Appendix 12

Geochemical Assessment of Spoil and Potential Coal Rejects Materials

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Geochemical Assessment of Spoil and Potential Coal Reject Materials

BYERWEN COAL PROJECT

December 2012

Prepared for: **Byerwen Coal Pty Ltd**

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EXECUTIVE SUMMARY

RGS-Terrenus were commissioned by QCoal Pty Ltd (QCoal) to undertake a geochemical assessment of potential mining waste materials from the proposed Byerwen Coal Project (the Project). The geochemical assessment was undertaken to assist Byerwen Coal Pty Ltd (the proponent) with the management of mining waste materials that are likely to be generated by the Project and also as part of the environmental regulatory approvals process for the Project. The environmental regulatory approval documentation is being prepared by Environmental Licensing Professionals Pty Ltd.

The Project will comprise the extraction of coal by open-cut mining methods from several pits over a 46 year mining (operations) period. Coal will mainly be mined from the P Seam, Goonyella Middle (GM) and Goonyella Lower (GL) seams from the Moranbah Coal Measures. Coal from the Rangal Coal Measures may also be mined during the latter half of mine-life. Run-of-mine (ROM) coal will be processed at one of two a coal handling and preparation plants (CHPP).

Using geochemical and geological data provided by the proponent, RGS-Terrenus has geochemically assessed overburden and interburden (collectively called spoil) and potential coal reject materials (potential reject obtained as coal seam immediate roof, parting and floor samples).

All samples used in the assessment were selected and collected from drill-core and drill-cuttings by the proponent's geologists. The geochemical results were provided to RGS-Terrenus for assessment.

The environmental geochemical characteristics and management of the spoil and potential coal reject materials can be summarised as follows:

Spoil Characteristics

- Spoil, as a bulk material, is expected to generate alkaline, potentially medium- to high-salinity run-off and seepage following surface exposure. Weathered spoil, particularly Quaternary and Tertiary material, is likely to initially generate medium- to high-salinity run-off and seepage, whereas unweathered spoil, primarily from the Permian Fort Cooper Coal Measures and Moranbah Coal Measures, is expected to initially generate comparatively lower salinity run-off and seepage.

- The salinity of spoil material is unlikely to significantly impact local groundwater resources, as groundwater at the Project is naturally saline (up to 15,000 mg/L total dissolved solids (TDS), with an average TDS concentration of approximately 5,100 mg/L).

- The total sulfur and sulfide-sulfur concentrations of the large majority of spoil samples assessed is very low (almost negligible). Almost all samples (97%) were classified as non-acid forming (NAF).

- Total metal and metalloid concentrations in spoil samples were generally low and typically well below the applied health-based guideline levels for soils.

- The soluble multi-element results indicate that some spoil materials *may* produce leachate containing slightly elevated concentrations of some soluble elements (mainly molybdenum, selenium and potentially vanadium) compared to applied guideline levels.
- Spoil materials are generally expected to be moderately to highly sodic. Weathered materials (primarily Quaternary and Tertiary), which comprise about half of the life-of-mine spoil quantity, are expected to have a greater potential for dispersion (erosion) than unweathered materials, which are mostly Permian.

Potential Coal Reject Characteristics

- Potential coal reject is expected to generate alkaline, low- to medium-salinity run-off and seepage following surface exposure.
- The total sulfur concentration of all samples is generally low (75th percentile = 0.19%; 90th percentile = 0.4%), however some coal reject materials contain sulfide concentrations sufficient, on their own, to generate acid (*ie*. in the absence of any neutralising materials).
- About 75% of potential coal reject samples, and therefore the bulk coal reject material, is expected to be NAF. About 20% of potential coal reject samples have been classified as potentially acid forming (PAF), with most of these samples having very low sulfur concentrations, and therefore have a 'Low Capacity' to generate significant acid.
- Total metal and metalloid concentrations in potential coal reject samples are low – below the applied health-based guideline levels for soils.
- The soluble multi-element results indicate that some potential coal reject materials *may* produce leachate containing slightly elevated concentrations of soluble elements (mainly molybdenum, selenium and potentially vanadium) compared to applied guideline levels.

Management and Mitigation of Spoil Piles

Spoil is overwhelmingly NAF and has a negligible risk of developing acid conditions. However, most spoil has some capacity to generate salinity, and in some weathered materials the salinity could be moderate to high.

Typically in an open-pit mining operation weathered spoil would be mined (and dumped) before unweathered materials (since weathered spoil is closest to the surface). At the Project that is likely to be the case, hence most weathered spoil is unlikely to report to final landform surfaces. Therefore, weathered spoil (not including topsoil) should not report to final spoil pile surfaces to any significant extent, and should not pose significant management issues for the Project. Spoil used for final landform covering will primarily comprise unweathered material, which has a relatively low salinity and low potential for dispersion.

Where spoil will be used for construction activities, especially where engineering or geotechnical stability is required, testing will be undertaken by the proponent to determine the propensity of such materials to erode given that most spoil materials are expected to be sodic, to varying degrees, with varying degrees of salinity.

At most coal mines in the Bowen Basin that generate sodic materials, Permian materials (Moranbah, Fort Cooper and Rangal Coal Measures) are generally more amenable to amelioration and vegetation growth, through the addition of fertilizer, than Tertiary materials. Ensuring that slopes are well stabilised against erosion will also reduce the risk of significant erosion of potentially dispersive sodic Permian materials.

For final rehabilitation of spoil storage areas at the Project, it is proposed that Permian spoil be used for the outer slopes to limit potential for dispersion and erosion, with Tertiary spoil preferentially disposed into the central (inner) zones of spoil piles. Where this strategy cannot be fully achieved (due to mine waste scheduling) and Tertiary spoil is required to report to outer surfaces there are two proposed options:

- establish a slope gradient of less than 10% with a cover of non-dispersive Permian material; or
- if steep outer slopes are required, a thick cover of durable rock must be placed, which may or may not be Permian material.

Poor quality Permian material may also require covering with selective benign and erosion resistant material. Notwithstanding, the proponent has committed to undertaking revegetation/ rehabilitation field trials for spoil materials when operations commence and bulk materials become available.

Surface run-off and seepage from spoil piles, including any rehabilitated areas, will be monitored for 'standard' water quality parameters, including pH, EC, sulfate (and other major ions) and a broad suite of soluble metals – including Mo, Se and V.

Management and Mitigation of Coal Reject Disposal Facilities

The large majority of potential coal reject materials will not pose a significant risk of developing acid conditions, and the generally low sulfur concentration within this material suggests that the magnitude of any acid generation, if it occurs, is likely to be small. Potential coal reject materials will comprise about 2% of the total mine waste generated by the Project, therefore any risk that a relatively small proportion of these coal reject materials poses needs to be placed into context relative to the overwhelming proportion of waste that will be inert, alkaline and NAF mined spoil.

Based on sample numbers, about 20% of potential coal reject materials may have a low capacity to generate acidity. However, when disposed as a bulk material at the reject disposal facility this minor proportion of PAF waste (mostly PAF-Low Capacity) when mixed/disposed amongst the broader NAF reject bulk material, would be expected to pose a low environmental risk. Furthermore, most coal reject is expected to be alkaline, which assists with neutralising any acid generated.

Two coal reject disposal strategies are currently being evaluated by the proponent, and essentially differ by the disposal strategy for mid-sized and fine reject (which comprise size fractions <12 mm). The EIS has adopted a conservative approach with respect to the coal reject disposal options being evaluated. Under the assumed disposal option, coarse reject will be disposed directly amongst spoil. Mid-sized and fine reject will be disposed (as a slurry) to an above-ground co-disposal facility constructed at each CHPP. At some stage during mine life

the above-ground co-disposal facility may be discontinued and, at that point, mid-sized and fine reject will report to an in-pit co-disposal facility.

Management of in-pit coal reject and out-of-pit coarse reject

Coal reject disposed into a pit, whether as coarse reject or as co-disposed reject, will be progressively covered (buried) with spoil. Coarse reject may be disposed initially into voids between spoil piles in out-of-pit areas, however the management of coarse reject disposed under this scenario is essentially the same as for in-pit disposal. (ie. progressive burial by a thick layer (at least several metres) of spoil, and managed thereafter as spoil).

Co-disposed reject managed under an in-pit disposal strategy will likely be disposed into cells in a nominated area of the pit (below the natural lip of the pit). As the cells are filled, they will be progressively buried by backfilled mine spoil.

Coal reject, whether disposed in-pit amongst out-of-pit spoil, will not report within at least 5 m of final (re-profiled) landform surfaces.

Operational monitoring of out-of-pit co-disposal facilities

Surface run-off and seepage from, and groundwater in the vicinity of, coal reject disposal facilities will be monitored for 'standard' water quality parameters, including pH, EC, sulfate (and other major ions) and a broad suite of soluble metals – including Mo, Se and V.

Decommissioning, rehabilitation and closure of out-of-pit co-disposal facilities

The decommissioning, closure and post-closure aspects of coal reject disposal facilities, particularly the out-of-pit co-disposal facilities, will be addressed by a Mine Closure Plan. During operations, the environmental characteristics of the out-of-pit co-disposed coal reject will be further assessed and well understood such that an appropriate Rehabilitation Plan can be adopted.

It is outside the scope of this report to detail the closure aspects of out-of-pit coal reject facilities, however the following general principles will be adopted.

Generally, as out-of-pit co-disposal facilities (including discrete cells) are decommissioned, they will be covered with an appropriate soil cover system, such as a store-and-release soil cover, and rehabilitated/ revegetated. The design of the soil cover system will be documented in the Rehabilitation Plan.

Spoil will be suitable to use as a soil cover, as it is alkaline, has low sulfur, is likely to have a high factor of safety and very low probability of acid generation, and will have excess capacity to neutralise any acidity generated by coal reject materials. However spoil may potentially generate medium- to high-salinity surface run-off and seepage and will require a topsoil 'cap' to use as a growth medium.

ROM Coal Characteristics and Management of ROM Pad

Potential ROM coal (and product coal) has not been assessed, however based on the characteristics of potential coal reject samples it can be reasonably assumed that ROM coal will

have similar characteristics to potential coal reject materials. The proponent will undertake assessment of ROM coal materials as the Project develops to assist with their management plans for ROM pads.

ROM and Product coal may be stored at the site for a relatively short period of time (weeks) compared to mining waste materials, which will be stored at the site in perpetuity. Management practices are therefore different for coal and will largely be based around managing seepage and run-off water quality from ROM pads and coal stockpiles – as is currently accepted practice at coal mines in Australia.

Surface run-off and seepage from ROM and Product coal stockpiles will be monitored for 'standard' water quality parameters, including pH, EC and a broad suite of soluble metals.

The assessment of spoil and potential coal reject has focussed on the areas to be mined during the first 15 years (nominally) of mining. The proponent will undertake further assessment of spoil and potential coal reject materials obtained from North Pit and East Pit areas (and similar 'late mining' areas) as the Project develops.

Results presented in this report represent an assumed 'worst case' scenario as the samples are pulverised prior to testing at the laboratory and have a very high surface area compared to materials in the field. Materials will also be well mixed at storage locations, hence, it is expected that the concentration of all metal/metalloids in surface run-off and seepage from spoil and coal reject materials will be less than applied guideline concentrations in the field.

Geochemical Assessment of Spoil and Potential Coal Reject Materials

BYERWEN COAL PROJECT

December 2012

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LIST of ABBREVIATIONS and DEFINITIONS

Acid	A measure of hydrogen ion (H^+) concentration; generally expressed as pH.
Acid-Base Account	Evaluation of the balance between acid generation and acid neutralisation processes. Generally determines the maximum potential acidity (MPA) and the inherent acid neutralising capacity (ANC), as defined below.
AMD	Acid and Metalliferous Drainage from mining waste materials characterised by low pH, elevated metal concentrations, high sulfate concentrations and high salinity. The term AMD is used more recently to replace the term ARD (see below) as metalliferous and saline drainage can occur under pH-neutral conditions.
ANC	Acid Neutralising Capacity, expressed as kg H_2SO_4 per tonne of sample. A measure of a sample's maximum potential ability to neutralise acid. See also ABCC.
ANC/MPA Ratio	Ratio of the acid neutralising capacity to the maximum potential acidity of a sample. Used to assess the risk of a sample generating acid conditions.
ARD	Acid Rock Drainage from mining waste materials characterised by low pH, elevated metal concentrations, high sulfate concentrations and high salinity.
CHPP	Coal Handling and Preparation Plant.
Coarse Reject	Coarse mineral waste material (at the Project, greater than 12 mm diameter) produced from the CHPP as part of the processing of coal. Coarse reject usually comprises the carbonaceous mudstone, siltstone and fine-grained sandstone located immediately above and below the 'economic' coal, which is mined during coal extraction. See also "Mid-Sized Reject" and "Fine Reject".
EC	Electrical Conductivity, expressed as µS/cm.
Fine Reject	Fine-grained mineral waste material (at the Project, less than 1 mm diameter) produced from the CHPP as part of the processing and washing of coal. Fine reject (also called 'tailings') typically comprise very fine-grained mudstone, claystone and sand present in CHPP wastewater. See also "Coarse Reject" and Mid-Sized Reject".
Interburden	Waste rock material between mined coal seams. See also "Parting" and "Spoil".
Mid-Sized Reject	Mineral waste material produced from the CHPP with a size range (at the Project) between 1 and 12 mm (*ie*. between coarse reject and fine reject size fractions). See also "Coarse Reject" and "Fine Reject".

