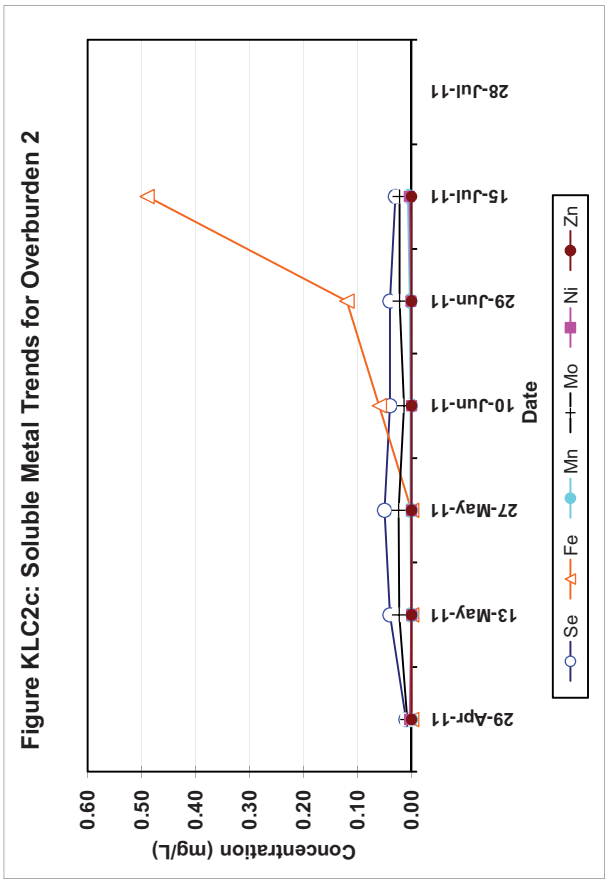


Figure KLC2c: Soluble Metal Trends for Overburden 2
Concentration (mg/L)
0.60
0.50
0.40
0.30
0.20
0.10
0.00
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
Se
Fe
Mn
Mo
Ni
Zn

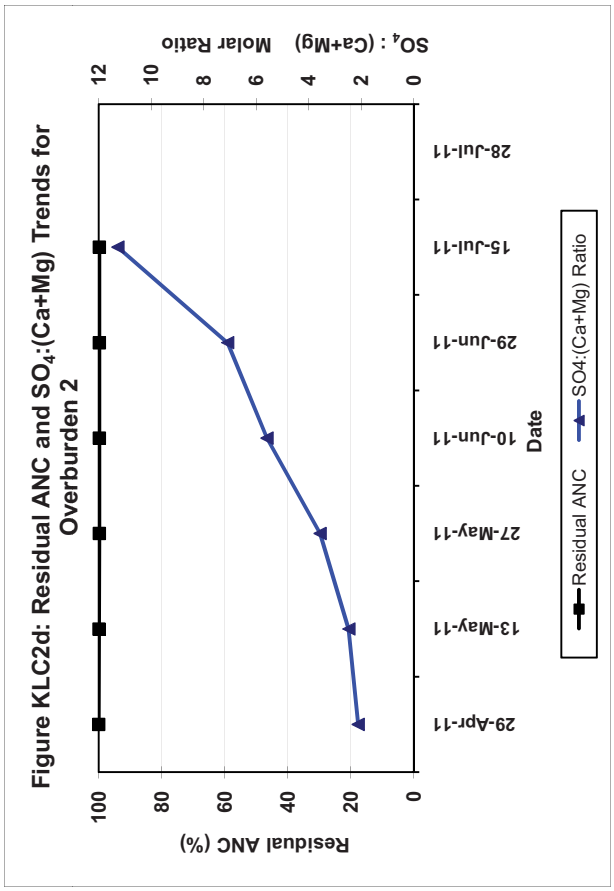


Figure KLC2d: Residual ANC and SO4:(Ca+Mg) Trends for Overburden 2
Residual ANC (%)
100
80
60
40
20
0
SO4 : (Ca+Mg) Molar Ratio
12
10
8
6
4
2
0
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
Residual ANC
SO4:(Ca+Mg) Ratio

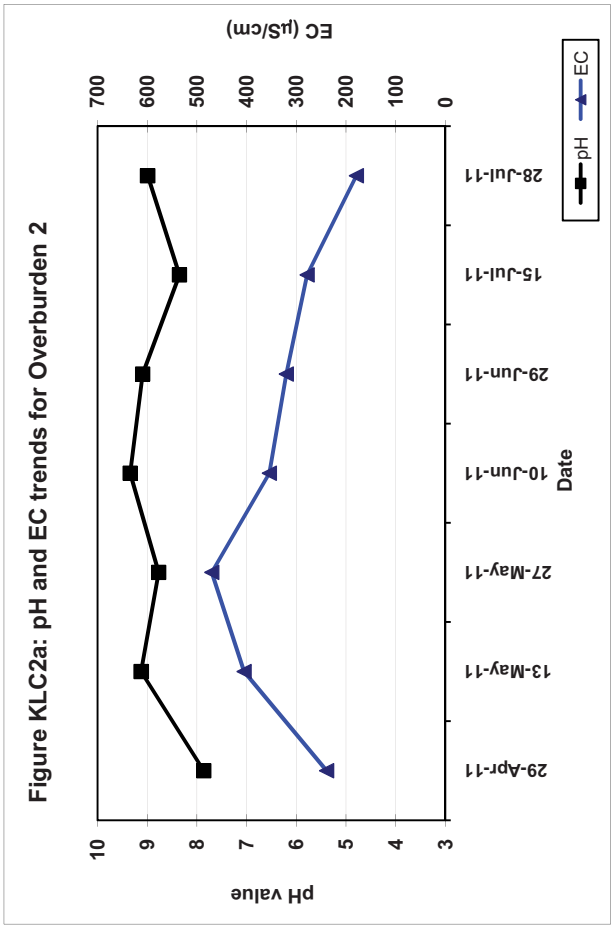


Figure KLC2a: pH and EC trends for Overburden 2
pH value
10
9
8
7
6
5
4
3
EC (µS/cm)
700
600
500
400
300
200
100
0
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
pH
EC

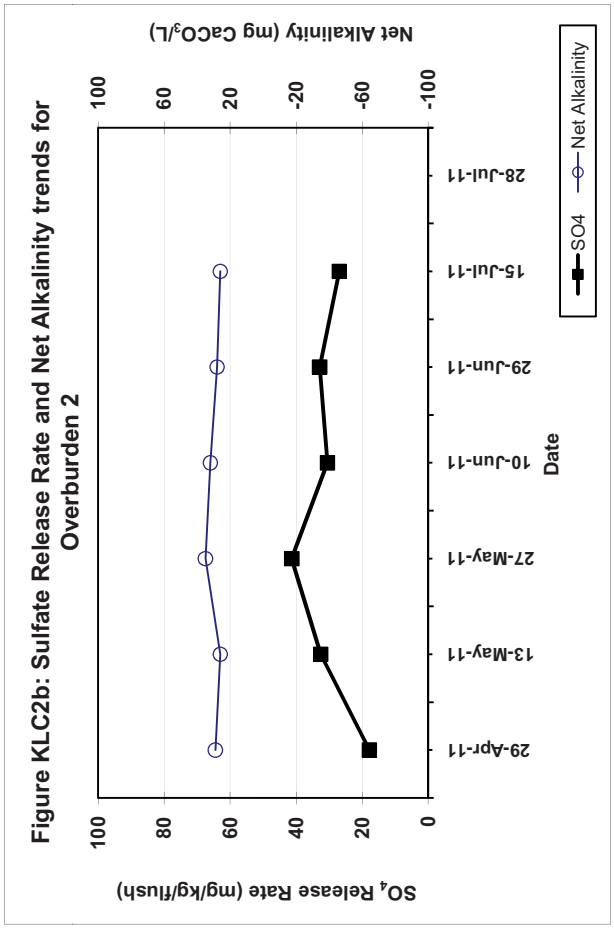


Figure KLC2b: Sulfate Release Rate and Net Alkalinity trends for Overburden 2
SO4 Release Rate (mg/kg/flush)
100
80
60
40
20
0
Net Alkalinity (mg CaCO3/L)
100
60
20
-20
-60
-100
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
SO4
Net Alkalinity

Table KLC3

KLC3 Test Results: Overburden 3

Sample Weight (kg)	1.5	**Total S (%)**			0.03	**ANC ($kg H_2SO_4/t$)**		22.4
pH(1:5)	8.3	**S_{CR} (%)**				**NAPP ($kg H_2SO_4/t$)**		-21.4
EC(1:5) (µS/cm)	561	**MPA ($kg H_2SO_4/t$)**			1.0	**ANC:MPA ratio**		22.2
Date	29-Apr-11	13-May-11	27-May-11	10-Jun-11	29-Jun-11	15-Jul-11	28-Jul-11	
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Volume Collected (L)	0.76	0.80	0.71	0.80	0.99	0.84	0.85	
Cum. Volume (L)	0.76	1.56	2.27	3.06	4.06	4.90	5.75	
Pore Volumes	0.7	1.4	2.0	2.7	3.5	4.3	5.0	
pH	7.67	8.00	7.85	8.95	9.00	8.29	8.80	
EC (µS/cm)	196	122	246	112	48	70	57	
Acidity (mg/L)*	<1	1	<1	<1	<1	<1	<1	
Alkalinity (mg/L)*	22	11	15	18	14	11		
Net Alkalinity (mg/L)*	22	10	15	18	14	11		
Dissolved elements (mg/L)								**Guideline Levels[1]**
Al	0.04	0.02	<0.01	0.04	0.37	0.38		5
As	0.005	0.002	0.003	0.004	0.003	0.002		0.5
B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		5
Ca	3	2	5	2	1	1		1000
Cd	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		0.01
Cl	26	15	33	9	4	4		-
Co	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		1
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		1 / -
Cu	0.002	<0.001	<0.001	<0.001	<0.001	<0.001		1 / 0.5
Fe	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		-
K	2	2	3	3	2	2		-
Mg	3	2	7	3	2	2		-
Mn	0.002	0.001	0.002	<0.001	<0.001	0.001		-
Mo	0.016	0.02	0.036	0.028	0.012	0.007		0.15
Na	30	19	33	19	10	8		-
Ni	0.003	<0.001	<0.001	<0.001	<0.001	<0.001		1
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		0.1
SO_4	24	19	49	32	18	12		1,000
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		-
Se	0.01	<0.01	0.03	0.01	<0.01	<0.01		0.02
Zn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		20
RESULTS**								
SO_4 Release Rate	12	10	23	17	12	7		
Cumulative SO_4 Release	12	22	45	62	74	81		
Ca Release Rate	2	1	2	1	1	1		
Cumulative Ca Release	2	3	5	6	7	7		
Mg Release Rate	2	1	3.3	2	1	1		
Cumulative Mg Release	2	3	6	7	9	10		
Residual ANC (%)	100	100	100	100	100	100		
Residual Sulfur (%)	99	98	95	94	92	92		
SO_4/(Ca+Mg) molar ratio	1.3	1.5	1.2	1.9	1.7	1.2		

< indicates less than the analytical detection limit.