MPA	Maximum Potential Acidity. Calculated by multiplying the total sulfur or sulfide-sulfur (Scr) 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	Waste rock material overlying the uppermost mined coal seam. See also "Spoil".
PAF	Potentially Acid Forming. Geochemical classification criterion for a sample that has the potential to generate acid conditions.
Parting	Thin band (nominally less than 0.5m thick) of non-coal material (typically siltstone/claystone) between economic coal seams. The parting is mined as part of the coal seam and typically reports as coarse or fine reject from the CHPP. Parting is interburden, but due to its low thickness it is not practical to selectively mine parting as "spoil", therefore it is mined with coal. See also "Interburden".
ROM	Run of Mine. Coal as it comes from the mine prior to screening or processing.
S	Sulfur.
Scr	Chromium reducible sulfur. Analytical procedure to determine the sulfide-sulfur concentration in a sample.
SO_4	Sulfate.
Spoil	Waste rock material overlying and between coal seams. Spoil overlying a mined coal seam is called overburden. Spoil between mined coal seams is called interburden.
Static test	Procedure for characterising the geochemical nature of a sample at one point in time. Static tests may include measurements of mineral and chemical composition of a sample and the Acid Base Account.
Total Sulfur	Total sulfur content of a sample generally measured using a 'LECO' analyser expressed as % S.

1 Introduction, Background and Context

RGS-Terrenus[1] were commissioned by QCoal Pty Ltd (QCoal) to undertake a geochemical assessment of potential mining waste materials from the proposed Byerwen Coal Project (the Project). The geochemical assessment was undertaken as part of the environmental impact statement (EIS) documentation for the Project, which is being prepared by Environmental Licensing Professionals Pty Ltd (ELP)[2].

The Project is located in the Northern Bowen Basin in Central Queensland, approximately 20 km west of Glenden and about 140 km west of Mackay. A schematic map showing mine and pit layouts is presented in **Figure 1**.

The Project is being developed by Byerwen Coal Pty Ltd (the proponent), under a joint venture agreement between JFE Steel (a subsidiary of the JFE Group, Japan) and QCoal. The first stage of the Project (the subject of this technical report for the EIS) will comprise the extraction of approximately 15 million tonnes per annum (Mt/a) of run-of-mine (ROM) coal by open-cut mining methods, over a mine life of about 50 years[3]. The second stage of the Project (not assessed in this technical report) comprises underground mining from approximately Year 15 onwards. The Project will be augmented by two new coal handling and preparation plants (CHPPs) to process the coal.

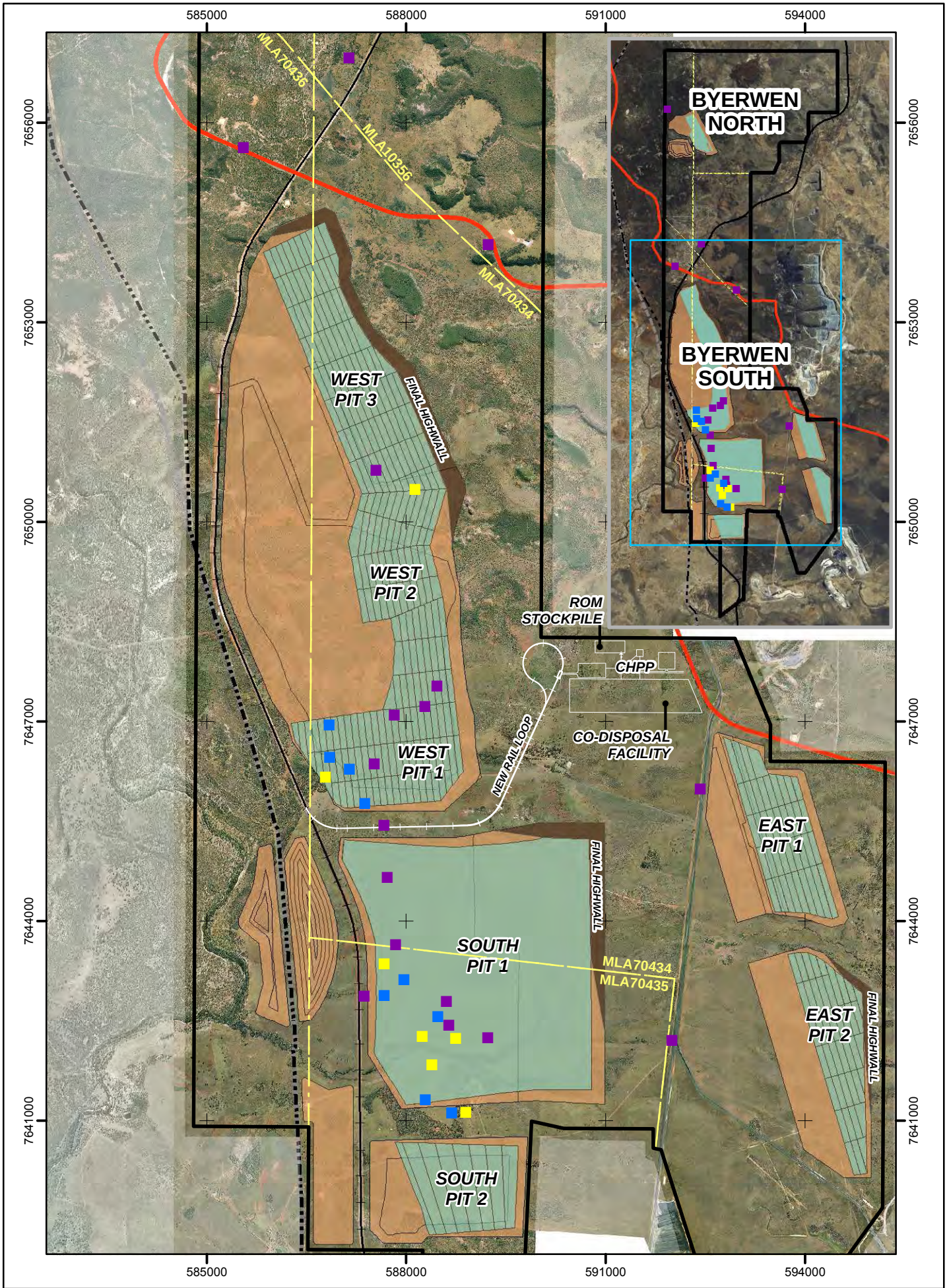
Using geochemical and geological data provided by the proponent, RGS-Terrenus has geochemically assessed potential overburden and interburden (collectively called spoil) and potential coal reject materials. Coal reject materials are derived from the processing of coal at the CHPP and primarily comprise immediate coal seam roof and coal seam floor (and some parting) materials. All samples used in the assessment were selected by the proponent and collected from drill-core and drill-cuttings by the proponent's geologists. The geochemical results were provided to RGS-Terrenus for assessment. In the context of this report the term 'spoil' refers to overburden and interburden material, unless otherwise stated.

1.1 Objective

The overall objective of this Project was to:

Evaluate the geochemical nature of spoil and potential coal reject materials likely to be produced from the Byerwen Coal Project and identify potential environmental issues that may be associated with mining, handling and storing these materials.

1 Collaboration between RGS Environmental Pty Ltd and Terrenus Earth Sciences.
2 ELP is the lead consulting firm responsible for the management of the environmental approvals for the project.
3 The proposed mine life of 50 years includes construction, operations, decommissioning and rehabilitation.



Legend

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Date:3/12/2012|ProjectCode:Byerwen
DataSource/s:DNRM,Minserve
Projection:UTMZone55|Datum:GDA1994

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Figure 1

1.2 Background to the Project

With respect to mining waste geochemistry, the key components of the Project are:

- An open-cut coal mining operation mining several seams (and associated plys) from the Moranbah Coal Measures.

  The Project may also mine coal from the Rangal Coal Measures in East Pit 1 and 2 (**Figure 1**), however this would be after approximately Year 25. An environmental geochemical assessment of the Rangal Coal Measures in the Project Area has not been undertaken as part of this current assessment, however the proponent has committed to undertaking geochemical characterisation and assessment of mining waste materials associated with the Rangal Coal Measures as the Project develops.

- Coal will be extracted at various times from eight open-cut pits (**Figure 1**). The approximate period of mining in each pit is shown in **Table 1**.

  Table 1. Approximate period of mining for each pit

Mining Area	Target Seams	Approx. Period of Mining
West Pit 1	Moranbah Coal Measures. All to Goonyella Middle	Years 1 to 11
West Pit 2	Moranbah Coal Measures. All to Goonyella Lower	Years 11 to 25
West Pit 3	Moranbah Coal Measures. All to Goonyella Lower	Years 25 to 46
South Pit 1	Moranbah Coal Measures. All to Goonyella Lower	Years 5 to 46
South Pit 2	Moranbah Coal Measures. All to Goonyella Lower	Years 5 to 30
East Pit 1	Rangal Coal Measures. Leichardt Seam	Years 26 to 40
East Pit 2	Rangal Coal Measures. Leichardt Seam	Years 31 to 46
North Pit	Moranbah Coal Measures. All to Goonyella Middle	Years 16 to 30

Note: North Pit (not shown in Figure 1) is located approximately 10 km north of West Pit 3. The potential underground area (also not shown in Figure 1) is located about 14 km northeast of West Pit 3.

  During the first five years of mining, coal will be extracted from West Pit 1. Between Year 6 to Year 10 coal will primarily be extracted from West Pit 1, with some coal also extracted from South Pit 1 and South Pit 2. Therefore, the focus of mining (and therefore, any potential environmental impacts) during the first 10 years of mining will primarily be on West Pit 1 and South Pits 1 and 2. Mining in each pit will generally advance down-dip towards the east.

- The Project will have a complete mine life of about 50 years, comprising approximately two years for construction, 46 years for mining operations and two years for decommissioning and rehabilitation, with some anticipated overlap period.

- The Project will mine approximately 5,300 Mbcm of mine waste (approximately 9,500 Mt at an assumed bulk density of 1.8) over the life-of-mine. This total quantity equates to about 210 Mt/a of spoil (on average) over the 46 year mining period. Spoil will be disposed into out-of-pit and in-pit spoil dumps.

- The Project has a coal resource of approximately 690 Mt. Run-of-mine (ROM) coal will be mined at a rate of about 15 Mt/a (on average) over 46 years. Coal will be processed at two CHPPs (northern and southern). In the first 16 years (approximately) of operation all ROM

coal will be processed at the southern CHPP, which will scale back production when the northern CHPP is commissioned, maintaining a project wide total of 15Mt/a ROM coal processing.

- The CHPPs will produce product coal and coal reject. Coal reject will comprise coarse, mid and fine reject (refer to **List of Abbreviations and Definitions** for a description of each coal reject type). The quantities of coal reject from each CHPP will vary throughout the mine life, since the Northern CHPP will not be constructed until approximately Year 16 and will be the smaller of the two CHPPs. Generally, the combined capacity of the two CHPPs will indicatively produce about 3 to 5 Mt/a of coal reject.

- Coal reject disposal strategies are currently being evaluated by the proponent. There are two proposed options being evaluated as part of the EIS:

    - Option 1 (the preferred method) comprises the trucking and disposal of coarse reject (>12 mm size fraction) amongst mined spoil, initially between the voids of mined spoil piles and then later into in-pit disposal areas. Mid-sized reject (1 to 12 mm size fraction) and fine reject (<1 mm size fraction) will be slurried and pumped (as co-disposed waste) into one of two out-of-pit co-disposal dams (northern or southern, located at each CHPP). The co-disposal dams will be decommissioned and closed once space becomes available to co-dispose fine reject to an in-pit co-disposal facility.

    - Option 2 (the alternative method) comprises all coal reject being combined as a single coal reject waste (fine reject will be dewatered prior) and trucked to in-pit co-disposal cells. Completed cells will be buried by spoil.

    From an environmental perspective above-ground co-disposal facilities potentially pose a greater level of environmental risk compared to in-pit disposal, primarily due to the increased exposure of coal reject to oxidation and also run-off and seepage from the facility into surface water environments. Therefore, in taking a conservative approach, the EIS assumes that Option 1 will be adopted. Should Option 2 be adopted, the operational, closure and post-closure management strategies for coal reject will be simpler.

- Based on an average spoil generation rate (over 46 years) of about 210 Mt/a and a coal reject generation rate of about 5 Mt/a, coal reject are expected to comprise about 2.5% of the average annual mine waste quantity.

The Project also includes the potential for an underground mining operation located in the north of the Project area, about 14 km northeast of West Pit 3 (**Figure 1**); however, the underground mining component is not included for assessment in this scope. Should the underground option progress, this component would undergo geochemical assessment at that time (along with other technical assessments) and would be subject to separate environmental regulatory approval.

1.3 Project geology

The Project is located within the Northern Bowen Basin in Central Queensland. The Bowen Basin is part of a connected group of Permian-Triassic basins in eastern Australia, which includes the Sydney and Gunnedah Basins. The Bowen Basin contains large reserves of Permian coals, which have been mined on a large scale by open-cut and underground methods since the 1970s.

The Project resource includes coal within both the Moranbah and Rangal Coal Measures (Permian age). The Moranbah Coal Measures represent the main stratigraphic unit of interest in the Project

area, and contains up to seven persistent coal seams. The Moranbah Coal Measures are approximately 290 m thick in the Project area and strike north-south, dipping to the east at between 4 and 12 degrees. Both normal and thrust faults are present in the Project area, which lead to seam offsets and displacement. The Moranbah Coal Measures are overlain by the Fort Cooper Coal Measures, which are overlain by the Rangal Coal Measures.

The principal seams of economic interest in the Moranbah Coal Measures are the Goonyella Lower (GL - 6 to 8 m thick), Goonyella Middle (GM – 6 to 10 m thick), and P Rider (2 to 4.5 m thick) seams. The main seam of interest in the Rangal Coal Measures is the Leichhardt seam, a correlative of the Upper Newlands seam which averages 6.5 m thick in the nearby Newlands Mine (east of the Project) and 4.5 m thick in the Suttor Creek mining lease area. The Fort Cooper Coal Measures do not contain target coal seams in the Project Area (based on resource drilling undertaken), however opportunistic coal extraction from the FCCM may be undertaken should suitable seams be identified during operations.

In the Project area the Bowen Basin is characterised by typical basin-fill fluvial (and some marine) sediments, comprising mudstones, siltstones, sandstones and coal seams. Spoil materials will predominantly comprise mudstone, siltstone and very fine- to fine-grained sandstone.

The depth to weathering is variable, ranging from 20 m to approximately 100 m below natural surface, with an average depth to base of weathering of about 40 m throughout most of the Project Area. Deep weathering (~100 m) is uncommon, and tends to be associated with the presence of deeper basalt flows. In the Project Area, approximately 50% of spoil to be mined (over the life-of-mine) is weathered (to varying degrees)[4]. Weathered spoil is also estimated to account for approximately 50% of spoil mined during the first 10 to 15 years of operations[4].

Coal seam roof and floor zones (immediately above and below coal) and coal partings (thin zone of non-coal material between coal seams) are typically comprised of very fine-grained sedimentary lithologies, such as mudstones, siltstones and very fine-grained sandstone, which is typical of the ‘low energy’ depositional environment of coal. These roof, floor and parting zones are also commonly carbonaceous, containing wispy coal laminations.

[4] Approximate proportions of weathered and unweathered spoil provided by Minserve.

2 Geochemical Assessment Methodology

This section provides the methodology used for the geochemical characterisation and assessment of spoil and coal reject materials that could potentially be produced by the Project.

2.1 Desktop review of existing information

A desktop review and understanding of available Project data and information was completed. The review included geological data, current and proposed coal exploration drilling programs, proposed mining methods and mine plan, proposed coal handling and processing methods, and proposed mineral waste disposal and management strategies. Discussions were held with proponent personnel (predominantly QCoal geologists) to identify and discuss relevant technical information and also with ELP to understand the Project Description.

Geological information was obtained from exploration drill-hole logs of the Project, coupled with discussions with the Project geologists[5]. Based on this information, an understanding of the geological environment (lithology and structure) at the Project site was gained.

2.2 Sampling strategy

A geochemical sampling and testing program was developed by the proponent that integrated with the exploration (resource definition) drilling and coal quality testing program. RGS-Terrenus provided advice to the proponent relating to the geochemical characterisation and assessment of the collected samples.

There are currently no specific regulatory requirements regarding the number of samples required to be obtained and tested for coal, spoil or potential reject materials at mines in Queensland. Whilst historical guidelines do exist in Queensland (DME, 1995), more recent Australian and international guidelines (DITR, 2007; INAP, 2009) advocate a risk-based approach to sampling, especially for proposed coal mines where the geology is well understood and existing information is available on similar coal and mining waste materials.

The number and type of samples for the current assessment were selected by the proponent's geologists based on a number of factors including the geological variability and complexity in rock types; the size of the operation; the proposed mining schedule; the potential for significant environmental or health impacts; sample representation requirements; the volume of materials; the availability and representativeness of drill-core samples; the level of confidence in predictive ability; and cost. The types of samples collected and assessed are outlined below.

The samples used in the geochemical assessment were derived from 37 drill-holes located throughout the Project area. The sample locations are shown at **Figure 1**. The sampling strategy was broad, but has focussed on the areas proposed to be mined during the first 15 years of mining – West Pit 1 and South Pit 1. Twenty-nine (29) of the 37 sampled drill-holes are located in the vicinity of West Pit 1 and South Pit 1.

In total, detailed geochemical data directly relevant to the Project is currently available for 279 samples, which comprise:

[5] Personal communications with John Tuttle, Principal Geologist (QCoal).

- 238 'spoil' samples, mostly from exploration drill-chip samples, but also including some drill-core. The 238 samples comprise:
    - 83 samples from the Quaternary and Tertiary materials;
    - 15 samples from the Fort Cooper Coal Measures;
    - 133 samples from the Moranbah Coal Measures; and
    - 7 samples from the Exmoor Formation, which lies immediately below the Moranbah Coal Measures.
- 41 potential coal reject samples from exploration drill-core (as part of the coal quality testing program):
    - 2 roof/floor samples from the P Rider seam;
    - 7 roof/parting/floor samples from the P seam;
    - 30 roof & floor samples from the GM seam; and
    - 2 roof samples from the GL seam.

The primary focus of the potential coal reject sampling program was on the GM seam, which is the principal seam mined during the first 10 years[6]. The proponent has committed to undertaking further assessment of representative samples from the GL and other seams as the Project develops.

Raw coal also requires some environmental geochemical consideration, as the geochemical characteristics of coal (ROM and product coal) need to be understood to manage this material during handling and storage on site prior to shipment. The proponent therefore has also committed to undertaking geochemical characterisation and assessment of representative ROM and product coal materials as the Project develops. Additionally, surface water run-off from ROM pads and product coal stockpiles will be captured and managed as part of the overall mine water management strategy.

Sample types obtained from each drill-hole are listed in **Appendix A – Table A1**. Drill-hole logs for all sampled drill-holes can be provided upon request.

[6] Personal communications with John Tuttle, Principal Geologist (QCoal).

2.3 Geochemical tests

The environmental geochemical assessment of spoil and potential coal reject materials was based on the characterisation of samples using static geochemical test methods.

Static testing provides the fundamental geochemical characteristics of a sample. Static testing involved discrete analytical tests undertaken on samples, where the results represent the geochemical characteristics of the sample at a single time period and under simple experimental conditions as a 'snapshot' of the sample's likely environmental geochemical characteristics.

The results obtained from the static testing were conclusive, and found that the materials are expected to pose a low environmental risk. Therefore, more detailed characterisation using such methods as kinetic leaching tests was not required.

Geochemical test methodology

The test methods employed on all samples comprised:

- pH and electrical conductivity (EC) (1:5 w:v);
- Total sulfur [Leco method]; and
- Acid neutralising capacity (ANC) [AMIRA, 2002].

Selected spoil and potential coal reject samples underwent additional analysis for:

- Sulfide (chromium reducible sulfur – Scr) [AS 4969.7-2008 method]; and
- Sulfate-sulfur.

From the total sulfur (or Scr where available) and ANC results, maximum potential acidity (MPA) and net acid producing potential (NAPP) was calculated. Where available, the MPA and NAPP of these samples were calculated using the Scr data instead of total sulfur data. The use of Scr data (for fresh samples) provides a more accurate representation of the MPA that could theoretically be generated, as acid generation primarily occurs from reactive sulfide, whereas total sulfur includes other sulfur forms such as sulfate and organic sulfur. The sulfate-sulfur data was used as a confirmatory check for the difference between the total sulfur and Scr values.

Based on the results of the initial screening tests selected individual samples (and some composite samples of the same lithological type and similar basic geochemical characteristics) were subjected to several or all of the following tests:

- Total organic and inorganic carbon [Leco method];
- Standard net acid generation (NAG) testing [AMIRA, 2002];
- Sequential NAG testing [AMIRA, 2002];
- Total metals and metalloids analyses by [HCl and HNO_3 acid digest followed by FIMS for Hg and ICP-MS / -AES for all other elements];
- Exchangeable cations (Al, Ca, Mg, Na, K);
- Soluble metals and metalloids ICP-AES and FIMS (1:5 w:v water extracts);
- Soluble cations and anions ICP-AES (1:5 w:v water extracts);

- Soluble cations, anions, metals, metalloids, nitrate and nitrite by toxicity characterisation leaching procedure (TCLP) [buffered to pH 7 with NaOH or acetic acid]; and
- Emerson Class testing (Standards Australia method AS1289-3.8.1).

The geochemical test work program is summarised in **Table 2**. Composite sample details are provided in **Appendix B – Table B3**.

Table 2. Summary of the geochemical test program
(number of individual and composite drill-core and drill-chip samples subjected to each test regime)

Analytical tests	**Spoil** (incl. minor coal seams reporting as spoil)	**Potential Reject** Coal seam immediate roof, parting and floor
pH, EC, total sulfur, ANC, NAPP	All (238) samples	All (41) samples
Scr	89 samples	40 samples
Sulfate, Carbon (total, organic and inorganic), NAG	63 samples	7 samples
Sequential NAG	1 sample	6 samples
Total elements in solids	79 samples 1 composite sample	13 discrete samples 5 composite samples
Exchangeable cations[7]	13 samples	-
Emerson Class[7]	16 samples	1 sample
Soluble elements and major ions in 1:5 water extracts	15 discrete samples 1 composite sample	6 discrete samples 5 composite sample
Soluble elements, major ions, nitrate and nitrite by TCLP	63 samples	7 samples

Assessment of element enrichment and solubility

Multi-element scans are typically carried out to identify any elements (particularly metals and metalloids) present in a material at concentrations that may be of environmental concern with respect to revegetation and surface water quality. The assay result for each element is compared to potentially relevant guideline criteria to determine any concerns related to mine operation, environmental toxicity and final rehabilitation. Elements identified as enriched may not necessarily be a concern for revegetation, human/animal health or drainage water quality, but their significance should be evaluated. Similarly, if an element is not enriched it does not mean it will never be a concern, because under some conditions (*eg*. low pH) the geochemical behaviour of common environmentally important elements such as Al, Cu, Cd and Zn can change significantly.

There are no guidelines and/or regulatory criteria specifically related to total metal concentrations in mining waste materials, such as spoil, coal and potential coal reject materials. In the absence of these, and to provide relevant context for this assessment, the total concentration of each element reported in mining waste samples (solids) has been compared to NEPC (1999a) health-based investigation levels (HIL) category 'E' for parks and recreation (open spaces) (See **Table B4 – Appendix B**) . The applicability of the NEPC (1999a) guideline for 'open spaces' stems from the potential final land use of the mine following closure (*ie*. low-intensity livestock grazing). The total

[7] Exchangeable cation and Emerson Class tests are typically only determined on materials, such as spoil, that are likely to report to final landform surfaces and be used in rehabilitation and revegetation activities. Coal reject will not report to final surfaces and not be used in final rehabilitation and revegetation activities.

concentration of each element has also been compared to the average 'background' concentrations in the earth's crust (Berkman, 1995) by use of a 'geochemical abundance index' (refer to **Section 3.3**).

The total metals concentration for individual elements in mining waste materials can also be relevant for revegetation activities and/or where the potential exists for human contact (*eg*. if the material was to be used off-site).

Furthermore, under certain circumstances, coal and mining waste materials can potentially leach soluble metals at concentrations that may impact the environment or human health. Water extract tests are used to determine the immediate solubility and potential mobility of elements under existing pH and oxygen (redox) conditions. Soluble element concentrations can be compared with those recommended in relevant surface water and groundwater guideline criteria in order to provide some context.

Again, there are no guidelines and regulatory criteria specifically related to surface run-off and/or seepage from coal, spoil and potential coal reject materials since guidelines (and regulatory criteria) will depend upon the end-use and receiving environment of the seepage. Therefore, to provide relevant context, the soluble concentration of each element extracted from coal and mining waste materials has been compared to livestock drinking water guidelines (NEPC, 1999b and ANZECC, 2000). These guidelines allow for higher concentrations of individual parameters (appropriate for an industrial facility in a rural area) and are less prescriptive and more appropriate (in the context of the Project) than guidelines designed for water to be used for direct human consumption or being directly discharged into an aquatic environment (*eg*. stream, river, lake, etc.).

2.4 Sample classification criteria

Sample classification of coal and mining waste materials from mining projects follows some general rules, however the classification has to take into account the site geology and other site-specific geochemical characteristics that may influence the classification criteria.

Samples for the Project were classified, with respect to acid generation, using total sulfur (or preferentially Scr, where available), NAPP and ANC/MPA ratio data into three broad categories: NAF; Uncertain; and PAF.

Within these three broad categories, the sample classification was refined as follows:

NAF – Barren[8]**:**

Total Sulfur ≤0.1 %

***NAF*:**

Sulfide-sulfur (S_{CR}) ≤0.2 % and ANC/MPA ratio >2 *or*

NAPP <-10 kg H_2SO_4/t and ANC/MPA ratio >3 *or*

NAPP <-10 kg H_2SO_4/t and NAGpH >4.5

[8] Samples with a total sulfur content of ≤0.1 % are essentially barren of sulfur and have negligible capacity to generate acidity, even in the absence of significant ANC.