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

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

Total S = Total Sulfur, S_{CR} = Chromium Reducible Sulfur, MPA = Maximum Potential Acidity, ANC = Acid Neutralising Capacity, and NAPP = Net Acid Producing Potential

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

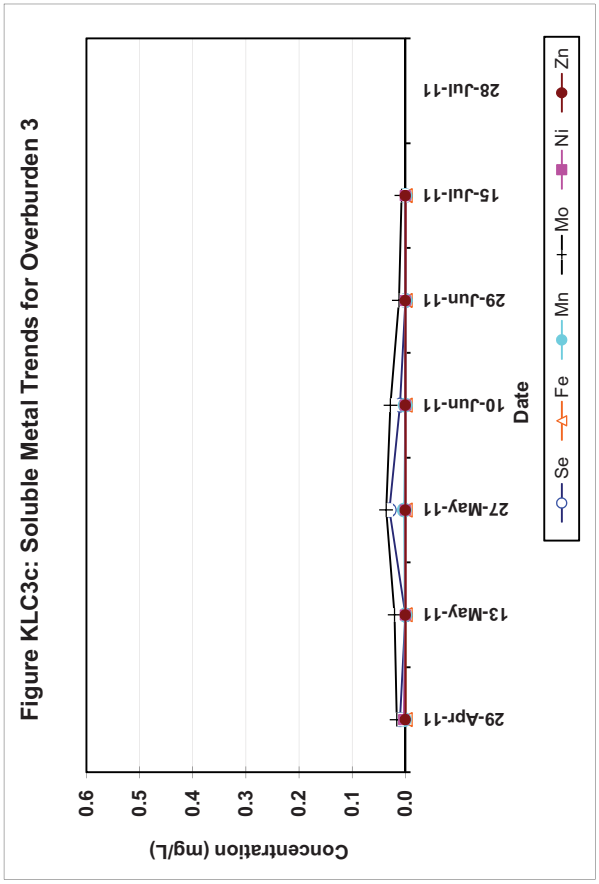


Figure KLC3c: Soluble Metal Trends for Overburden 3
Concentration (mg/L)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Date
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Se
Fe
Mn
Mo
Ni
Zn

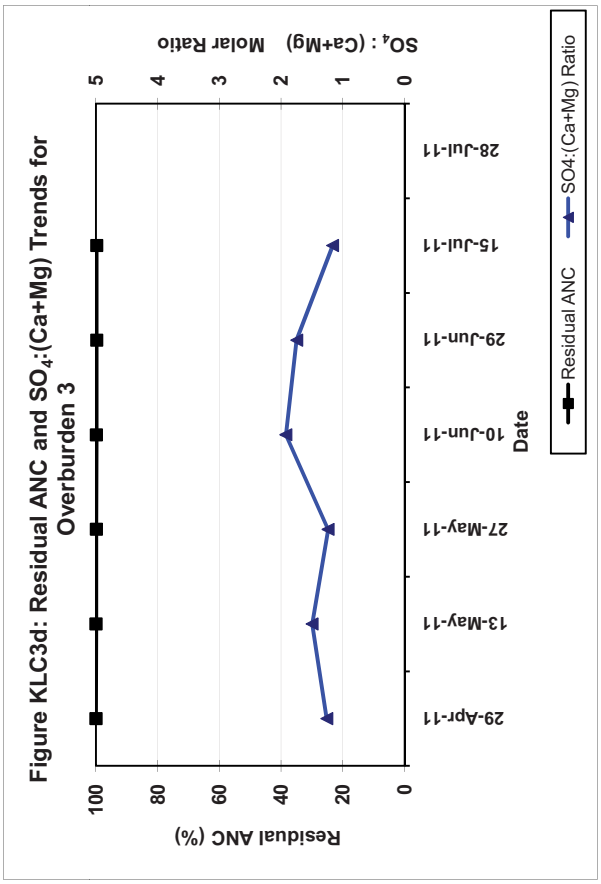


Figure KLC3d: Residual ANC and SO4:(Ca+Mg) Trends for Overburden 3
Residual ANC (%)
0
20
40
60
80
100
SO4 : (Ca+Mg) Molar Ratio
0
1
2
3
4
5
Date
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Residual ANC
SO4:(Ca+Mg) Ratio

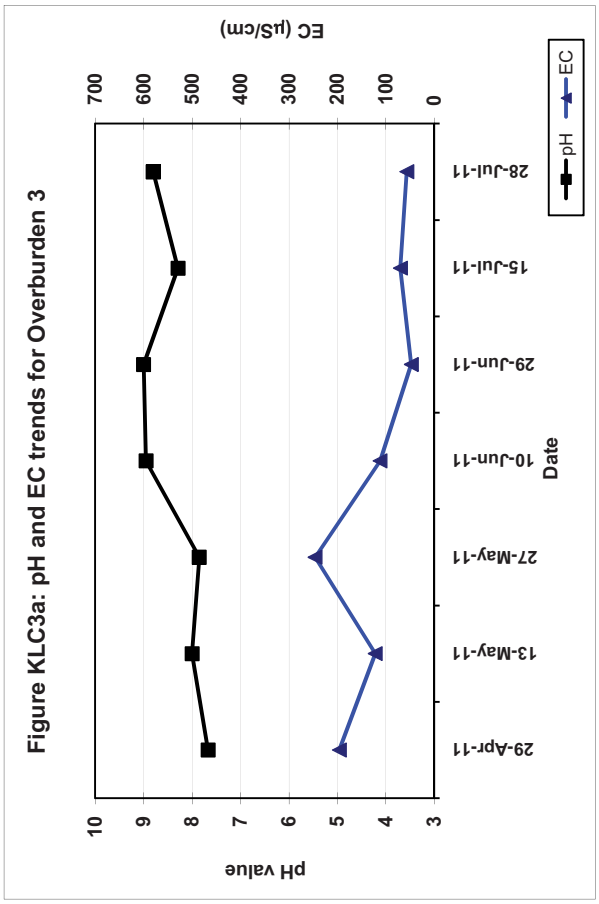


Figure KLC3a: pH and EC trends for Overburden 3
pH value
3
4
5
6
7
8
9
10
EC (µS/cm)
0
100
200
300
400
500
600
700
Date
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
pH
EC

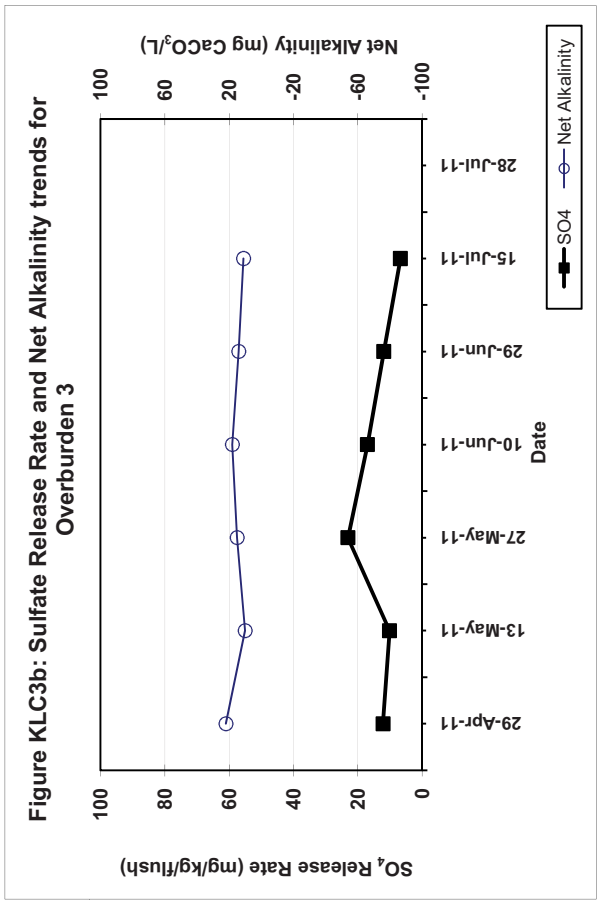


Figure KLC3b: Sulfate Release Rate and Net Alkalinity trends for Overburden 3
SO4 Release Rate (mg/kg/flush)
0
20
40
60
80
100
Net Alkalinity (mg CaCO3/L)
-100
-60
-20
20
60
100
Date
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
SO4
Net Alkalinity

Table KLC4

KLC4 Test Results: Coal Reject

Sample Weight (kg)	1.8	Total S (%)		0.14	ANC (kg H_2SO_4/t)		17.8	
pH(1:5)	8.0	S_{CR} (%)		0.062	NAPP (kg H_2SO_4/t)		-13.5	
EC(1:5) (µS/cm)	842	MPA (kg H_2SO_4/t)		4.3	ANC:MPA ratio		4.2	
Date	29-Apr-11	13-May-11	27-May-11	10-Jun-11	29-Jun-11	15-Jul-11	28-Jul-11	
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Volume Collected (L)	0.58	0.60	0.77	0.51	0.59	0.58	0.65	
Cum. Volume (L)	0.58	1.18	1.95	2.46	3.05	3.63	4.28	
Pore Volumes	0.4	0.9	1.4	1.8	2.3	2.7	3.2	
pH	7.34	7.63	7.23	7.60	7.75	7.43	7.95	
EC (µS/cm)	1,290	4,140	1,389	1,223	1,331	1,200	806	
Acidity (mg/L)*	<1	2	3	3	2	2		
Alkalinity (mg/L)*	15	57	12	11	21	24		
Net Alkalinity (mg/L)*	15	55	9	8	19	22		
Dissolved elements (mg/L)								**Guideline Levels[1]**
Al	0.01	<0.01	<0.01	<0.01	<0.01	<0.01		5
As	0.037	0.049	0.012	0.035	0.004	0.014		0.5
B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		5
Ca	24	107	32	25	30	23		1000
Cd	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001		0.01
Cl	635	1410	531	457	450	409		-
Co	0.002	0.005	0.001	<0.001	<0.001	<0.001		1
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		1 / -
Cu	0.001	0.002	0.001	0.002	<0.001	<0.001		1 / 0.5
Fe	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		-
K	10	26	13	11	11	11		-
Mg	28	138	42	41	36	27		-
Mn	0.044	0.136	0.035	0.031	0.030	0.019		-
Mo	0.005	0.018	0.008	0.008	0.010	0.009		0.15
Na	239	523	211	210	205	147		-
Ni	0.005	0.009	0.002	0.003	0.002	0.002		1
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		0.1
SO_4	43	130	40	70	95	78		1,000
Sb	<0.001	0.001	<0.001	<0.001	<0.001	<0.001		-
Se	0.15	0.22	0.06	0.14	0.03	0.06		0.02
Zn	<0.005	0.009	<0.005	<0.005	<0.005	<0.005		20
RESULTS**								
SO_4 Release Rate	14.3	45	18	21	32	26		
Cumulative SO_4 Release	14.3	59	76	97	129	155		
Ca Release Rate	8.0	36.7	14.0	7.3	10.1	7.6		
Cumulative Ca Release	8.0	44.6	58.7	66.0	76.1	83.7		
Mg Release Rate	9.3	47.3	18.4	12.0	12.1	8.9		
Cumulative Mg Release	9.3	56.6	75.0	87.0	99.1	108.1		
Residual ANC (%)	100	98	97	97	97	96		
Residual Sulfur (%)	100	99	98	98	97	96		
SO_4/(Ca+Mg) molar ratio	0.3	0.2	0.2	0.3	0.4	0.5		

< indicates less than the analytical detection limit.