***PAF – Low Capacity (PAF-LC)*:**

Sulfide-sulfur (S_{CR}) >0.2 % and NAPP between 0 and +10 kg H_2SO_4/t or

NAGpH ≤4.5 (and NAG capacity ≤5 kg H_2SO_4/t) and NAPP between 0 and +10 kg H_2SO_4/t

***PAF*:**

NAPP >+10 kg H_2SO_4/t and ANC/MPA ratio <2 or

NAGpH ≤4.5 (and NAG capacity >5 kg H_2SO_4/t) and NAPP >+10 kg H_2SO_4/t

Uncertain:

Any result outside of the above criteria or conflicting results (*eg*., positive NAPP combined with a high NAGpH value) or results which appear to significantly conflict with the expected result based on lithology or mineralogy.

NAG test results were not used for the classification of reject samples as most samples had high organic carbon concentrations, which can contribute to 'false positive' NAGpH values (ACARP, 2008).

3 Geochemical Test Results

The data and interpretations herein are reported in the context of mining waste materials likely to report directly as mined spoil or potential coal reject (*ie*. mining waste material likely to be generated from the CHPP).

3.1 Acid-Base Accounting results for spoil samples

Acid-base accounting (ABA) is a theoretical balance between the potential for a sample to generate acid and neutralise acid, and in Australia is commonly expressed in units of kilograms of sulfuric acid per tonne of sample (kg H_2SO_4/t).

ABA results for the 238 'spoil' samples that underwent detailed geochemical characterisation are presented in **Appendix B - Table B1** and summarised as follows, with reference to summary **Tables 3 to 9** and **Figures 2 to 7**. The laboratory certificates for these samples are provided in **Appendix D**.

3.1.1 pH and electrical conductivity

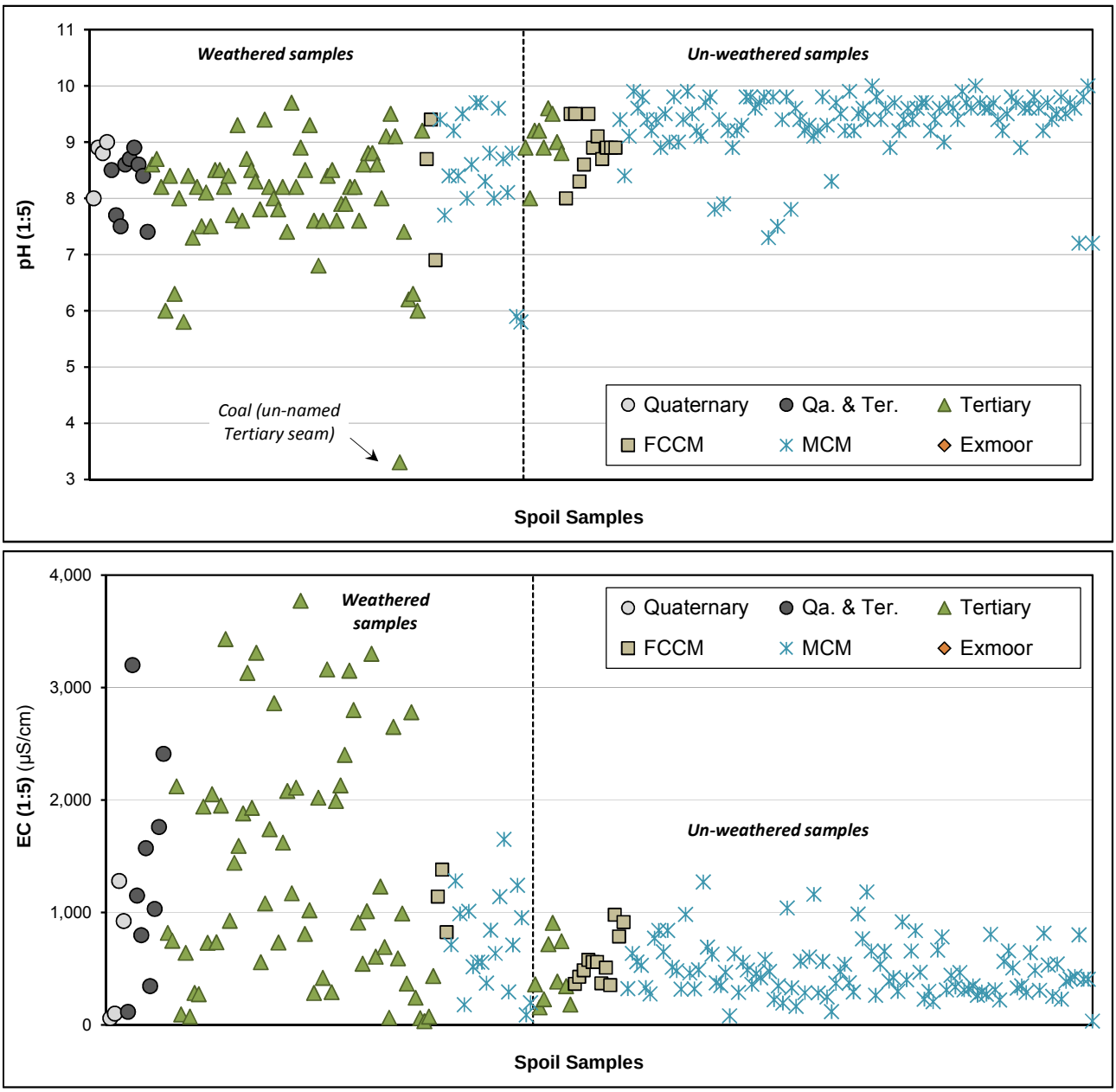
- Spoil samples overwhelmingly produced alkaline pH, with a median $pH_{1:5}$ value of 9.2. Values ranged from pH 3.3 to pH 10.0, with 227 samples (95% of samples) having $pH_{1:5}$ values greater than 7. Of the 11 samples (5% of samples) less than pH 7, one 'coally' sample (un-named and un-economic seam) had a pH value of 3 and is acidic. The weathered samples, which are mostly Quaternary (Qa)- and Tertiary-age, were noted to have a broader pH range and slightly lower (but still alkaline) pH values (median pH 8.4) than the unweathered samples, which are mostly from the Permian Moranbah Coal Measures (median pH 9.5). (**Table 3 and Figure 2**).

- The $EC_{1:5}$ values of spoil samples ranged from 31 to 3,770, with a median EC of 520 µS/cm. Similar to the pH values, the weathered samples (predominantly Qa and Tertiary samples) produced a wider range of EC values compared to the deeper (unweathered) samples from the Moranbah Coal Measures (**Table 3 and Figure 2**). The weathered samples produced a median EC of 969 µS/cm, compared to a median EC value of 423 µS/cm for the unweathered samples.

Table 3. Summary pH and EC results for spoil samples

Sample Material	Minimum	Maximum	Median	General Comments
pH				
All spoil samples (n=238)	3.3	10.0	**9.2**	Most samples have a high to very high pH and are alkaline.
Weathered spoil samples (n=96)	3.3	9.7	**8.4**	
Unweathered spoil samples (n=142)	7.2	10.0	**9.5**	
Electrical conductivity (EC) *µS/cm*				
All spoil samples (n=238)	31	3,770	**539**	Very broad range of salinity values, particularly from weathered samples. Generally, spoil samples are moderately to highly saline.
Weathered spoil samples (n=96)	31	3,770	**969**	
Unweathered spoil samples (n=142)	33	1,270	**423**	

Figure 2. Electrical conductivity (EC) and pH for spoil samples



The Queensland DME technical guideline (DME, 1995) defines pH and salinity criteria for mine waste materials, as reproduced in **Table 4**. Based on the median pH and EC values for the spoil samples overall, and also the median pH and EC values for the weathered versus unweathered samples, spoil samples are generally regarded as having a 'High' to 'Very High' pH. The spoil samples have a very broad range of salinity values, as evident by the distribution of samples corresponding to each salinity class.

Based on the distribution of samples corresponding to each salinity class, the weathered samples exhibit the broad range of salinity values evident in all spoil samples, but tending towards the 'Medium' to 'Very High' salinity classes. In comparison, the unweathered samples are regarded as having 'Low' to 'Medium' salinity.

The proportions of weathered to unweathered spoil are approximately equal, therefore general spoil (as a mixed bulk material), is expected to have a generally medium salinity derived from a mixture of low salinity unweathered spoil and medium to high salinity weathered spoil (**Table 4**).

Table 4. Salinity and pH criteria for assessment of spoil samples
Adapted from DME, 1995

	Very Low	Low	Medium	High	Very High
All spoil samples (median for n= 238)					
$EC_{1:5}$ (sample:water) µS/cm	< 150	150 - 450	450 - 900	900 – 2,000	> 2,000
No. and (%) of samples corresponding to each salinity classification	13 (~5%)	85 (36%)	78 (33%)	42 (18%)	20 (~8%)
$pH_{1:5}$ (sample:water)	< 4.5	4.5 – 5.5	5.5 – 7.0	7.0 – 9.0	> 9.0
No. and (%) of samples corresponding to each soil pH classification	1 (<1%)	-	10 (~4%)	99 (42%)	128 (54%)
Weathered spoil samples (median for n=96)					
$EC_{1:5}$ (sample:water) µS/cm	< 150	150 - 450	450 - 900	900 – 2,000	> 2,000
No. and (%) of samples corresponding to each salinity classification	10 (10%)	13 (14%)	21 (22%)	32 (33%)	20 (21%)
$pH_{1:5}$ (sample:water)	< 4.5	4.5 – 5.5	5.5 – 7.0	7.0 – 9.0	> 9.0
No. and (%) of samples corresponding to each soil pH classification	1 (~1%)	-	10 (10%)	70 (73%)	15 (16%)
Unweathered spoil samples (median for n=142)					
$EC_{1:5}$ (sample:water) µS/cm	< 150	150 - 450	450 - 900	900 – 2,000	> 2,000
No. and (%) of samples corresponding to each salinity classification	3 (~2%)	72 (51%)	57 (40%)	10 (~7%)	-
$pH_{1:5}$ (sample:water)	< 4.5	4.5 – 5.5	5.5 – 7.0	7.0 – 9.0	> 9.0
No. and (%) of samples corresponding to each soil pH classification	-	-	-	29 (20%)	113 (80%)

Highlighted cells in table show the category corresponding to the median EC (orange shading) and median pH (purple shading) for each of the three spoil categories (all spoil, weathered spoil and unweathered spoil).

3.1.2 Sulfur

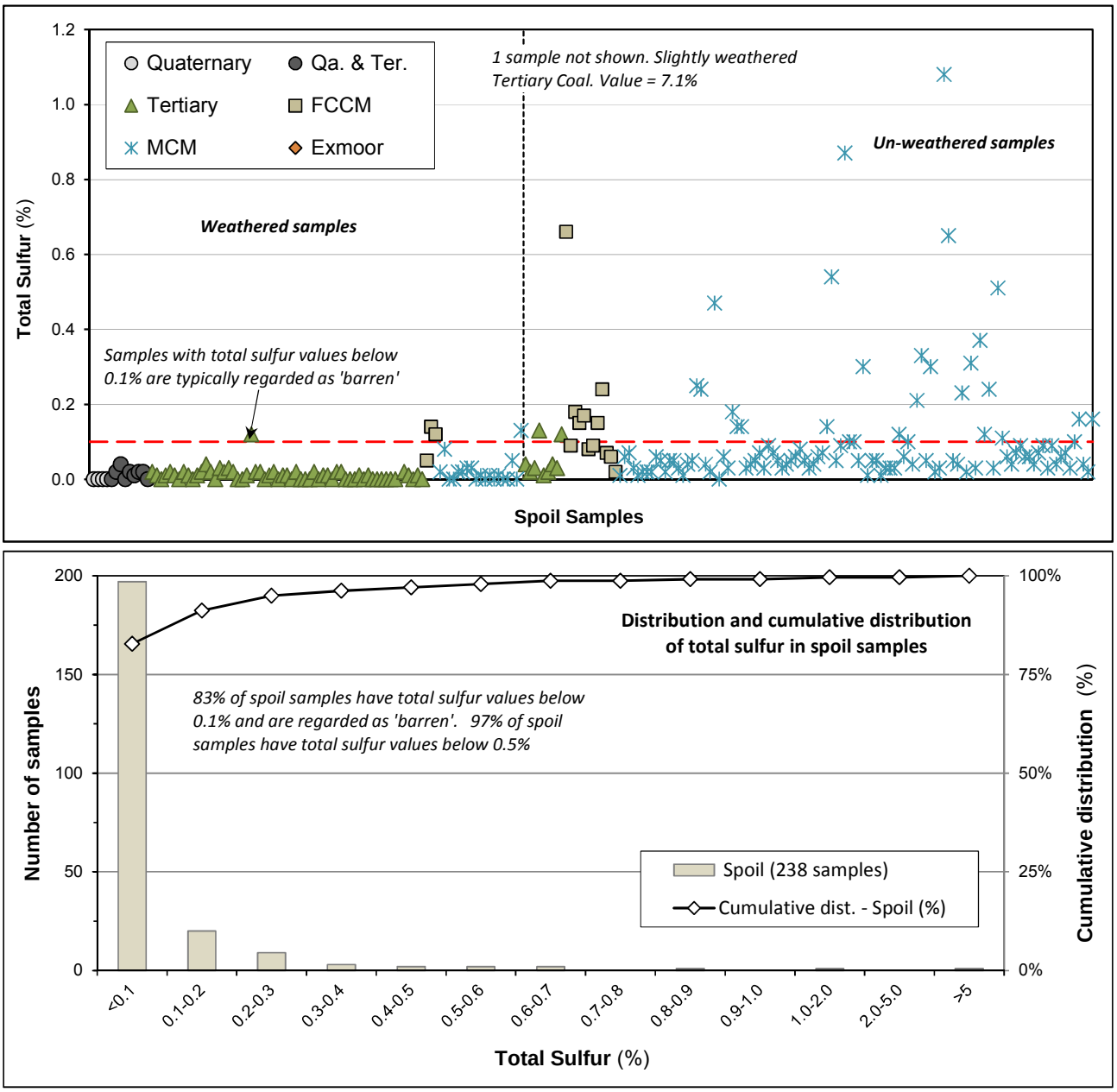
- The total sulfur concentration of spoil samples is very low, as summarised in **Table 5** and shown in **Figure 3**, with 90% of all spoil samples having a total sulfur value below 0.2%. Only seven of 238 samples (3% of all spoil samples) had total sulfur values above 0.5% and only two samples (<1% of all spoil samples) had total sulfur values above 1%. As evident in **Figure 3** (top), the sulfur concentrations were more broad-ranging in the unweathered samples compared to the weathered samples.