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

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

Total S = Total Sulfur, S_{CR} = Chromium Reducible Sulfur, MPA = Maximum Potential Acidity, ANC = Acid Neutralising Capacity, and NAPP = Net Acid Producing Potential

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

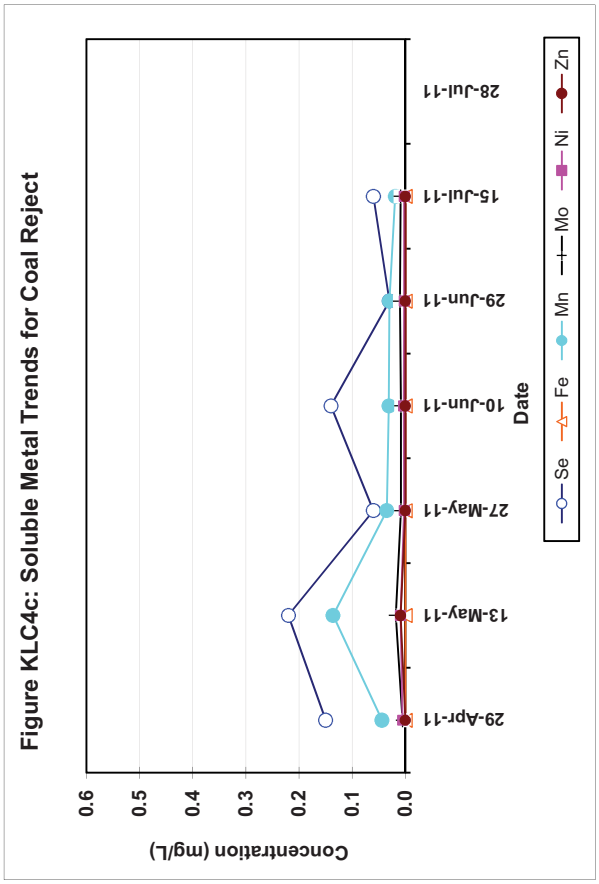


Figure KLC4c: Soluble Metal Trends for Coal Reject
Concentration (mg/L)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Date
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Se
Fe
Mn
Mo
Ni
Zn

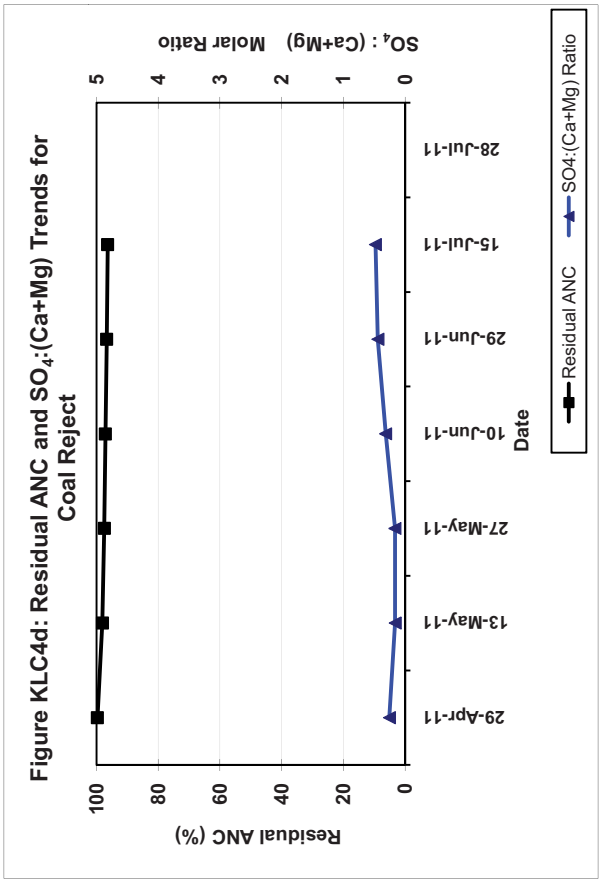


Figure KLC4d: Residual ANC and SO4:(Ca+Mg) Trends for Coal Reject
Residual ANC (%)
0
20
40
60
80
100
SO4 : (Ca+Mg) Molar Ratio
0
1
2
3
4
5
Date
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Residual ANC
SO4:(Ca+Mg) Ratio

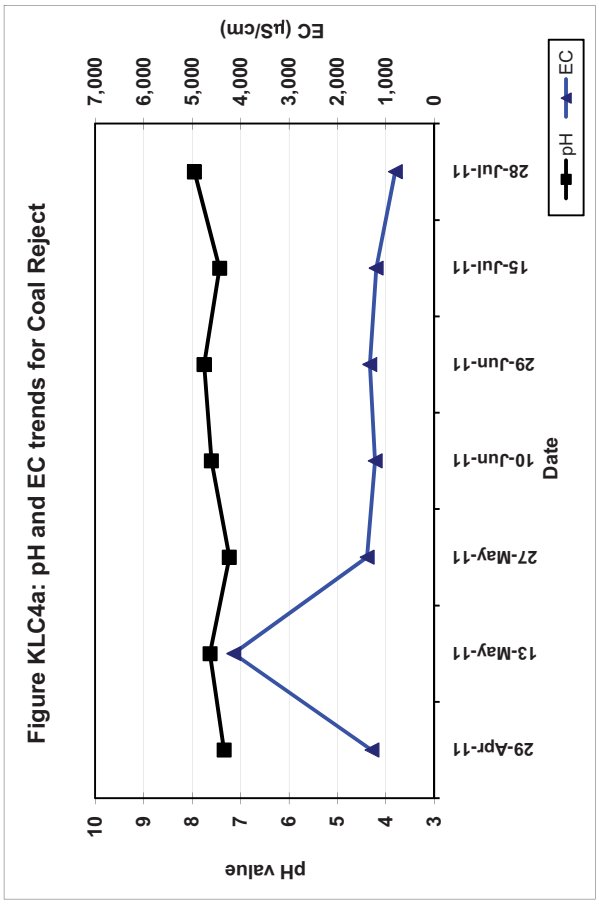


Figure KLC4a: pH and EC trends for Coal Reject
pH value
3
4
5
6
7
8
9
10
EC (µS/cm)
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
Date
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
pH
EC

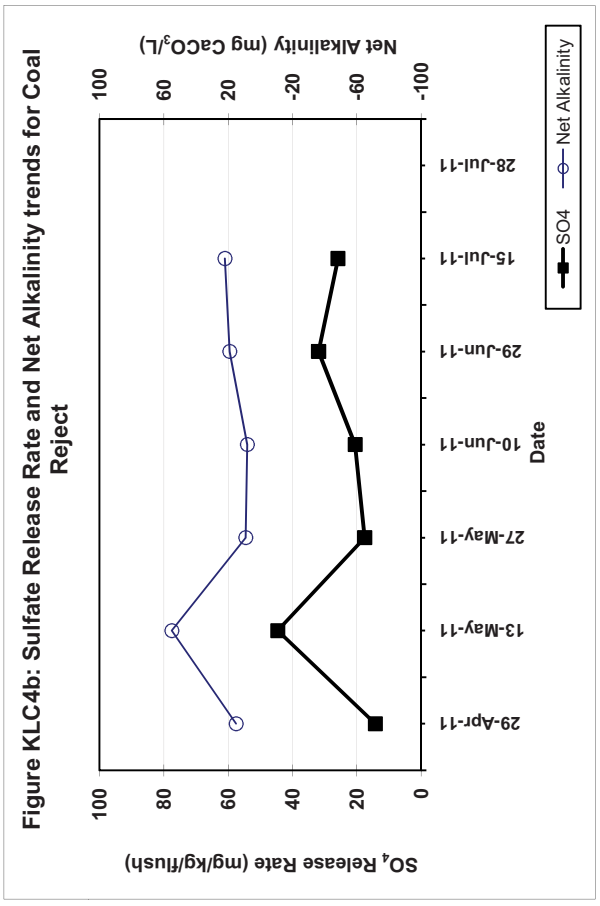


Figure KLC4b: Sulfate Release Rate and Net Alkalinity trends for Coal Reject
SO4 Release Rate (mg/kg/flush)
0
20
40
60
80
100
Net Alkalinity (mg CaCO3/L)
-100
-60
-20
20
60
100
Date
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
SO4
Net Alkalinity

Table KLC5

KLC5 Test Results: Coal Reject

Sample Weight (kg)	1.5	**Total S (%)**		0.16	**ANC (kg H_2SO_4/t)**		68.9	
pH(1:5)	7.7	**S_{CR} (%)**		0.084	**NAPP (kg H_2SO_4/t)**		-64.0	
EC(1:5) (µS/cm)	784	**MPA (kg H_2SO_4/t)**		4.9	**ANC:MPA ratio**		14.1	
Date	29-Apr-11	13-May-11	27-May-11	10-Jun-11	29-Jun-11	15-Jul-11	28-Jul-11	
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Volume Collected (L)	0.65	0.68	0.90	0.52	0.66	0.59	0.69	
Cum. Volume (L)	0.65	1.33	2.23	2.75	3.41	4.00	4.69	
Pore Volumes	0.6	1.2	1.9	2.4	3.0	3.5	4.1	
pH	6.61	7.62	7.54	7.45	7.96	7.86	8.12	
EC (µS/cm)	2,140	2,440	957	821	685	539	416	
Acidity (mg/L)*	4	5	3	2	2	2		
Alkalinity (mg/L)*	4	45	51	30	39	48		
Net Alkalinity (mg/L)*	0	40	48	28	37	46		
Dissolved elements (mg/L)								**Guideline Levels[1]**
Al	<0.01	<0.01	<0.01	0.02	0.02	0.07		5
As	0.051	0.012	0.016	0.025	0.014	0.016		0.5
B	0.05	<0.05	<0.05	<0.05	<0.05	<0.05		5
Ca	39	60	15	12	9	7		1000
Cd	0.0016	0.0004	<0.0001	<0.0001	<0.0001	<0.0001		0.01
Cl	855	877	285	149	74	30		-
Co	0.078	0.043	0.01	0.005	0.002	0.002		1
Cr	<0.001	<0.001	0.003	<0.001	<0.001	<0.001		1 / -
Cu	<0.001	0.003	<0.001	0.002	<0.001	<0.001		1 / 0.5
Fe	0.16	<0.05	<0.05	<0.05	<0.05	<0.05		-
K	11	23	8	7	6	6		-
Mg	38	61	15	10	9	6		-
Mn	0.205	0.165	0.044	0.02	0.007	0.005		-
Mo	0.002	0.018	0.016	0.029	0.023	0.017		0.15
Na	496	481	219	153	127	86		-
Ni	0.108	0.096	0.021	0.008	0.004	0.003		1
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		0.1
SO_4	390	324	157	176	194	136		1,000
Sb	<0.001	<0.001	<0.001	0.001	0.001	0.001		-
Se	0.26	0.11	0.05	0.07	0.01	0.01		0.02
Zn	0.2	0.036	0.007	<0.005	<0.005	<0.005		20
RESULTS**								
SO_4 Release Rate	175	152	97	63	89	55		
Cumulative SO_4 Release	175	327	424	487	575	631		
Ca Release Rate	17	28.1	9.3	4.3	4.1	2.8		
Cumulative Ca Release	17	46	55	59	63	66		
Mg Release Rate	17.0	28.6	9.3	3.6	4.1	2.4		
Cumulative Mg Release	17.0	45.6	54.9	58.5	62.6	65.1		
Residual ANC (%)	100	100	99	99	99	99		
Residual Sulfur (%)	96	93	91	90	88	87		
SO_4/(Ca+Mg) molar ratio	1.6	0.8	1.6	2.6	3.4	3.4		

< indicates less than the analytical detection limit.

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

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

Total S = Total Sulfur, S_{CR} = Chromium Reducible Sulfur, MPA = Maximum Potential Acidity, ANC = Acid Neutralising Capacity, and NAPP = Net Acid Producing Potential

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

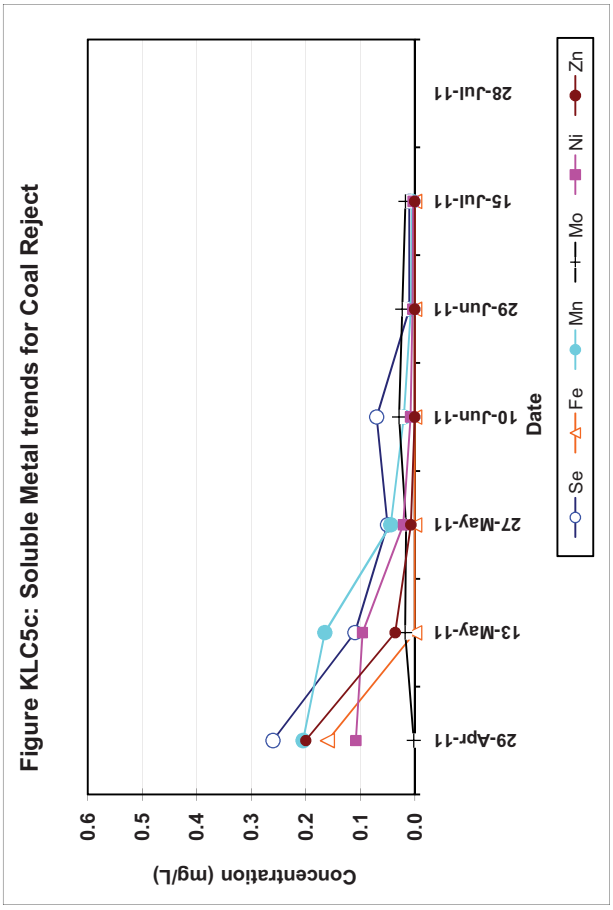


Figure KLC5c: Soluble Metal trends for Coal Reject
Concentration (mg/L)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
Se
Fe
Mn
Mo
Ni
Zn

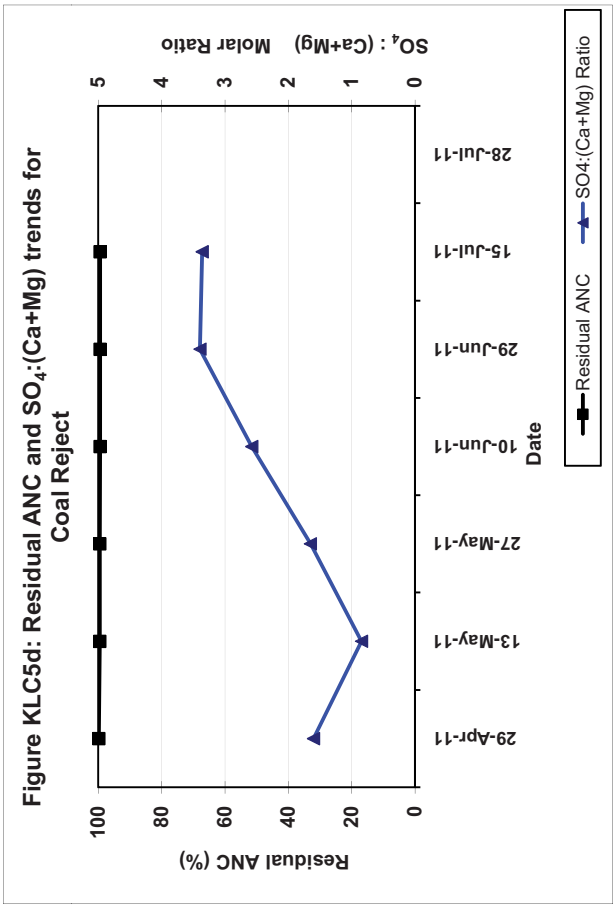


Figure KLC5d: Residual ANC and SO4:(Ca+Mg) trends for Coal Reject
Residual ANC (%)
0
20
40
60
80
100
SO4 : (Ca+Mg) Molar Ratio
0
1
2
3
4
5
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
Residual ANC
SO4:(Ca+Mg) Ratio

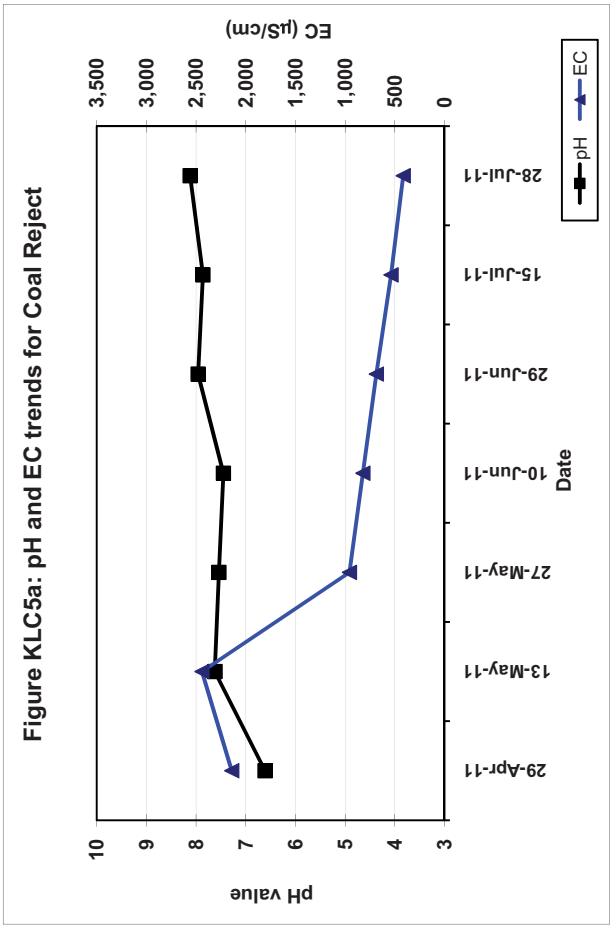


Figure KLC5a: pH and EC trends for Coal Reject
pH value
3
4
5
6
7
8
9
10
EC (µS/cm)
0
500
1,000
1,500
2,000
2,500
3,000
3,500
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
pH
EC

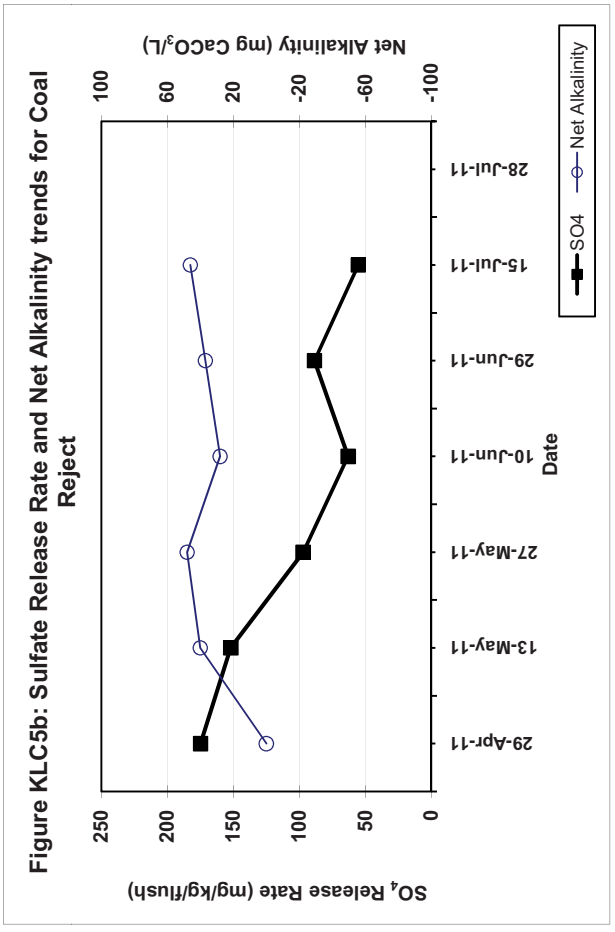


Figure KLC5b: Sulfate Release Rate and Net Alkalinity trends for Coal Reject
SO4 Release Rate (mg/kg/flush)
0
50
100
150
200
250
Net Alkalinity (mg CaCO3/L)
-100
-60
-20
20
60
100
29-Apr-11
13-May-11
27-May-11
10-Jun-11
29-Jun-11
15-Jul-11
28-Jul-11
Date
SO4
Net Alkalinity

ATTACHMENT D

ALS Laboratory Results

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1104975**	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	: Drayton South Project	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 15-MAR-2011
Sampler	: Anglocoal	Issue Date	: 29-MAR-2011
Site	: Drayton South		
		No. of samples received	: 6
Quote number	: BN/567/10	No. of samples analysed	: 6

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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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
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY

Environmental Division Brisbane
Part of the ALS Laboratory Group
32 Shand Street Stafford QLD Australia 4053
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A Campbell Brothers Limited Company

Page	:	2 of 4
Work Order	:	EB1104975
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

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

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

Page	:	3 of 4
Work Order	:	EB1104975
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	DD1158 EO 001 28.25 - 28.81	DD1158 EO 002 37.09 - 37.44	DD1158 EO 003 60.23 - 60.62	DD1158 EO 004 66.59 - 67.1	DD1158 EO 005 78.26 - 78.7
				Client sampling date / time	02-MAR-2011 15:00	02-MAR-2011 15:00	02-MAR-2011 15:00	02-MAR-2011 15:00	02-MAR-2011 15:00
					EB1104975-001	EB1104975-002	EB1104975-003	EB1104975-004	EB1104975-005
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.4**	**9.3**	**9.8**	**9.9**	**9.7**
EA009: Nett Acid Production Potential									
^ Acid Production Potential (APP)	----	0.5	kg H2SO4/t		**0.6**	<0.5	**6.5**	<0.5	**0.9**
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-18.5**	**-86.5**	**-57.8**	**-229**	**-18.0**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**152**	**123**	**234**	**341**	**279**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**19.1**	**87.0**	**64.4**	**230**	**18.9**
^ ANC as CaCO3	----	0.1	% CaCO3		**2.0**	**8.9**	**6.6**	**23.4**	**1.9**
Fizz Rating	----	0	Fizz Unit		**0**	**2**	**2**	**3**	**0**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.02**	**0.02**	**0.21**	**0.02**	**0.03**

Page	:	4 of 4
Work Order	:	EB1104975
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

Analytical Results

Sub-Matrix: **SOIL**				Client sample ID	**DD1158 EO 006 94.06 - 94.53**	----	----	----	----
				Client sampling date / time	02-MAR-2011 15:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1104975-006**	**----**	**----**	**----**	**----**
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.7**	----	----	----	----
EA009: Nett Acid Production Potential									
^ Acid Production Potential (APP)	----	0.5	kg H2SO4/t		<0.5	----	----	----	----
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-247**	----	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**163**	----	----	----	----
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**248**	----	----	----	----
^ ANC as CaCO3	----	0.1	% CaCO3		**25.2**	----	----	----	----
Fizz Rating	----	0	Fizz Unit		**3**	----	----	----	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.01**	----	----	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1104977**	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	: Drayton South Project	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 15-MAR-2011
Sampler	: Anglocoal	Issue Date	: 29-MAR-2011
Site	: Drayton South		
		No. of samples received	: 7
Quote number	: BN/567/10	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.