- Sulfide-sulfur values were measured on 89 spoil samples. With the exception of one 'slightly weathered' coal sample, which had an Scr value of 6.33%, the sulfide concentration of the weathered samples was very low (as expected) and less than 0.13%. The unweathered samples, expectedly, had greater sulfide concentrations compared to the weathered samples, but the values were still very low (median 0.07%).

Table 5. Summary sulfur results for spoil samples

Sample Material	Minimum	Maximum	Median	25th %ile	90th %ile
***Total sulfur** (%)*					
All spoil samples (n=238)	<0.01	7.07	**0.03**	0.01	0.16
Weathered spoil samples (n=96)	<0.01	7.07	**0.01**	<0.01	0.04
Unweathered spoil samples (n=142)	<0.01	1.08	**0.06**	0.03	0.25
***Sulfide sulfur (Scr)** (%)*					
All spoil samples (n=89)	<0.01	6.33	**0.04**	<0.01	0.29
Weathered spoil samples (n=27)	<0.01	6.33	**<0.01**	<0.01	0.01
Unweathered spoil samples (n=62)	<0.01	1.08	**0.07**	0.03	0.33

Figure 3. Total sulfur concentration and sulfur distribution for spoil samples



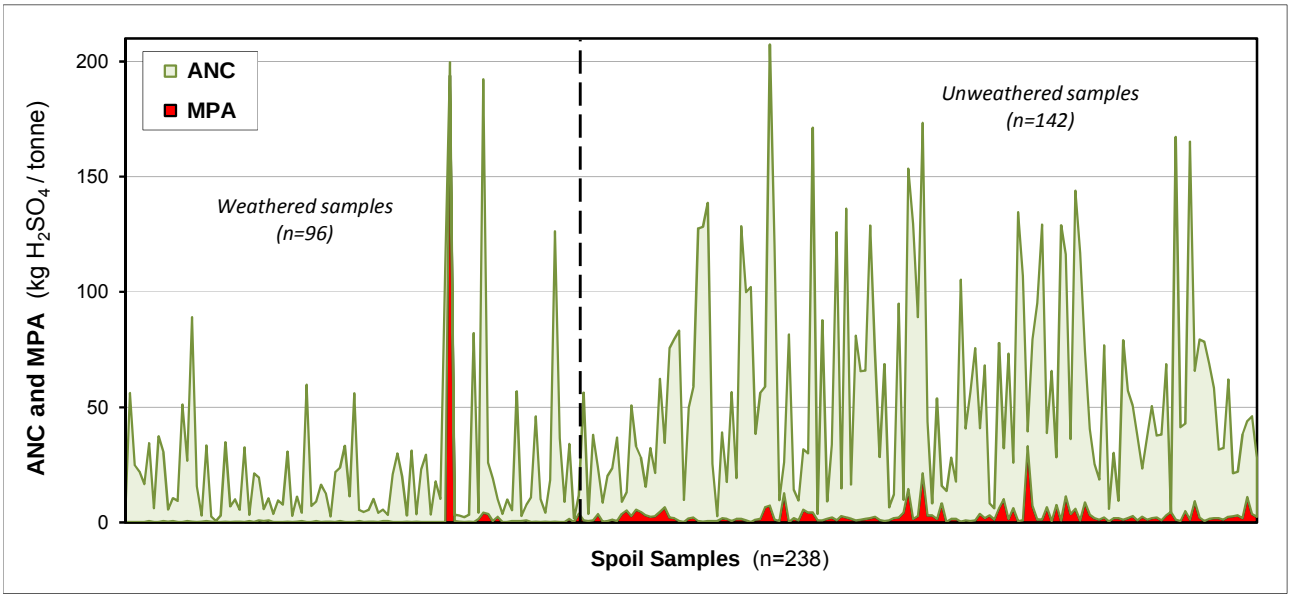
3.1.3 Maximum potential acidity and acid neutralising capacity

The ANC and MPA that could be generated by these spoil samples (MPA calculated from Scr, where available) is summarised in **Table 6** and shown in **Figure 4**.

Table 6. Summary maximum potential acidity (MPA), acid neutralising capacity (ANC) and net acid producing potential (NAPP) values for spoil samples

Sample Material	Minimum	Maximum	Median	General Comments
Maximum Potential Acidity (MPA) *kg H_2SO_4/t*				
All spoil samples (n=238)	0.2	194	**0.9**	Generally very low (negligible)
Weathered spoil samples (n=96)	0.2	194	**0.2**	Generally very low (negligible)
Unweathered spoil samples (n=142)	0.2	33	**1.8**	Generally very low (negligible)
Acid Neutralising Capacity (ANC) *kg H_2SO_4/t*				
All spoil samples (n=238)	<0.5	200	**27**	Low to moderate
Weathered spoil samples (n=96)	0.5	188	**10**	Low to moderate
Unweathered spoil samples (n=142)	<0.5	200	**40**	Low to moderate
Net Acid Producing Potential (NAPP) *kg H_2SO_4/t*				
All spoil samples (n=238)	-193	+188	**-24**	All negative except for 4 samples
Weathered spoil samples (n=96)	-184	+188	**-9.6**	All negative except for 1 sample
Unweathered spoil samples (n=142)	-193	+27	**-27**	All negative except for 3 samples

Figure 4. Maximum potential acidity (MPA) and acid neutralising capacity (ANC) for spoil samples



- The MPA values for all spoil samples were essentially negligible, with a very low median MPA of <1 kg H_2SO_4/t. One weathered sample (slightly weathered coal sample, as mentioned previously) had an MPA value of 194 kg H_2SO_4/t (shown as the high red spike in **Figure 4**),

whereas all other weathered samples had MPA values below 5 kg H_2SO_4/t, and mostly <1 kg H_2SO_4/t. The unweathered samples had slightly higher MPA values compared to the weathered samples, as expected due to the generally higher sulfur and sulfide concentrations of these unweathered samples. However, the unweathered samples still produced a very low median MPA value of <2 kg H_2SO_4/t.

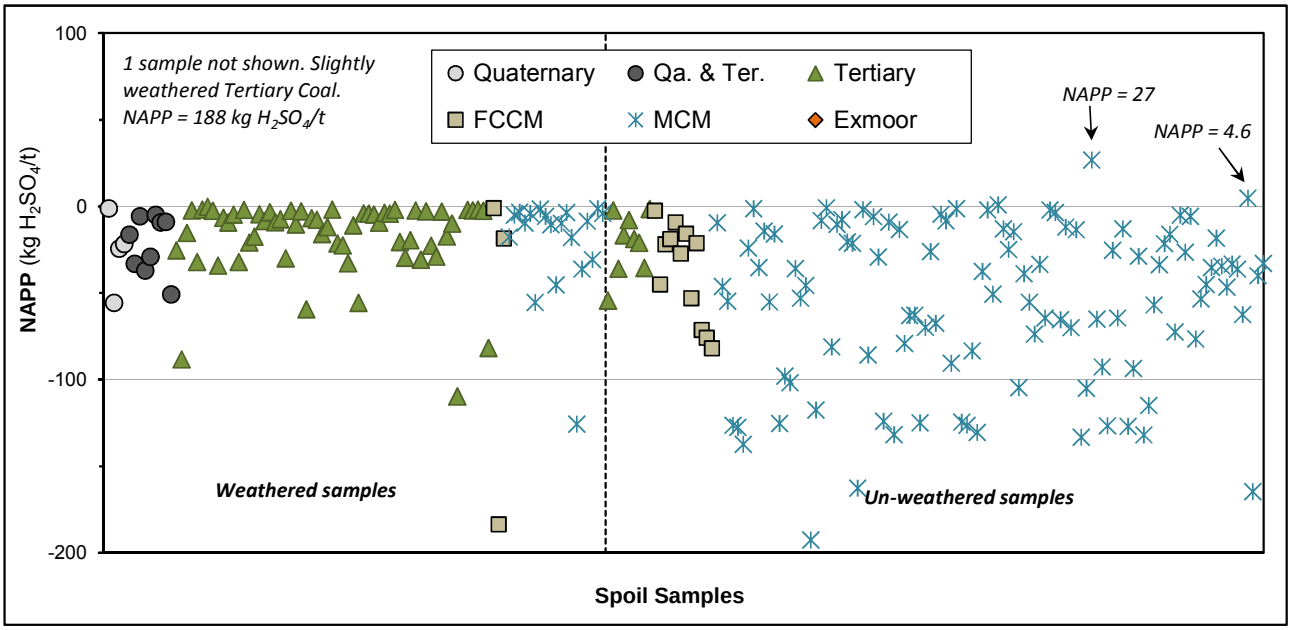
- The ANC values spanned a relatively large range, from <0.5 to 200 kg H_2SO_4/t, with a modest median ANC value of 27 kg H_2SO_4/t. Nine of the 86 weathered samples (10%) had ANC values above 50 kg H_2SO_4/t, compared to 60 of the 136 unweathered samples (44%). The carbonate form is unknown in these samples. As evident in **Figure 4**, the ANC clearly and significantly overwhelms the MPA of the spoil samples, showing significantly excess neutralising capacity.

3.1.4 Net acid producing potential

The calculated NAPP values for these samples (NAPP calculated from Scr, where available) are summarised in **Table 6** and shown in **Figure 5**.

Based on the generally low MPA and higher ANC values, the calculated NAPP values were negative for all except four spoil samples (1 weathered and 3 unweathered samples), indicating a greater overall theoretical proportion of neutralising capacity (ANC) compared to potential acidity (MPA). With the exception of one 'slightly weathered' coal sample, which had a NAPP value of 188 kg H_2SO_4/t, the NAPP values of the weathered samples were all negative, and ranged from -184 to -0.3 kg H_2SO_4/t, with an overall median NAPP value of -9.6 kg H_2SO_4/t for all weathered samples. The unweathered samples had a similar range of NAPP values to the weathered samples, but overall, had a lower (more negative) average and median NAPP value.

Figure 5. Net acid producing potential (NAPP) for spoil samples



3.1.5 ANC/MPA ratios

Generally those samples with an ANC/MPA mass ratio of greater than 2 are considered to have a negligible/low risk of acid generation and a high factor of safety in terms of potential for acid and metalliferous drainage (AMD) (DITR, 2007; INAP, 2009[9]). The results are summarised in **Table 7**.