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- 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
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY

Page	:	2 of 4
Work Order	:	EB1104977
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

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

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

Page	:	3 of 4
Work Order	:	EB1104977
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	DD1156 EO 001 53.69 - 54.09	DD1156 EO 002 62.83 - 63.15	DD1156 EO 003 68.69 - 69.1	DD1156 EO 004 83.46 - 83.79	DD1156 EO 005 104.72 - 105.21
				Client sampling date / time	02-MAR-2011 15:00	02-MAR-2011 15:00	02-MAR-2011 15:00	02-MAR-2011 15:00	02-MAR-2011 15:00
					EB1104977-001	EB1104977-002	EB1104977-003	EB1104977-004	EB1104977-005
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.3**	**9.2**	**9.4**	**9.8**	**9.4**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-12.5**	**-7.7**	**-10.2**	**-8.4**	**-30.7**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**180**	**153**	**168**	**274**	**337**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**12.5**	**8.3**	**10.8**	**8.4**	**31.2**
^ ANC as CaCO3	----	0.1	% CaCO3		**1.3**	**0.8**	**1.1**	**0.9**	**3.2**
Fizz Rating	----	0	Fizz Unit		**0**	**0**	**0**	**0**	**2**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		<0.01	**0.02**	**0.02**	<0.01	**0.02**

Page	:	4 of 4
Work Order	:	EB1104977
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

Analytical Results

Sub-Matrix: **SOIL**				Client sample ID	DD1156 EO 006 123.91 - 124.28	DD1156 EO 007 138.65 - 139.02	----	----	----
				Client sampling date / time	02-MAR-2011 15:00	02-MAR-2011 15:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1104977-006**	**EB1104977-007**	**----**	**----**	**----**
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.8**	**10.1**	----	----	----
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-9.7**	**-65.7**	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**185**	**289**	----	----	----
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**10.1**	**68.0**	----	----	----
^ ANC as CaCO3	----	0.1	% CaCO3		**1.0**	**6.9**	----	----	----
Fizz Rating	----	0	Fizz Unit		**0**	**2**	----	----	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.01**	**0.08**	----	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1104978**	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	: Drayton South Project	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 15-MAR-2011
Sampler	: Anglocoal	Issue Date	: 29-MAR-2011
Site	: Drayton South		
		No. of samples received	: 8
Quote number	: BN/567/10	No. of samples analysed	: 8

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Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY

Page	:	2 of 4
Work Order	:	EB1104978
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

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

Page : 3 of 4
Work Order : EB1104978
Client : RGS ENVIRONMENTAL PTY LTD
Project : Drayton South Project

Analytical Results

Sub-Matrix: **SOIL**				Client sample ID	DD1151 EO 001 15.42 - 15.83	DD1151 EO 002 20.27 - 20.96	DD1151 EO 003 23.76 - 24.3	DD1151 EO 004 25 - 25.39	DD1151 EO 005 26.87 - 27.46
				Client sampling date / time	[15-MAR-2011]	[15-MAR-2011]	[15-MAR-2011]	[15-MAR-2011]	[15-MAR-2011]
Compound	*CAS Number*	*LOR*	*Unit*		**EB1104978-001**	**EB1104978-002**	**EB1104978-003**	**EB1104978-004**	**EB1104978-005**
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**8.9**	**9.4**	**9.5**	**9.5**	**9.3**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-7.6**	**-89.8**	**-31.0**	<0.5	**-15.6**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**351**	**275**	**206**	**313**	**294**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**7.9**	**96.8**	**31.9**	**13.7**	**28.2**
^ ANC as CaCO3	----	0.1	% CaCO3		**0.8**	**9.9**	**3.2**	**1.4**	**2.9**
Fizz Rating	----	0	Fizz Unit		**0**	**2**	**2**	**0**	**2**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.01**	**0.23**	**0.03**	**0.45**	**0.41**

Page	:	4 of 4
Work Order	:	EB1104978
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

Analytical Results

Sub-Matrix: **SOIL**				Client sample ID	DD1151 EO 006 31.58 - 31.95	DD1151 EO 007 38.19 - 38.54	DD1151 EO 008 39.75 - 40.22	----	----
				Client sampling date / time	[15-MAR-2011]	[15-MAR-2011]	[15-MAR-2011]	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1104978-006**	**EB1104978-007**	**EB1104978-008**	**----**	**----**
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.4**	**9.5**	**9.4**	----	----
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-10.3**	**-7.9**	**-13.0**	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**281**	**206**	**167**	----	----
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**11.1**	**10.0**	**16.2**	----	----
^ ANC as CaCO3	----	0.1	% CaCO3		**1.1**	**1.0**	**1.6**	----	----
Fizz Rating	----	0	Fizz Unit		**0**	**0**	**0**	----	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.02**	**0.06**	**0.10**	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1104980**	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	: Drayton South Project	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 15-MAR-2011
Sampler	: Anglocoal	Issue Date	: 29-MAR-2011
Site	: Drayton South		
		No. of samples received	: 9
Quote number	: BN/567/10	No. of samples analysed	: 9

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Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY

Page	:	2 of 4
Work Order	:	EB1104980
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

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

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

Page	:	3 of 4
Work Order	:	EB1104980
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

Analytical Results

Sub-Matrix: **SOIL**				Client sample ID	DD1150 EO 001 18.1 - 18.61	DD1150 EO 002 19.73 - 20.02	DD1150 EO 003 20.93 - 21.28	DD1150 EO 004 25.53 - 25.82	DD1150 EO 005 27.57 - 28.05
				Client sampling date / time	[15-MAR-2011]	[15-MAR-2011]	[15-MAR-2011]	[15-MAR-2011]	[15-MAR-2011]
Compound	*CAS Number*	*LOR*	*Unit*		**EB1104980-001**	**EB1104980-002**	**EB1104980-003**	**EB1104980-004**	**EB1104980-005**
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.1**	**8.8**	**8.3**	**9.6**	**9.5**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-6.6**	**-5.7**	**-3.7**	**-303**	**-11.9**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**252**	**184**	**436**	**270**	**341**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**6.6**	**6.7**	**13.9**	**303**	**12.5**
^ ANC as CaCO3	----	0.1	% CaCO3		**0.7**	**0.7**	**1.4**	**30.9**	**1.3**
Fizz Rating	----	0	Fizz Unit		**0**	**0**	**0**	**4**	**0**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		<0.01	**0.03**	**0.33**	**0.02**	**0.02**

Page	:	4 of 4
Work Order	:	EB1104980
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

Analytical Results

Sub-Matrix: **SOIL**				Client sample ID	DD1150 EO 006 29.47 - 29.81	DD1150 EO 007 32 - 32.37	DD1150 EO 008 38.5 - 39	DD1150 EO 009 42.86 - 43.13	----
				Client sampling date / time	[15-MAR-2011]	[15-MAR-2011]	[15-MAR-2011]	[15-MAR-2011]	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1104980-006**	**EB1104980-007**	**EB1104980-008**	**EB1104980-009**	**----**
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.2**	**9.6**	**9.7**	**9.5**	----
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**16.9**	**-15.0**	**-11.6**	**-10.6**	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**262**	**215**	**202**	**237**	----
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**9.6**	**15.6**	**12.2**	**12.5**	----
^ ANC as CaCO3	----	0.1	% CaCO3		**1.0**	**1.6**	**1.2**	**1.3**	----
Fizz Rating	----	0	Fizz Unit		**0**	**0**	**0**	**0**	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.86**	**0.02**	**0.02**	**0.06**	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1104981**	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	: Drayton South Project	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 15-MAR-2011
Sampler	: Anglocoal	Issue Date	: 29-MAR-2011
Site	: Drayton South		
		No. of samples received	: 6
Quote number	: BN/567/10	No. of samples analysed	: 6

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

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

Page	:	2 of 4
Work Order	:	EB1104981
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

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

Page : 3 of 4
Work Order : EB1104981
Client : RGS ENVIRONMENTAL PTY LTD
Project : Drayton South Project

Analytical Results

Sub-Matrix: **SOIL**				Client sample ID	DD1163 EO 001 17.46 - 17.88	DD1163 EO 002 25.02 - 25.37	DD1163 EO 003 28.71 - 29.11	DD1163 EO 004 39.76 - 40.07	DD1163 EO 005 54.08 - 54.44
				Client sampling date / time	02-MAR-2011 15:00	02-MAR-2011 15:00	02-MAR-2011 15:00	02-MAR-2011 15:00	02-MAR-2011 15:00
Compound	*CAS Number*	*LOR*	*Unit*		**EB1104981-001**	**EB1104981-002**	**EB1104981-003**	**EB1104981-004**	**EB1104981-005**
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.4**	**9.3**	**9.1**	**8.8**	**8.4**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-17.0**	**-49.0**	**-29.6**	**-14.4**	**-12.8**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**227**	**167**	**167**	**142**	**145**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**17.0**	**49.0**	**30.0**	**14.7**	**14.4**
^ ANC as CaCO3	----	0.1	% CaCO3		**1.7**	**5.0**	**3.1**	**1.5**	**1.5**
Fizz Rating	----	0	Fizz Unit		**0**	**2**	**2**	**0**	**0**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		<0.01	<0.01	**0.01**	**0.01**	**0.05**

Page	:	4 of 4
Work Order	:	EB1104981
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

Analytical Results

Sub-Matrix: **SOIL**				Client sample ID	**DD1163 EO 006 60.81 - 61.24**	----	----	----	----
				Client sampling date / time	02-MAR-2011 15:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1104981-006**	**----**	**----**	**----**	**----**
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.0**	----	----	----	----
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-13.3**	----	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**134**	----	----	----	----
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**13.7**	----	----	----	----
^ ANC as CaCO3	----	0.1	% CaCO3		**1.4**	----	----	----	----
Fizz Rating	----	0	Fizz Unit		**0**	----	----	----	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.01**	----	----	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1107153**	Page	: 1 of 8
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	: DRAYTON SOUTH	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 10-APR-2011
Sampler	: ----	Issue Date	: 06-MAY-2011
Site	: ----		
		No. of samples received	: 13
Quote number	: BN/057/11 V2	No. of samples analysed	: 13

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Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Myles.Clark	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics

Page	:	2 of 8
Work Order	:	EB1107153
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	DRAYTON SOUTH

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- **$$: NATA accreditation does not cover performance of this service.**

Page : 3 of 8
Work Order : EB1107153
Client : RGS ENVIRONMENTAL PTY LTD
Project : DRAYTON SOUTH

Analytical Results

Sub-Matrix: PULP				Client sample ID	EB1104975-1	EB1104975-3	EB1104977-3	EB1104977-4	EB1104978-2
				Client sampling date / time	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00
Compound	CAS Number	LOR	Unit		EB1107153-001	EB1107153-002	EB1107153-003	EB1107153-004	EB1107153-005
EA026 : Chromium Reducible Sulfur									
Chromium Reducible Sulphur	----	0.005	%		----	0.016	----	----	0.006
ED007: Exchangeable Cations									
^ Exchangeable Calcium	----	0.1	meq/100g		9.7	20.1	1.8	10.4	21.5
^ Exchangeable Magnesium	----	0.1	meq/100g		6.0	6.3	4.3	8.9	3.5
^ Exchangeable Potassium	----	0.1	meq/100g		0.6	0.5	0.8	1.0	0.5
^ Exchangeable Sodium	----	0.1	meq/100g		0.8	2.4	1.4	4.7	1.6
^ Cation Exchange Capacity	----	0.1	meq/100g		17.0	29.3	8.4	25.1	27.2
^ Exchangeable Sodium Percent	----	0.1	%		4.6	8.1	17.3	18.9	6.0
ED037: Alkalinity									
Total Alkalinity as CaCO3	----	1	mg/kg		3240	10200	1350	2450	39300
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg		2960	9450	1300	1730	38600
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		288	721	48	721	673
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		110	100	80	20	150
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		50	40	60	60	170
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		20	<10	<10	<10	20
Magnesium	7439-95-4	10	mg/kg		20	<10	<10	<10	20
Sodium	7440-23-5	10	mg/kg		110	260	160	270	250
Potassium	7440-09-7	10	mg/kg		20	20	30	10	30
ED093T: Total Major Cations									
Sodium	7440-23-5	10	mg/kg		340	880	470	1300	900
Potassium	7440-09-7	10	mg/kg		950	1120	1550	1260	900
Calcium	7440-70-2	10	mg/kg		6260	32800	3820	2790	38600
Magnesium	7439-95-4	10	mg/kg		3800	9870	4540	1540	3750
EG005S : Soluble Metals by ICPAES									
Aluminium	7429-90-5	1	mg/kg		<1	2	9	6	<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		1.2	0.2	0.1	0.2	<0.1
Boron	7440-42-8	1	mg/kg		<1	<1	<1	<1	<1
Cadmium	7440-43-9	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Iron	7439-89-6	1	mg/kg		<1	<1	2	<1	<1
Lead	7439-92-1	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1

Page : 4 of 8
Work Order : EB1107153
Client : RGS ENVIRONMENTAL PTY LTD
Project : DRAYTON SOUTH

Analytical Results

Sub-Matrix: **PULP**				Client sample ID	EB1104975-1	EB1104975-3	EB1104977-3	EB1104977-4	EB1104978-2
				Client sampling date / time	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00
Compound	*CAS Number*	*LOR*	*Unit*		**EB1107153-001**	**EB1107153-002**	**EB1107153-003**	**EB1107153-004**	**EB1107153-005**
EG005S : Soluble Metals by ICPAES - Continued									
Manganese	7439-96-5	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	7439-98-7	0.1	mg/kg		**0.6**	**0.5**	**0.4**	<0.1	**0.1**
Nickel	7440-02-0	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.1	mg/kg		**0.1**	**0.1**	**0.2**	<0.1	**0.1**
Zinc	7440-66-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		**2920**	**3740**	**3530**	**4230**	**6480**
Antimony	7440-36-0	5	mg/kg		<5	<5	<5	<5	<5
Arsenic	7440-38-2	5	mg/kg		**12**	<5	<5	<5	**17**
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		**14**	**8**	**9**	<2	**31**
Cobalt	7440-48-4	2	mg/kg		**36**	**20**	**21**	<2	**13**
Copper	7440-50-8	5	mg/kg		**16**	**21**	**30**	**5**	**12**
Iron	7439-89-6	50	mg/kg		**51000**	**22500**	**110000**	**1110**	**17400**
Lead	7439-92-1	5	mg/kg		**10**	**8**	**12**	**52**	**10**
Manganese	7439-96-5	5	mg/kg		**837**	**367**	**2200**	<5	**558**
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg		**36**	**28**	**24**	<2	**28**
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg		**64**	**67**	**132**	**104**	**41**

Page : 5 of 8
Work Order : EB1107153
Client : RGS ENVIRONMENTAL PTY LTD
Project : DRAYTON SOUTH

Analytical Results

Sub-Matrix: **PULP**				Client sample ID	EB1104978-4	EB1104978-5	EB1104978-8	EB1104980-2	EB1104980-3
				Client sampling date / time	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00
Compound	*CAS Number*	*LOR*	*Unit*		EB1107153-006	EB1107153-007	EB1107153-008	EB1107153-009	EB1107153-010
EA026 : Chromium Reducible Sulfur									
Chromium Reducible Sulphur	----	0.005	%		**0.117**	**0.029**	----	----	**0.236**
ED007: Exchangeable Cations									
^ Exchangeable Calcium	----	0.1	meq/100g		**18.4**	**19.7**	**2.9**	**5.8**	**11.5**
^ Exchangeable Magnesium	----	0.1	meq/100g		**9.2**	**5.4**	**6.0**	**14.4**	**24.5**
^ Exchangeable Potassium	----	0.1	meq/100g		**0.4**	**0.4**	**0.7**	**1.2**	**1.0**
^ Exchangeable Sodium	----	0.1	meq/100g		**3.4**	**2.0**	**2.6**	**3.6**	**5.6**
^ Cation Exchange Capacity	----	0.1	meq/100g		**31.4**	**27.4**	**12.2**	**25.0**	**42.6**
^ Exchangeable Sodium Percent	----	0.1	%		**10.8**	**7.3**	**21.6**	**14.4**	**13.2**
ED037: Alkalinity									
Total Alkalinity as CaCO3	----	1	mg/kg		**6010**	**4690**	**1830**	**2550**	**2760**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg		**5720**	**4690**	**1730**	**2480**	**2670**
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		**288**	<1	**96**	**72**	**96**
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		**270**	**500**	**210**	**230**	**500**
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		**120**	**130**	**80**	**140**	**80**
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		**10**	**70**	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg		**10**	**70**	<10	<10	<10
Sodium	7440-23-5	10	mg/kg		**420**	**320**	**270**	**240**	**350**
Potassium	7440-09-7	10	mg/kg		**10**	**30**	**10**	**10**	**10**
ED093T: Total Major Cations									
Sodium	7440-23-5	10	mg/kg		**1000**	**720**	**820**	**960**	**1410**
Potassium	7440-09-7	10	mg/kg		**690**	**730**	**1550**	**1920**	**1440**
Calcium	7440-70-2	10	mg/kg		**9370**	**9720**	**6380**	**2330**	**3790**
Magnesium	7439-95-4	10	mg/kg		**2340**	**2180**	**8250**	**4990**	**5470**
EG005S : Soluble Metals by ICPAES									
Aluminium	7429-90-5	1	mg/kg		<1	<1	**4**	**1**	<1
Antimony	7440-36-0	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	7440-38-2	0.1	mg/kg		**1.4**	<0.1	**0.2**	<0.1	**0.3**
Boron	7440-42-8	1	mg/kg		<1	<1	<1	<1	<1
Cadmium	7440-43-9	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
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

Page	:	6 of 8
Work Order	:	EB1107153
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	DRAYTON SOUTH

Analytical Results

Sub-Matrix: **PULP**				Client sample ID	EB1104978-4	EB1104978-5	EB1104978-8	EB1104980-2	EB1104980-3
				Client sampling date / time	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00
Compound	*CAS Number*	*LOR*	*Unit*		**EB1107153-006**	**EB1107153-007**	**EB1107153-008**	**EB1107153-009**	**EB1107153-010**
EG005S : Soluble Metals by ICPAES - Continued									
Manganese	7439-96-5	0.1	mg/kg		<0.1	**0.1**	<0.1	<0.1	<0.1
Molybdenum	7439-98-7	0.1	mg/kg		**0.1**	**1.0**	<0.1	<0.1	**0.2**
Nickel	7440-02-0	0.1	mg/kg		<0.1	**0.3**	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.1	mg/kg		**0.1**	**0.2**	**0.1**	**1.3**	**0.2**
Zinc	7440-66-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		**4190**	**3620**	**6220**	**12400**	**9940**
Antimony	7440-36-0	5	mg/kg		<5	**7**	<5	<5	<5
Arsenic	7440-38-2	5	mg/kg		**8**	**6**	<5	<5	**7**
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	**3**	<1	<1
Chromium	7440-47-3	2	mg/kg		**12**	**40**	**9**	**17**	**21**
Cobalt	7440-48-4	2	mg/kg		**15**	**74**	**19**	**17**	**24**
Copper	7440-50-8	5	mg/kg		**15**	**84**	**20**	**29**	**30**
Iron	7439-89-6	50	mg/kg		**5860**	**6060**	**163000**	**17400**	**12800**
Lead	7439-92-1	5	mg/kg		**6**	**22**	**13**	**8**	**13**
Manganese	7439-96-5	5	mg/kg		**78**	**141**	**2000**	**93**	**192**
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg		**64**	**283**	**20**	**40**	**204**
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg		**41**	**150**	**144**	**42**	**109**

Page : 7 of 8
Work Order : EB1107153
Client : RGS ENVIRONMENTAL PTY LTD
Project : DRAYTON SOUTH

Analytical Results

Sub-Matrix: **PULP**				Client sample ID	EB1104980-6	EB1104980-9	EB1022785-33	----	----
				Client sampling date / time	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1107153-011**	**EB1107153-012**	**EB1107153-013**	**----**	**----**
EA026 : Chromium Reducible Sulfur									
Chromium Reducible Sulphur	----	0.005	%		**0.398**	----	----	----	----
ED007: Exchangeable Cations									
^ Exchangeable Calcium	----	0.1	meq/100g		**4.8**	**4.7**	**3.5**	----	----
^ Exchangeable Magnesium	----	0.1	meq/100g		**6.9**	**9.9**	**2.8**	----	----
^ Exchangeable Potassium	----	0.1	meq/100g		**0.7**	**1.6**	**1.1**	----	----
^ Exchangeable Sodium	----	0.1	meq/100g		**2.0**	**4.2**	<0.1	----	----
^ Cation Exchange Capacity	----	0.1	meq/100g		**14.3**	**20.4**	**7.5**	----	----
^ Exchangeable Sodium Percent	----	0.1	%		**13.7**	**20.7**	**0.7**	----	----
ED037: Alkalinity									
Total Alkalinity as CaCO3	----	1	mg/kg		**2380**	**2550**	**697**	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg		**2380**	**2450**	**697**	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		<1	**96**	<1	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		**270**	**170**	**190**	----	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		**60**	**110**	<10	----	----
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		**10**	<10	**20**	----	----
Magnesium	7439-95-4	10	mg/kg		**20**	<10	**10**	----	----
Sodium	7440-23-5	10	mg/kg		**270**	**170**	<10	----	----
Potassium	7440-09-7	10	mg/kg		**30**	**10**	**60**	----	----
ED093T: Total Major Cations									
Sodium	7440-23-5	10	mg/kg		**690**	**1150**	**40**	----	----
Potassium	7440-09-7	10	mg/kg		**1220**	**2460**	**1160**	----	----
Calcium	7440-70-2	10	mg/kg		**1570**	**1250**	**1170**	----	----
Magnesium	7439-95-4	10	mg/kg		**3160**	**5060**	**2290**	----	----
EG005S : Soluble Metals by ICPAES									
Aluminium	7429-90-5	1	mg/kg		<1	**18**	<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	**1.0**	<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		<0.1	<0.1	<0.1	----	----
Iron	7439-89-6	1	mg/kg		<1	**2**	<1	----	----
Lead	7439-92-1	0.1	mg/kg		<0.1	<0.1	<0.1	----	----

Page : 8 of 8
Work Order : EB1107153
Client : RGS ENVIRONMENTAL PTY LTD
Project : DRAYTON SOUTH

Analytical Results

Sub-Matrix: **PULP**				Client sample ID	EB1104980-6	EB1104980-9	EB1022785-33	----	----
				Client sampling date / time	09-APR-2011 15:00	09-APR-2011 15:00	09-APR-2011 15:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1107153-011**	**EB1107153-012**	**EB1107153-013**	**----**	**----**
EG005S : Soluble Metals by ICPAES - Continued									
Manganese	7439-96-5	0.1	mg/kg		**0.1**	<0.1	**0.5**	----	----
Molybdenum	7439-98-7	0.1	mg/kg		**0.3**	<0.1	<0.1	----	----
Nickel	7440-02-0	0.1	mg/kg		<0.1	<0.1	**0.3**	----	----
Selenium	7782-49-2	0.1	mg/kg		<0.1	**0.1**	**0.1**	----	----
Zinc	7440-66-6	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		**6280**	**12200**	**4030**	----	----
Antimony	7440-36-0	5	mg/kg		<5	<5	<5	----	----
Arsenic	7440-38-2	5	mg/kg		<5	**5**	**14**	----	----
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		**12**	**11**	**15**	----	----
Cobalt	7440-48-4	2	mg/kg		**9**	**4**	**18**	----	----
Copper	7440-50-8	5	mg/kg		**25**	**29**	**26**	----	----
Iron	7439-89-6	50	mg/kg		**13000**	**18200**	**20500**	----	----
Lead	7439-92-1	5	mg/kg		**11**	**16**	**23**	----	----
Manganese	7439-96-5	5	mg/kg		**125**	**139**	**392**	----	----
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	----	----
Nickel	7440-02-0	2	mg/kg		**36**	**14**	**76**	----	----
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	----	----
Zinc	7440-66-6	5	mg/kg		**60**	**105**	**105**	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1105959**	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	: 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	: Drayton South Project	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 28-MAR-2011
Sampler	: SGS Newcastle R.Hall	Issue Date	: 11-APR-2011
Site	: Drayton South		
		No. of samples received	: 2
Quote number	: BN/567/10	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

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

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

Page	:	2 of 3
Work Order	:	EB1105959
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

General Comments

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

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

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

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

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

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

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

Page : 3 of 3
Work Order : EB1105959
Client : RGS ENVIRONMENTAL PTY LTD
Project : Drayton South Project

Analytical Results

Sub-Matrix: **SOIL**				Client sample ID	SCK Coal Reject	SCK Roof/Floor	----	----	----
				Client sampling date / time	[25-MAR-2011]	[25-MAR-2011]	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1105959-001**	**EB1105959-002**	**----**	**----**	**----**
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**8.0**	**7.7**	----	----	----
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-13.6**	**-64.1**	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**842**	**784**	----	----	----
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**17.8**	**68.9**	----	----	----
^ ANC as CaCO3	----	0.1	% CaCO3		**1.8**	**7.0**	----	----	----
Fizz Rating	----	0	Fizz Unit		**0**	**2**	----	----	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.14**	**0.16**	----	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1107132**	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	: Drayton South Project	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 12-APR-2011
Sampler	: ----	Issue Date	: 29-APR-2011
Site	: ----		
		No. of samples received	: 2
Quote number	: BN/057/11 V2	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