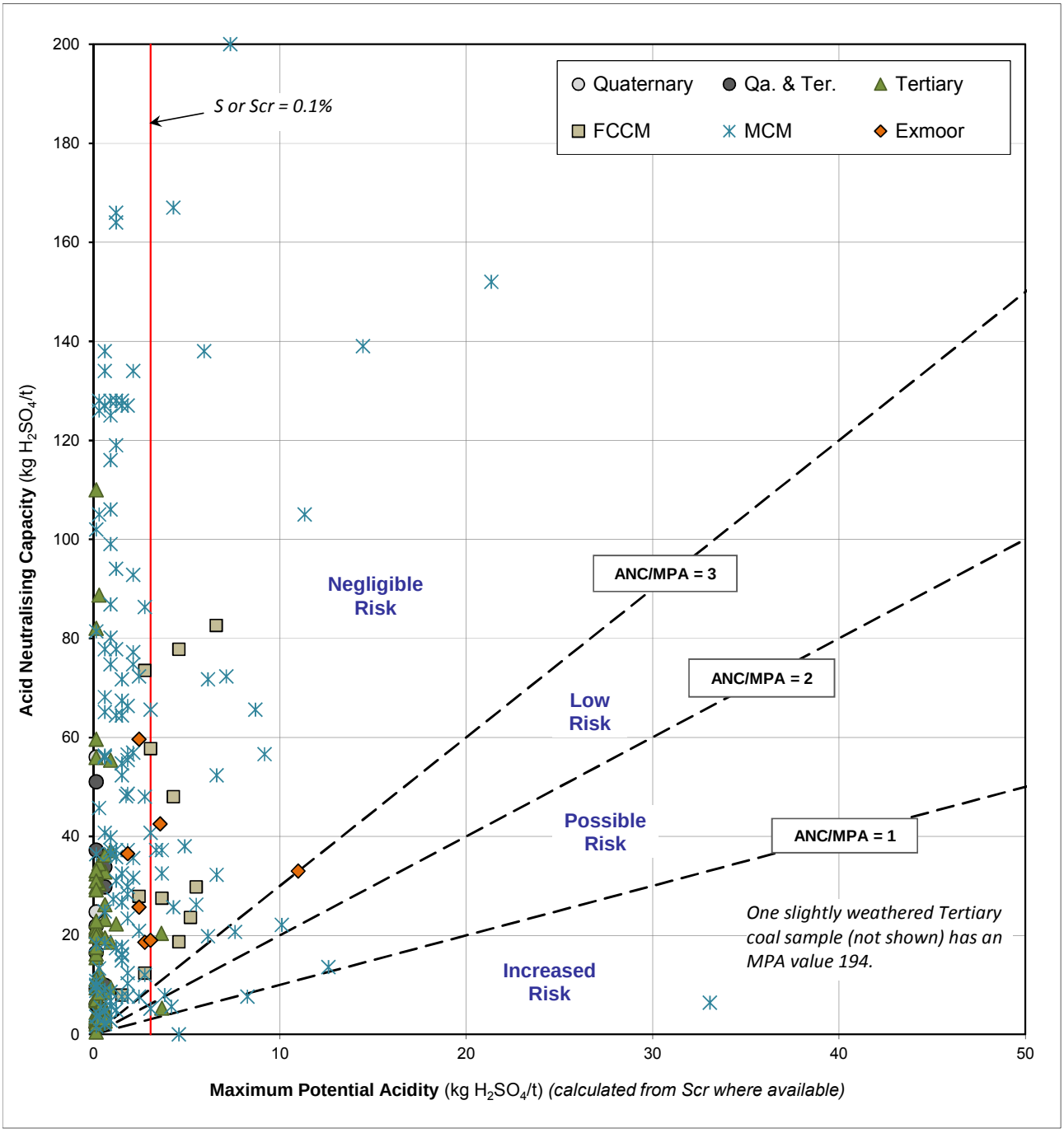
Table 7. Summary ANC/MPA ratios for spoil samples

Sample Material	Min.	Max.	Median	No. (%). of Samples with ratios <2	No. (%) of Samples with ratios between 2 -5	No. (%) of Samples with ratios >5
All spoil samples (n=238)	<0.1	718	**27**	11 (5%)	22 (9%)	205 (86%)
Weathered spoil samples (n=96)	<0.1	718	**40**	2 (2%)	7 (7%)	87 (91%)
Unweathered spoil samples (n=142)	0.1	666	**21**	9 (6%)	15 (11%)	118 (83%)

- The weathered and unweathered spoil samples have generally similar distributions of ANC/MPA ratios, although the weathered samples have a higher overall median ANC/MPA ratio of 40, compared to 21 for the unweathered spoil samples.
- The significant majority (95%) of spoil samples, have an ANC/MPA ratio greater than 2 (and about 86% of the samples have an ANC/MPA ratio greater than 5). Therefore, spoil samples, as a bulk material, are considered to have a negligible risk of acid generation, high levels of ANC with a high factor of safety (**Figure 6**).
- About 5% of all spoil samples (predominantly the unweathered samples), have ANC/MPA ratios of less than 2. ANC/MPA ratio values less than 1 indicates a 'theoretical' excess of acidity relative to neutralising capacity. ANC/MPA ratio values between 1 and 2 indicate a 'theoretical' excess of ANC relative to acidity, however in this case it cannot be assumed that the limited excess of ANC will be available or in a suitable form to neutralise potential acidity (*ie*. there is little 'safety margin').

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

Figure 6. Acid neutralising capacity (ANC) versus maximum potential acidity (MPA) for spoil samples



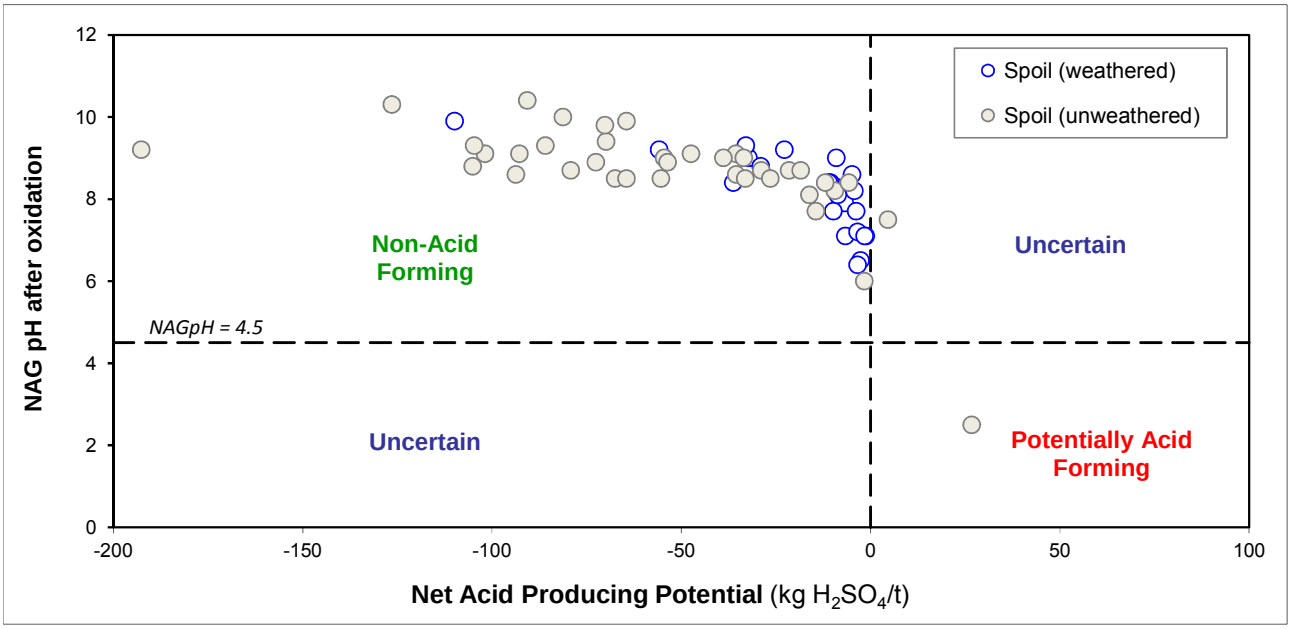
3.1.6 Net acid generation

Net acid generation (NAG) tests were performed on 63 spoil samples (randomly selected) and the results are summarised in **Table 8** and shown in **Figure 7** (compared with NAPP values). With the exception of one sample (unweathered sample BY132-7), all spoil samples tested had NAGpH values above pH 6, with the median NAGpH value of 8.6. There was little difference in the NAG values between the weathered and unweathered samples, as shown in **Figure 7**.

Table 8. Summary net acid generation pH (NAGpH) values for spoil samples

Sample Material	Minimum	Maximum	Median	General Comments
NAGpH after oxidation				
All spoil samples (n=63)	2.5	10.4	**8.6**	One low NAGpH spoil sample. All other spoil samples are well above the 'typical' acid-generation limit of NAGpH 4.5.
Weathered spoil samples (n=24)	6.4	9.9	**8.3**	
Unweathered spoil samples (n=39)	2.5	10.4	**8.7**	

Figure 7. Net acid generation pH after oxidation (NAGpH) versus net acid producing potential (NAPP) for spoil samples



3.1.7 Geochemical classification

The ABA results presented in this section have been used to classify the acid forming nature of the 238 spoil samples as shown in **Appendix B - Table B1**, based on the criteria outlined in **Section 2.4**. The classification of the sample types with respect to these criteria is summarised in **Table 9**.

The results in **Table 9** show that almost all spoil samples tested (97%) fall in the NAF-Barren or NAF categories, and spoil materials represented by these samples have very low sulfur values, excess ANC and clearly have little to no capacity to generate acidity. Generally, there was little difference between the classifications of the weathered samples compared to the unweathered samples. Five unweathered spoil samples were classified as Uncertain due to a low oxidisable sulfur (Scr) content and low NAPP value. Three samples, representing about 1% of samples, were classified as PAF.

Table 9. Geochemical classification of spoil samples

	All Spoil Samples (n=238)		Weathered Spoil Samples (n=96)		Unweathered Spoil Samples (n=142)	
Geochemical Classification	**No. of Samples**	**% of Samples**	**No. of Samples**	**% of Samples**	**No. of Samples**	**% of Samples**
Non-acid forming (barren) (NAF-barren)	197	97 %	91	99 %	106	95 %
Non-acid forming (NAF)	33		4		29	
Uncertain	5	~2 %	-	-	5	~4 %
Potentially acid forming – Low capacity (PAF-LC)	1	~1 %	-	~1 %	1	~1 %
Potentially acid forming (PAF)	2		1		1	

From an acid generating perspective, spoil (as a bulk material) is expected to be overwhelmingly NAF with excess ANC.

3.2 Acid-Base Accounting results for potential coal reject samples

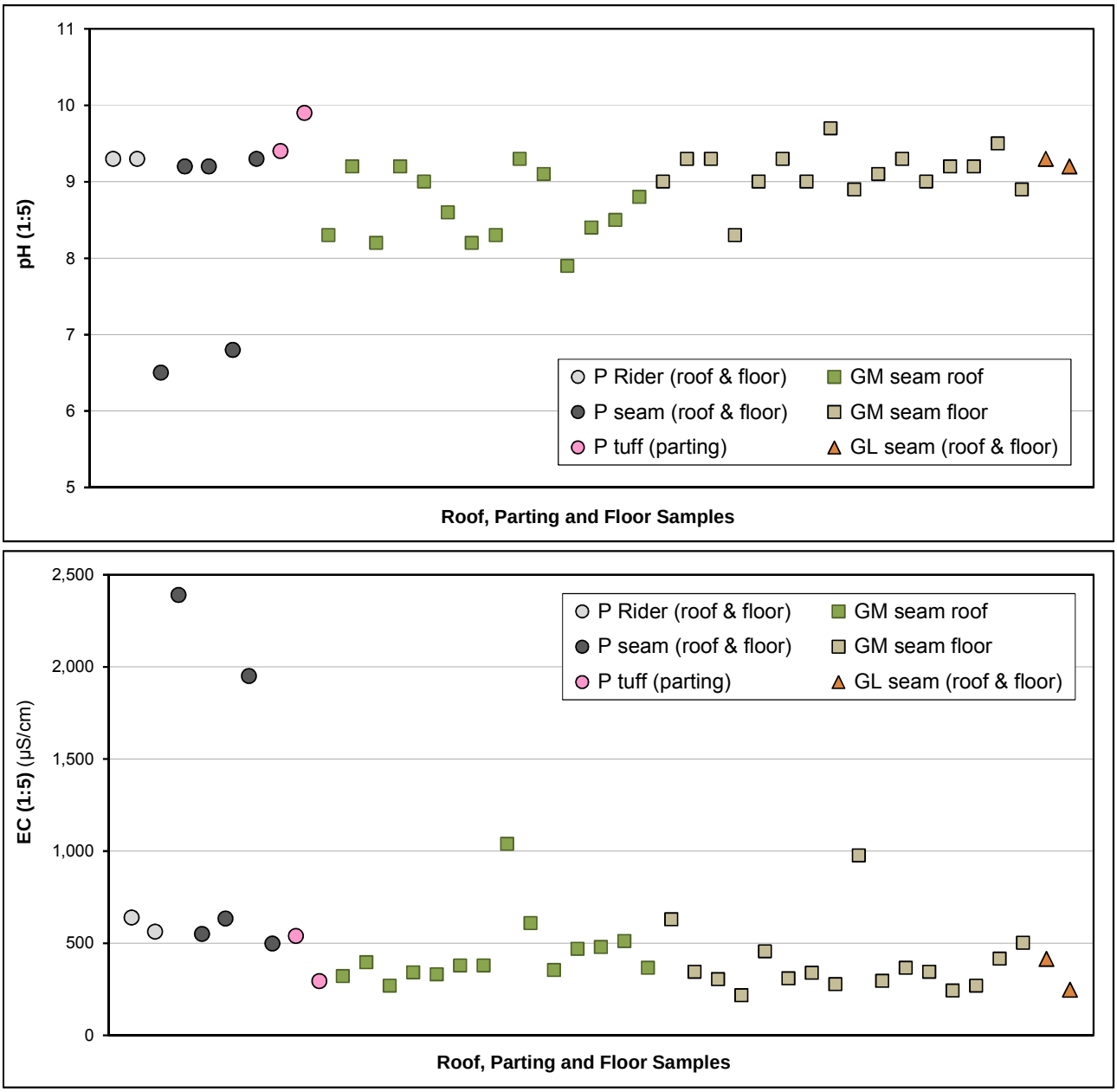
ABA results for the 41 potential coal reject samples that underwent detailed geochemical characterisation are presented in **Appendix B - Table B2** and summarised as follows, with reference to summary **Tables 10** to **14** and **Figures 8** to **12**. The laboratory certificates for these samples are provided in **Appendix D**.