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

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

Page	:	2 of 4
Work Order	:	EB1107132
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	Drayton South Project

General Comments

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

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

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

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

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

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

Page : 3 of 4
Work Order : EB1107132
Client : RGS ENVIRONMENTAL PTY LTD
Project : Drayton South Project

Analytical Results

Sub-Matrix: **PULP**			Client sample ID	Coal Reject	Roof and Floor	----	----	----
			Client sampling date / time	27-MAR-2011 15:00	27-MAR-2011 15:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1107132-001**	**EB1107132-002**	**----**	**----**	**----**
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	**0.062**	**0.084**	----	----	----
ED007: Exchangeable Cations								
^ Exchangeable Calcium	----	0.1	meq/100g	**8.1**	**4.9**	----	----	----
^ Exchangeable Magnesium	----	0.1	meq/100g	**11.5**	**5.9**	----	----	----
^ Exchangeable Potassium	----	0.1	meq/100g	**0.7**	**0.6**	----	----	----
^ Exchangeable Sodium	----	0.1	meq/100g	**3.6**	**3.7**	----	----	----
^ Exchangeable Sodium Percent	----	0.1	%	**15.2**	**24.3**	----	----	----
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	**2020**	**6900**	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	**2020**	**6900**	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	<1	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**110**	**610**	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**1230**	**690**	----	----	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	**80**	**50**	----	----	----
Magnesium	7439-95-4	10	mg/kg	**80**	**50**	----	----	----
Sodium	7440-23-5	10	mg/kg	**600**	**690**	----	----	----
Potassium	7440-09-7	10	mg/kg	**70**	**50**	----	----	----
ED093T: Total Major Cations								
Sodium	7440-23-5	10	mg/kg	**990**	**1330**	----	----	----
Potassium	7440-09-7	10	mg/kg	**1150**	**1090**	----	----	----
Calcium	7440-70-2	10	mg/kg	**5460**	**16800**	----	----	----
Magnesium	7439-95-4	10	mg/kg	**3620**	**9430**	----	----	----
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	<1	<1	----	----	----
Antimony	7440-36-0	0.1	mg/kg	**0.1**	<0.1	----	----	----
Arsenic	7440-38-2	0.1	mg/kg	<0.1	<0.1	----	----	----
Boron	7440-42-8	1	mg/kg	<1	<1	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	----	----	----
Chromium	7440-47-3	0.1	mg/kg	<0.1	<0.1	----	----	----
Cobalt	7440-48-4	0.1	mg/kg	<0.1	<0.1	----	----	----
Copper	7440-50-8	0.1	mg/kg	<0.1	<0.1	----	----	----
Iron	7439-89-6	1	mg/kg	<1	<1	----	----	----
Lead	7439-92-1	0.1	mg/kg	<0.1	<0.1	----	----	----
Manganese	7439-96-5	0.1	mg/kg	**0.1**	**0.1**	----	----	----

Page : 4 of 4
Work Order : EB1107132
Client : RGS ENVIRONMENTAL PTY LTD
Project : Drayton South Project

Analytical Results

Sub-Matrix: **PULP**				Client sample ID	Coal Reject	Roof and Floor	----	----	----
				Client sampling date / time	27-MAR-2011 15:00	27-MAR-2011 15:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1107132-001**	**EB1107132-002**	**----**	**----**	**----**
EG005S : Soluble Metals by ICPAES - Continued									
Molybdenum	7439-98-7	0.1	mg/kg		**0.2**	<0.1	----	----	----
Nickel	7440-02-0	0.1	mg/kg		<0.1	<0.1	----	----	----
Selenium	7782-49-2	0.1	mg/kg		<0.1	**0.2**	----	----	----
Zinc	7440-66-6	0.1	mg/kg		<0.1	<0.1	----	----	----
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		**3940**	**3950**	----	----	----
Antimony	7440-36-0	5	mg/kg		<5	<5	----	----	----
Boron	7440-42-8	50	mg/kg		<50	<50	----	----	----
Cobalt	7440-48-4	2	mg/kg		**2**	**9**	----	----	----
Iron	7439-89-6	50	mg/kg		**25500**	**46400**	----	----	----
Manganese	7439-96-5	5	mg/kg		**321**	**404**	----	----	----
Molybdenum	7439-98-7	2	mg/kg		<2	<2	----	----	----
Selenium	7782-49-2	5	mg/kg		<5	<5	----	----	----
Phosphorus	7723-14-0	50	mg/kg		**280**	**710**	----	----	----
Arsenic	7440-38-2	5	mg/kg		<5	**17**	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg		**5**	**12**	----	----	----
Copper	7440-50-8	5	mg/kg		**11**	**25**	----	----	----
Lead	7439-92-1	5	mg/kg		**21**	**10**	----	----	----
Nickel	7440-02-0	2	mg/kg		**7**	**36**	----	----	----
Zinc	7440-66-6	5	mg/kg		**64**	**62**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	----	0.1	mg/kg		<0.1	<0.1	----	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1108503**	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	: 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	: 091018	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 091018		
C-O-C number	: ----	Date Samples Received	: 03-MAY-2011
Sampler	: A.Robertson	Issue Date	: 16-MAY-2011
Site	: Drayton South		
		No. of samples received	: 3
Quote number	: BN/567/10	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

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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 Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics

Page	:	2 of 3
Work Order	:	EB1108503
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018

General Comments

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

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

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

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

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

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

Page	:	3 of 3
Work Order	:	EB1108503
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018

Analytical Results

Sub-Matrix: **LEACHATE**				Client sample ID	Drayton South 1	Drayton South 2	Drayton South 3	----	----
				Client sampling date / time	29-APR-2011 15:00	29-APR-2011 15:00	29-APR-2011 15:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1108503-001**	**EB1108503-002**	**EB1108503-003**	**----**	**----**
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**9.52**	**7.86**	**7.67**	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**188**	**239**	**196**	----	----
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		**21**	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**25**	**29**	**22**	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**46**	**29**	**22**	----	----
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L		<1	<1	<1	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**26**	**32**	**24**	----	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		**12**	**26**	**26**	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**1**	**3**	**3**	----	----
Magnesium	7439-95-4	1	mg/L		**1**	**2**	**3**	----	----
Sodium	7440-23-5	1	mg/L		**36**	**40**	**30**	----	----
Potassium	7440-09-7	1	mg/L		**2**	**1**	**2**	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.16**	**0.04**	**0.04**	----	----
Antimony	7440-36-0	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L		**0.036**	**0.005**	**0.005**	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
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**	**0.002**	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		**0.003**	**0.003**	**0.003**	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	**0.002**	**0.002**	----	----
Molybdenum	7439-98-7	0.001	mg/L		**0.069**	**0.008**	**0.016**	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	**0.01**	**0.01**	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	<0.05	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1108899**	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	: 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	: 091018 DRAYTON SOUTH	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 09-MAY-2011
Sampler	: ----	Issue Date	: 23-MAY-2011
Site	: ----		
		No. of samples received	: 2
Quote number	: BN/057/11 V2	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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Signatories

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

Page	:	2 of 3
Work Order	:	EB1108899
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018 DRAYTON SOUTH

General Comments

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LOR = Limit of reporting
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- **EG020A-F (Dissolved Metals): LCS recovery for Se falls outside Dynamic Control Limits. They are however within ALS Static Control Limits and hence deemed acceptable.**
- **LCS recovery for EA010-P (Conductivity), ED037-P (Alkalinity) analyses fall outside Dynamic Control Limits. They are however within ALS Static Control Limits and hence deemed acceptable.**

Page	:	3 of 3
Work Order	:	EB1108899
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018 DRAYTON SOUTH

Analytical Results

Sub-Matrix: **LIQUID**				Client sample ID	DRAYTON SOUTH 4	DRAYTON SOUTH 5	----	----	----
				Client sampling date / time	29-APR-2011 15:00	29-APR-2011 15:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB1108899-001**	**EB1108899-002**	**----**	**----**	**----**
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.34**	**6.61**	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**1290**	**2140**	----	----	----
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		**15**	**4**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**15**	**4**	----	----	----
ED038A: Acidity									
Acidity as CaCO3	----	1	mg/L		<1	**4**	----	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**43**	**390**	----	----	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		**635**	**855**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**24**	**39**	----	----	----
Magnesium	7439-95-4	1	mg/L		**28**	**38**	----	----	----
Sodium	7440-23-5	1	mg/L		**239**	**496**	----	----	----
Potassium	7440-09-7	1	mg/L		**10**	**11**	----	----	----
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		**0.037**	**0.051**	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	**0.0016**	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.001**	<0.001	----	----	----
Cobalt	7440-48-4	0.001	mg/L		**0.002**	**0.078**	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.005**	**0.108**	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.200**	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.044**	**0.205**	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		**0.005**	**0.002**	----	----	----
Selenium	7782-49-2	0.01	mg/L		**0.15**	**0.26**	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	**0.05**	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	**0.16**	----	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1109558**	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	: 091018 Drayton South	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 16-MAY-2011
Sampler	: A. Robertson	Issue Date	: 30-MAY-2011
Site	: ----		
		No. of samples received	: 5
Quote number	: BN/057/11 V2	No. of samples analysed	: 5

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

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

Page	:	2 of 4
Work Order	:	EB1109558
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018 Drayton South

General Comments

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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 : EB1109558
Client : RGS ENVIRONMENTAL PTY LTD
Project : 091018 Drayton South

Analytical Results

Sub-Matrix: **WATER**				Client sample ID	Drayton South 1	Drayton South 2	Drayton South 3	Drayton South 4	Drayton South 5
				Client sampling date / time	13-MAY-2011 15:00	13-MAY-2011 15:00	13-MAY-2011 15:00	13-MAY-2011 15:00	13-MAY-2011 15:00
Compound	*CAS Number*	*LOR*	*Unit*		**EB1109558-001**	**EB1109558-002**	**EB1109558-003**	**EB1109558-004**	**EB1109558-005**
EA005P: pH by PC Titrator									
pH Value	---	0.01	pH Unit		**9.27**	**9.12**	**8.00**	**7.63**	**7.62**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	---	1	µS/cm		**194**	**405**	**122**	**4140**	**2440**
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		**10**	**7**	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**21**	**19**	**11**	**57**	**45**
Total Alkalinity as CaCO3	---	1	mg/L		**31**	**26**	**11**	**57**	**45**
ED038A: Acidity									
Acidity as CaCO3	---	1	mg/L		<1	<1	**1**	**2**	**5**
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**35**	**57**	**19**	**130**	**324**
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		**15**	**65**	**15**	**1410**	**877**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**1**	**3**	**2**	**107**	**60**
Magnesium	7439-95-4	1	mg/L		**1**	**4**	**2**	**138**	**61**
Sodium	7440-23-5	1	mg/L		**37**	**72**	**19**	**523**	**481**
Potassium	7440-09-7	1	mg/L		**1**	**2**	**2**	**26**	**23**
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.28**	**0.03**	**0.02**	<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		**0.016**	**0.004**	**0.002**	**0.049**	**0.012**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	**0.0002**	**0.0004**
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		**0.001**	<0.001	<0.001	**0.002**	**0.003**
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	**0.005**	**0.043**
Nickel	7440-02-0	0.001	mg/L		**0.002**	<0.001	<0.001	**0.009**	**0.096**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	**0.009**	**0.036**
Manganese	7439-96-5	0.001	mg/L		<0.001	**0.001**	**0.001**	**0.136**	**0.165**
Molybdenum	7439-98-7	0.001	mg/L		**0.131**	**0.023**	**0.020**	**0.018**	**0.018**
Selenium	7782-49-2	0.01	mg/L		**0.01**	**0.04**	<0.01	**0.22**	**0.11**
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EN055: Ionic Balance									
^ Total Anions	---	0.01	meq/L		**1.77**	**3.55**	**1.04**	**43.6**	**32.4**