3.2.1 pH and electrical conductivity

- Potential coal reject samples generally produced alkaline pH, with a median $pH_{1:5}$ value of 9.1. Values ranged from pH 6.5 to pH 9.9. Two P-seam samples (~5% of all coal reject samples tested) had $pH_{1:5}$ values less than pH 7. The $pH_{1:5}$ results are presented **Figure 8**, which shows there is no significant difference between the pH values of samples from the various coal seams tested, or between roof, parting and floor samples within the same seam. The exceptions are the two samples from the P seam (one roof and one floor sample), which have lower (neutral) pH values compared to all other potential coal reject samples tested.

- The current $EC_{1:5}$ values of potential coal reject samples ranged from 218 to 2,390 µS/cm, with a generally low median EC of 380 µS/cm. Similar to the pH values, there is generally no significant difference between the salinity values of samples from the various coal seams tested, or between roof, parting and floor samples within the same seam (**Figure 8**). The exceptions to this are two P-seam samples (the same samples with lower pH values), which had significantly greater EC values compared to the other potential coal reject samples.

Figure 8. Electrical conductivity (EC) and pH for potential coal reject samples



The Queensland DME technical guideline (DME, 1995) defines pH and salinity criteria for mining waste materials, as reproduced in **Table 10**. Based on the median pH values, the potential coal reject samples are generally regarded as having a 'Very High' soil pH. However, based on the number of samples corresponding to each category, the samples are generally regarded as having 'High' to 'Very High' soil pH values. The potential coal reject samples have a very broad range of salinity values, with the median EC value corresponding to a 'Low' salinity. However, based on the number of samples corresponding to each category, the samples are generally regarded as having 'Low' to 'Medium' salinity.

Table 10. Salinity and pH criteria for assessment of potential coal reject samples
Adapted from DME, 1995

	Very Low	Low	Medium	High	Very High
Salinity					
$EC_{1:5}$ (sample:water) µS/cm	< 150	150 - 450	450 - 900	900 - 2000	> 2000
No. and (%) of samples corresponding to each salinity classification. (n=41)	-	24 (59%)	13 (32%)	3 (7%)	1 (2%)
pH					
$pH_{1:5}$ (sample:water)	< 4.5	4.5 – 5.5	5.5 – 7.0	7.0 – 9.0	> 9.0
No. and (%) of samples corresponding to each pH classification. (n=41)	-	-	2 (5%)	17 (41%)	22 (54%)

Highlighted cells in Table 10 show the category corresponding to the median EC (orange shading) and median pH (purple shading) for the potential coal reject samples.

3.2.2 Sulfur

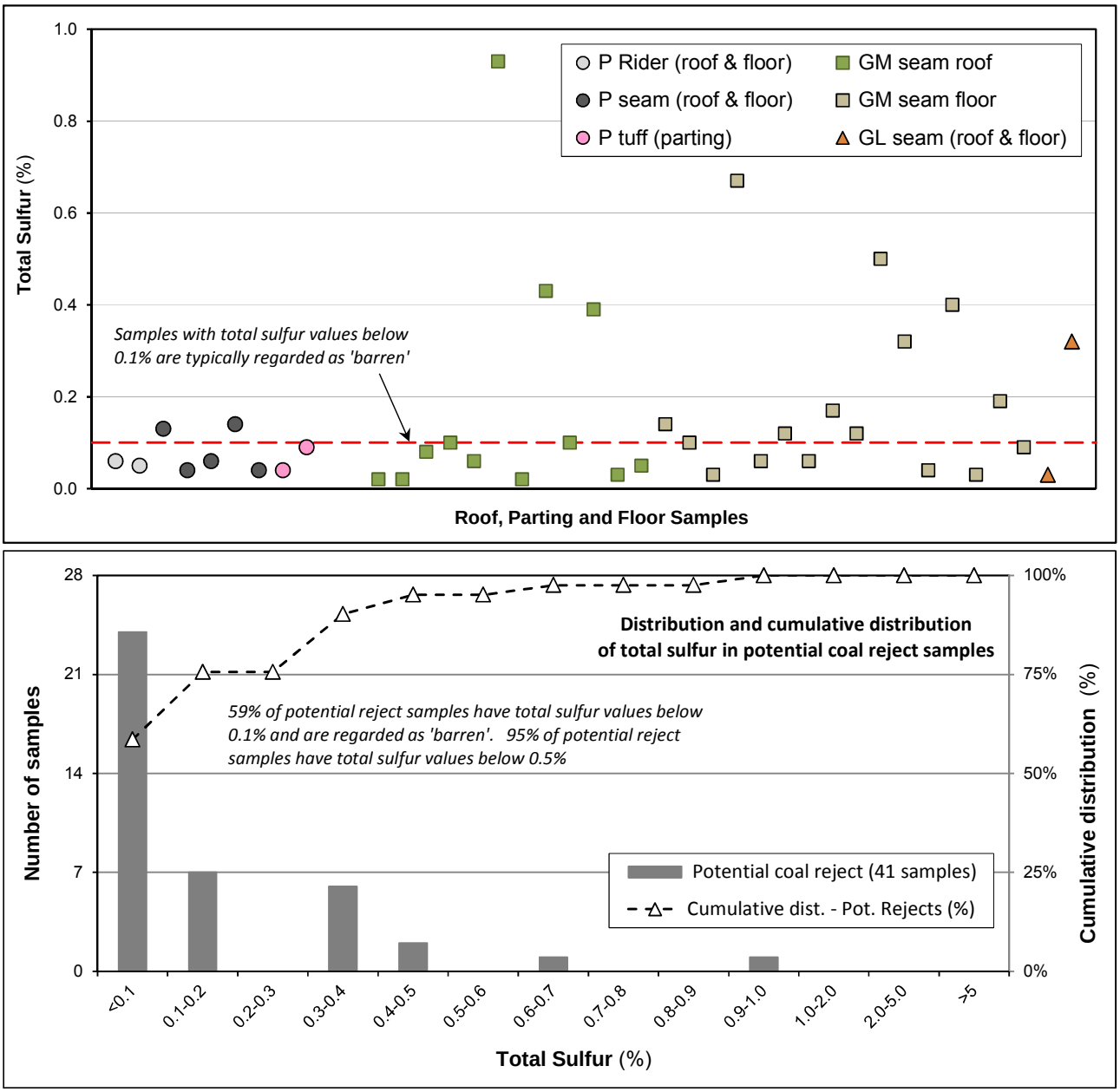
- The total sulfur concentration of potential coal reject samples is generally low, as summarised in **Table 11** and shown in **Figure 9.**

Table 11. Summary sulfur results for potential coal reject samples

Parameter	Minimum	Maximum	Median	25th %ile	90th %ile
Total sulfur (%) (coal reject samples; n=41)	0.02	0.93	**0.09**	0.04	0.40
Scr (%) (coal reject samples; n=40)	0.01	0.89	**0.05**	0.03	0.38

- 90% of all potential coal reject samples have total sulfur values below 0.40% (**Table 11**). Only two of 41 samples (~5% of all potential coal reject samples) had total sulfur values above 0.5% and no samples had total sulfur values above 1% (**Figure 9**). As evident in **Figure 9** (top graph), the sulfur concentrations were more broad-ranging in the roof and floor samples from the GM seam compared to the P Rider and P seam samples (although it is acknowledged that there are significantly more GM-seam samples compared to other seams).
- Sulfide-sulfur values were measured on 40 potential coal reject samples and generally approximated the total sulfur values (**Table 11**), indicating that most sulfur in potential coal reject is present as sulfide.

Figure 9. Total sulfur concentration and sulfur distribution for potential coal reject samples



3.2.3 Maximum potential acidity and acid neutralising capacity

The ANC and MPA that could be generated by potential coal reject samples (MPA calculated from Scr, where available) is summarised in **Table 12** and shown in **Figure 10**.

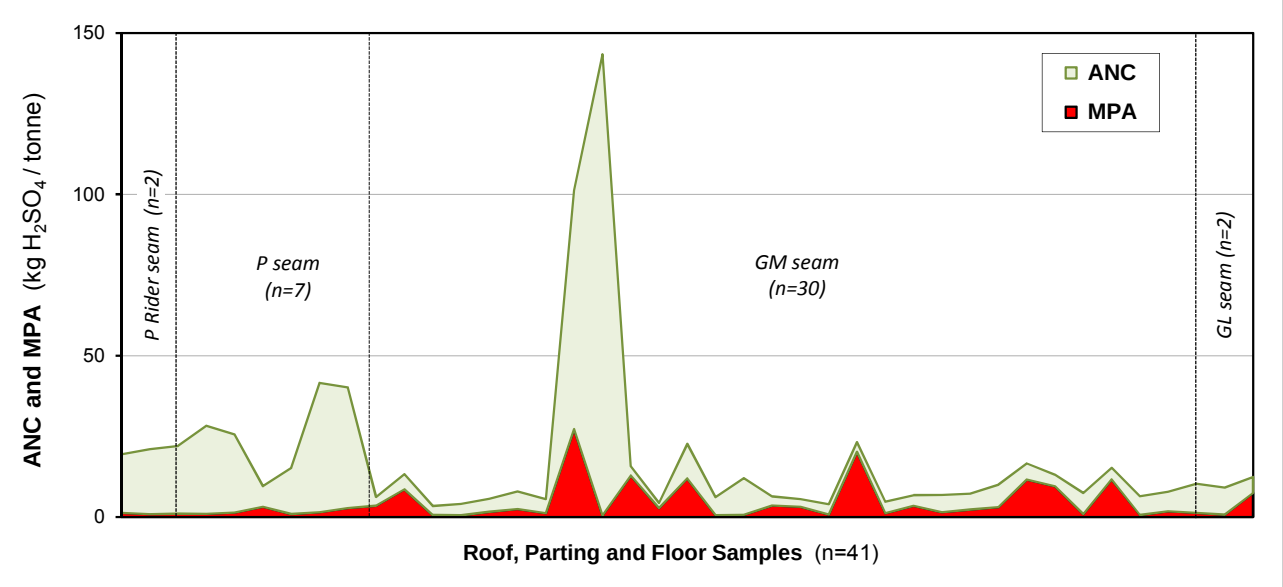
- The MPA values for potential coal reject samples were generally low, ranging from <1 to 27 kg H_2SO_4/t with a very low median MPA of 1.6 kg H_2SO_4/t. Six of the 41 samples (15%) had MPA values above 10 kg H_2SO_4/t and two samples had MPA values above 20 kg H_2SO_4/t. As evident in **Figure 10**, the MPA values are generally lower in the samples from the P Rider and P seam compared to the MPA values in samples from the GM and GL seams.

- The ANC values spanned a relatively large range, from 1.6 to 143 kg H_2SO_4/t, with a low median ANC value of 5.4 kg H_2SO_4/t. Two GM seam samples had ANC values above 50 kg H_2SO_4/t (indicated by the ANC spike in **Figure 10**). The carbonate form is unknown in these samples. Excluding the two samples with high ANC values (both GM seam samples; 143 and 74 kg H_2SO_4/t ANC) the average ANC values were higher in the P Rider and P seam coal reject samples (average 23 kg H_2SO_4/t) compared to the GM and GL seam samples (average 5 kg H_2SO_4/t).

Table 12. Summary maximum potential acidity (MPA), acid neutralising capacity (ANC) and net acid producing potential (NAPP) values for potential coal reject samples

Parameter	Minimum	Maximum	Median	25th %ile	90th %ile
MPA (kg H_2SO_4/t) (coal reject samples; n=41)	0.4	27	**1.6**	0.9	12
ANC (kg H_2SO_4/t) (coal reject samples; n=41)	1.6	143	**5.4**	3.6	27
NAPP (kg H_2SO_4/t) (coal reject samples; n=41)	-143	+17	**-3.2**	-11	+5.9

Figure 10. Maximum potential acidity (MPA) and acid neutralising capacity (ANC) for potential coal reject samples



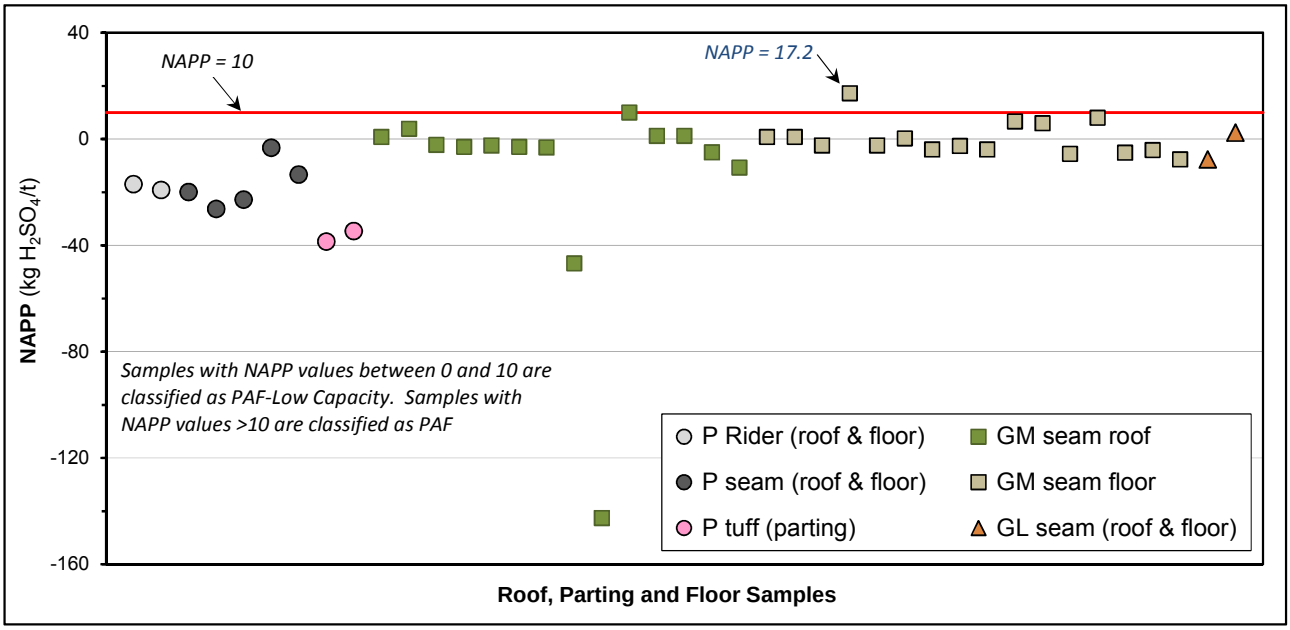
As shown in **Figure 10**, there is a broad excess of ANC compared to MPA in the P-Rider and P seams, while the excess of ANC over MPA in the GM seam is comparatively moderate. The GM seam is expected to constitute the majority of the coal reject produced during the first 10 years of mining (operations).