Page	:	4 of 4
Work Order	:	EB1109558
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018 Drayton South

Analytical Results

Sub-Matrix: **WATER**				Client sample ID	Drayton South 1	Drayton South 2	Drayton South 3	Drayton South 4	Drayton South 5
				Client sampling date / time	13-MAY-2011 15:00	13-MAY-2011 15:00	13-MAY-2011 15:00	13-MAY-2011 15:00	13-MAY-2011 15:00
Compound	*CAS Number*	*LOR*	*Unit*		**EB1109558-001**	**EB1109558-002**	**EB1109558-003**	**EB1109558-004**	**EB1109558-005**
EN055: Ionic Balance - Continued									
^ Total Cations	**----**	0.01	meq/L		**1.79**	**3.62**	**1.12**	**40.2**	**29.5**
^ Ionic Balance	**----**	0.01	%		**----**	**0.98**	**----**	**4.13**	**4.59**

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1111344**	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	: 091018 Drayton South	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 10-JUN-2011
Sampler	: A Robertson	Issue Date	: 20-JUN-2011
Site	: ----		
		No. of samples received	: 5
Quote number	: BN/057/11 V2	No. of samples analysed	: 5

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

Page	:	2 of 4
Work Order	:	EB1111344
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018 Drayton South

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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	:	EB1111344
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018 Drayton South

Analytical Results

Sub-Matrix: **WATER**				Client sample ID	Drayton South 1	Drayton South 2	Drayton South 3	Drayton South 4	Drayton South 5
				Client sampling date / time	10-JUN-2011 11:00	10-JUN-2011 11:00	10-JUN-2011 11:00	10-JUN-2011 11:00	10-JUN-2011 11:00
Compound	*CAS Number*	*LOR*	*Unit*		**EB1111344-001**	**EB1111344-002**	**EB1111344-003**	**EB1111344-004**	**EB1111344-005**
EA005P: pH by PC Titrator									
pH Value	---	0.01	pH Unit		**9.06**	**8.74**	**8.85**	**7.13**	**7.46**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	---	1	µS/cm		**387**	**394**	**154**	**1320**	**916**
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		**20**	**6**	**5**	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**63**	**26**	**13**	**11**	**30**
Total Alkalinity as CaCO3	---	1	mg/L		**84**	**32**	**18**	**11**	**30**
ED038A: Acidity									
Acidity as CaCO3	---	1	mg/L		<1	<1	<1	**3**	**2**
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**66**	**71**	**32**	**70**	**176**
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		**14**	**44**	**9**	**457**	**149**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**1**	**2**	**2**	**25**	**12**
Magnesium	7439-95-4	1	mg/L		**1**	**2**	**3**	**41**	**10**
Sodium	7440-23-5	1	mg/L		**77**	**71**	**19**	**210**	**153**
Potassium	7440-09-7	1	mg/L		**3**	**2**	**3**	**11**	**7**
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.12**	**0.22**	**0.04**	<0.01	**0.02**
Antimony	7440-36-0	0.001	mg/L		**0.004**	<0.001	<0.001	<0.001	**0.001**
Arsenic	7440-38-2	0.001	mg/L		**0.083**	**0.008**	**0.004**	**0.035**	**0.025**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		**0.003**	**0.001**	<0.001	**0.002**	**0.002**
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.005**
Nickel	7440-02-0	0.001	mg/L		**0.004**	<0.001	<0.001	**0.003**	**0.008**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	7439-96-5	0.001	mg/L		<0.001	**0.002**	<0.001	**0.031**	**0.020**
Molybdenum	7439-98-7	0.001	mg/L		**0.173**	**0.014**	**0.028**	**0.008**	**0.029**
Selenium	7782-49-2	0.01	mg/L		**0.02**	**0.04**	**0.01**	**0.14**	**0.07**
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		<0.05	**0.06**	<0.05	<0.05	<0.05
EN055: Ionic Balance									
^ Total Anions	---	0.01	meq/L		**3.45**	**3.36**	**1.28**	**14.6**	**8.47**

Page	:	4 of 4
Work Order	:	EB1111344
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018 Drayton South

Analytical Results

Sub-Matrix: **WATER**				Client sample ID	Drayton South 1	Drayton South 2	Drayton South 3	Drayton South 4	Drayton South 5
				Client sampling date / time	10-JUN-2011 11:00	10-JUN-2011 11:00	10-JUN-2011 11:00	10-JUN-2011 11:00	10-JUN-2011 11:00
Compound	*CAS Number*	*LOR*	*Unit*		**EB1111344-001**	**EB1111344-002**	**EB1111344-003**	**EB1111344-004**	**EB1111344-005**
EN055: Ionic Balance - Continued									
^ Total Cations	---	0.01	meq/L		**3.56**	**3.40**	**1.25**	**14.0**	**8.26**
^ Ionic Balance	---	0.01	%		**1.53**	**0.63**	---	**1.86**	**1.28**

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1112740**	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	: 091018-Drayton South	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 30-JUN-2011
Sampler	: A. Robertson	Issue Date	: 14-JUL-2011
Site	: ----		
		No. of samples received	: 5
Quote number	: BN/057/11 V2	No. of samples analysed	: 5

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

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

Page	:	2 of 4
Work Order	:	EB1112740
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018-Drayton South

General Comments

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

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

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

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

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

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

- **Ionic balances are within acceptable limits as detailed in the 21st Ed. APHA "Standard Methods for the Examination of Water and Wastewater".**

Page	:	3 of 4
Work Order	:	EB1112740
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018-Drayton South

Analytical Results

Sub-Matrix: **WATER**				Client sample ID	Drayton South 1	Drayton South 2	Drayton South 3	Drayton South 4	Drayton South 5
				Client sampling date / time	30-JUN-2011 09:00	30-JUN-2011 09:00	30-JUN-2011 09:00	30-JUN-2011 09:00	30-JUN-2011 09:00
Compound	*CAS Number*	*LOR*	*Unit*		**EB1112740-001**	**EB1112740-002**	**EB1112740-003**	**EB1112740-004**	**EB1112740-005**
EA005P: pH by PC Titrator									
pH Value	---	0.01	pH Unit		**9.32**	**8.74**	**8.69**	**7.30**	**7.67**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	---	1	µS/cm		**143**	**353**	**82**	**1450**	**743**
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		**20**	**8**	**6**	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**23**	**20**	**8**	**21**	**39**
Total Alkalinity as CaCO3	---	1	mg/L		**43**	**28**	**14**	**21**	**39**
ED038A: Acidity									
^ Acidity as CaCO3	---	1	mg/L		<1	<1	<1	**2**	**2**
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**21**	**73**	**18**	**95**	**194**
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		**4**	**42**	**4**	**450**	**74**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	**1**	**1**	**30**	**9**
Magnesium	7439-95-4	1	mg/L		<1	**2**	**2**	**36**	**9**
Sodium	7440-23-5	1	mg/L		**28**	**69**	**10**	**205**	**127**
Potassium	7440-09-7	1	mg/L		**1**	**1**	**2**	**11**	**6**
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**1.11**	**0.48**	**0.37**	<0.01	**0.02**
Antimony	7440-36-0	0.001	mg/L		**0.001**	<0.001	<0.001	<0.001	**0.001**
Arsenic	7440-38-2	0.001	mg/L		**0.019**	**0.004**	**0.003**	**0.004**	**0.014**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.002**
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.001**	<0.001	**0.002**	**0.004**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	7439-96-5	0.001	mg/L		<0.001	**0.003**	<0.001	**0.030**	**0.007**
Molybdenum	7439-98-7	0.001	mg/L		**0.050**	**0.022**	**0.012**	**0.010**	**0.023**
Selenium	7782-49-2	0.01	mg/L		<0.01	**0.04**	<0.01	**0.03**	**0.01**
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		**0.14**	**0.12**	<0.05	<0.05	<0.05
EN055: Ionic Balance									
^ Total Anions	---	0.01	meq/L		**1.41**	**3.26**	**0.77**	**15.1**	**6.91**

Page	:	4 of 4
Work Order	:	EB1112740
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018-Drayton South

Analytical Results

Sub-Matrix: **WATER**				Client sample ID	Drayton South 1	Drayton South 2	Drayton South 3	Drayton South 4	Drayton South 5
				Client sampling date / time	30-JUN-2011 09:00	30-JUN-2011 09:00	30-JUN-2011 09:00	30-JUN-2011 09:00	30-JUN-2011 09:00
Compound	*CAS Number*	*LOR*	*Unit*		**EB1112740-001**	**EB1112740-002**	**EB1112740-003**	**EB1112740-004**	**EB1112740-005**
EN055: Ionic Balance - Continued									
^ Total Cations	**---**	0.01	meq/L		**1.24**	**3.24**	**0.70**	**13.7**	**6.87**
^ Ionic Balance	**---**	0.01	%		**----**	**0.39**	**----**	**4.99**	**0.31**

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1113865**	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	: 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	: 091018 Drayton South	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 15-JUL-2011
Sampler	: ----	Issue Date	: 27-JUL-2011
Site	: ----		
		No. of samples received	: 5
Quote number	: BN/057/11 V2	No. of samples analysed	: 5

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Greg Vogel	Laboratory Manager	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics

Page	:	2 of 3
Work Order	:	EB1113865
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018 Drayton South

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

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

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

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

- **Ionic Balance out of acceptable limits for EB1113865-004 due to analytes not quantified in this report.**

Page	:	3 of 3
Work Order	:	EB1113865
Client	:	RGS ENVIRONMENTAL PTY LTD
Project	:	091018 Drayton South

Analytical Results

Sub-Matrix: **LIQUID**				Client sample ID	Drayton South 1	Drayton South 2	Drayton South 3	Drayton South 4	Drayton South 5
				Client sampling date / time	14-JUL-2011 15:00	14-JUL-2011 15:00	14-JUL-2011 15:00	14-JUL-2011 15:00	14-JUL-2011 15:00
Compound	*CAS Number*	*LOR*	*Unit*		**EB1113865-001**	**EB1113865-002**	**EB1113865-003**	**EB1113865-004**	**EB1113865-005**
EA005P: pH by PC Titrator									
pH Value	---	0.01	pH Unit		**9.24**	**8.35**	**8.29**	**7.43**	**7.86**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	---	1	µS/cm		**78**	**278**	**70**	**1200**	**539**
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		**8**	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**15**	**26**	**11**	**24**	**48**
Total Alkalinity as CaCO3	---	1	mg/L		**24**	**27**	**11**	**24**	**48**
ED038A: Acidity									
Acidity as CaCO3	---	1	mg/L		<1	**1**	**1**	**2**	**2**
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**9**	**58**	**12**	**78**	**136**
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		**2**	**23**	**4**	**409**	**30**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	**1**	**23**	**7**
Magnesium	7439-95-4	1	mg/L		<1	**1**	**2**	**27**	**6**
Sodium	7440-23-5	1	mg/L		**15**	**50**	**8**	**147**	**86**
Potassium	7440-09-7	1	mg/L		**1**	**2**	**2**	**11**	**6**
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.77**	**1.81**	**0.38**	<0.01	**0.07**
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		**0.009**	**0.004**	**0.002**	**0.014**	**0.016**
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.002**	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	**0.002**	<0.001	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L		<0.001	**0.001**	<0.001	<0.001	**0.002**
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.004**	<0.001	**0.002**	**0.003**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	7439-96-5	0.001	mg/L		<0.001	**0.007**	**0.001**	**0.019**	**0.005**
Molybdenum	7439-98-7	0.001	mg/L		**0.027**	**0.022**	**0.007**	**0.009**	**0.017**
Selenium	7782-49-2	0.01	mg/L		<0.01	**0.03**	<0.01	**0.06**	**0.01**
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		**0.09**	**0.49**	<0.05	<0.05	<0.05