3.2.4 Net acid producing potential

The calculated NAPP values for these samples (NAPP calculated from Scr, where available) are summarised in **Table 12** and shown in **Figure 11**.

Based on the generally low MPA and higher ANC values, the calculated NAPP values were generally negative for most samples, with a median NAPP value of -3.2 kg H_2SO_4/t. Thirteen of the 41 samples (~32%) had positive NAPP values, but only one sample had a NAPP value greater than 10 kg H_2SO_4/t (maximum NAPP = 17 kg H_2SO_4/t).

Figure 11. Net acid producing potential (NAPP) for potential coal reject samples



3.2.5 ANC/MPA ratios

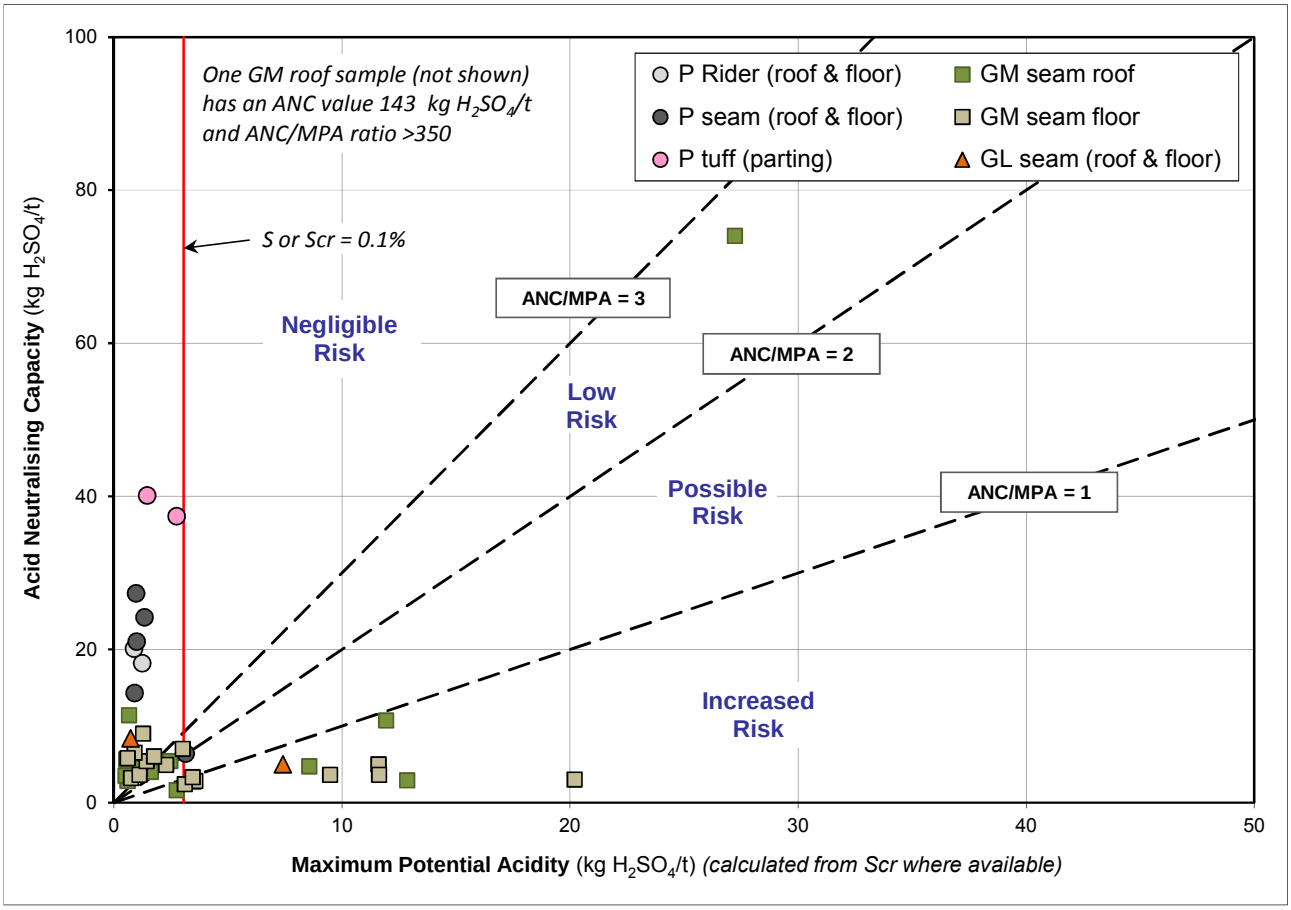
Generally those samples with an ANC/MPA mass ratio of greater than 2 are considered to have a negligible/low risk of acid generation and a high factor of safety in terms of potential for acid and metalliferous drainage (AMD) (DITR, 2007; INAP, 20099). The results are summarised in **Table 13**.

Table 13. Summary ANC/MPA ratios for coal reject samples

Sample Material	Min.	Max.	Median	No. (%). of Samples with ratios <2	No. (%) of Samples with ratios between 2 -5	No. (%) of Samples with ratios >5
All coal reject samples (n=41)	0.1	359	**3.4**	13 (32%)	12 (29%)	16 (39%)

- Over two-thirds (68%) of the potential coal reject samples have an ANC/MPA ratio greater than 2 (and about 39% of samples have an ANC/MPA ratio greater than 5). Therefore, a majority proportion of coal reject samples as a bulk material, and mostly from the P and P Rider seams, are considered to have a low risk of acid generation and a high factor of safety (**Figure 12**).

Figure 12. Acid neutralising capacity (ANC) versus maximum potential acidity (MPA) for potential coal reject samples



- About 32% (13 out of 41 samples) of all potential coal reject samples (predominantly the GM and GL seam samples), have ANC/MPA ratios of less than 2. Of these 13 samples, four have total sulfur values below 0.14%, therefore their ability to generate significant acidity is limited by their very low sulfur concentrations.

ANC/MPA ratio values less than 1 indicates a 'theoretical' excess of acidity relative to neutralising capacity. ANC/MPA ratio values between 1 and 2 indicate a 'theoretical' excess of neutralising capacity relative to acidity, however in this case it cannot be assumed that the limited excess of ANC will be available or in a suitable form to neutralise potential acidity (*ie*. there is little 'safety margin').

3.2.6 Net acid generation

Standard net acid generation (NAG) tests were performed on seven coal reject samples, and sequential NAG tests were performed on six of these seven samples. NAGpH values (after oxidation) ranged from pH 2.8 to pH 7.3. All except two samples had NAGpH values below pH 4.5. All samples were identified as coaly or carbonaceous and have organic carbon concentrations ranging from 9 to 49% (median 22%). High concentrations of organic carbon (such as present in six of the seven samples tested) can contribute to the generation of organic acids, which can add non-sulfidic acidity to the test solution, which can potentially lead to 'false positive' NAGpH values (ACARP, 2008). As such, the NAG values were used in the assessment as part of

the overall data evaluation, but were not used as a criterion for classifying coal reject samples as NAF or PAF.

3.2.7 Geochemical classification

The ABA results presented in this section have been used to classify the acid forming nature of the 41 potential coal reject samples as shown in **Appendix B - Table B2**, based on the criteria outlined in **Section 2.4**. The classification of the sample types with respect to these criteria is summarised in **Table 14**.

The results in **Table 14** show that about 73% of potential coal reject samples tested (30 out of 41 samples) fall in the NAF-Barren or NAF categories, and coal reject materials represented by these samples have very low sulfur values, excess ANC and clearly have little capacity to generate acidity. Eight samples were classified as PAF-Low Capacity and one sample was classified as PAF. These nine samples represent about 22% of the samples – indicating that about one-quarter of coal reject samples have some capacity to generate acid. As discussed above with respect to ANC/MPA ratios, and evident in the lower left corner of **Figure 12**, some samples classified as PAF-LC or Uncertain have very low sulfur values, therefore these samples are unlikely to generate significant acidity even in the absence of modest neutralising capacity.

Table 14. Geochemical classification of potential coal reject samples

	Geochemical Classification				
All coal reject samples (n =41)	Non-acid forming – barren (NAF-barren)	Non-acid forming (NAF)	Uncertain	Potentially acid forming – low capacity (PAF-LC)	**Potentially acid forming (PAF)**
Number of samples	24	6	2	8	1
% of samples	73 %		5 %	22 %	

All PAF-LC and PAF potential coal reject samples were from the GM and GL seams indicating that, as a bulk material, coal reject from the GM and GL seams (during the first 10-15 years of mining) may have a slightly lower factor of safety with respect to potential acid generation compared to coal reject from the shallower P and P Rider seams.

Overall, from an acid generating perspective, coal reject (as a bulk material) from the areas expected to be mined within the first 10 to 15 years is expected to be NAF. Whilst about one-quarter of the potential coal reject samples tested are PAF, most PAF samples have a 'low capacity' to generate acid due to their generally low sulfur values. In the field, the bulk coal reject is expected to be reasonably well mixed and generate neutral pH leachate, although the salinity and sulfate concentration in leachate from this material could be elevated. An additional factor of safety is present in that coal reject material will either be buried within spoil piles or, if a coal reject disposal facility remains at the surface after mining ceases, it will be decommissioned and managed as per a Mine Closure Plan and Rehabilitation Plan. During operations the environmental characteristics of the out-of-pit co-disposal coal reject will be further assessed and well understood such that an appropriate Rehabilitation Plan can be adopted.

3.3 Multi-elements in spoil and potential coal reject

The composition of the samples used for multi-element testing is provided in **Appendix B – Table B3**. The multi-element (solid) test results for the 3 individual and 19 composite samples are presented in **Appendix B – Table B4** and summarised below. The ALS laboratory certificates for these samples subjected to multi-element analysis are provided in **Appendix D**.

Metals and metalloids

The multi-element (solid) results in **Appendix B – Table B4** show that total metal and metalloid concentrations in 79 spoil and 18 potential coal reject samples tested are low. All except two spoil samples (97% of spoil samples) reported total metals and metalloid concentrations below the applied NEPC (1999a) health-based investigation levels (HILs) (E) for soils, and in many cases, below the laboratory limit of reporting for metals and metalloids.

Spoil sample (BY082-10) reported a total arsenic concentration of 212 mg/kg, which is slightly above the applied health-based guideline value of 200 mg/kg (**Appendix B – Table B4**). Spoil sample (BY127-6) reported a total nickel concentration of 662 mg/kg, which is above the applied health-based guideline value of 600 mg/kg (**Appendix B – Table B4**).

To provide additional relevant context, the total assay result for each element (mg/kg) was compared to the average background concentration of those elements in soil and rock. From the comparison with average crustal abundance in rocks a geochemical abundance index (GAI) was calculated. The GAI quantifies an assay result for a particular element in terms of the average crustal abundance for that element. The index, based on a log 2 scale, is expressed in seven integer increments (0 to 6), which correspond to enrichment factors from 0 to over 96 times average crustal abundance, as shown.

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

As a general rule, a GAI greater than or equal to three indicates enrichment to a level that may warrant further investigation or provides an indication of which elements may potentially be problematic with respect to environmental impacts. This is particularly the case with some environmentally important 'trace' elements, such as As, Cd, Cu, Zn, *etc*., more so than with major rock-forming elements, such as Al, Ca, Na, *etc*.

Elements identified as enriched may not necessarily be a concern for revegetation, drainage water quality or public health, but their significance should be evaluated. Similarly, if an element is not enriched that does not mean it will never be a concern, because under some conditions (*eg*. low pH) the geochemical behaviour of common environmentally important elements such as Al, Cu, Cd, Fe and Zn can change significantly.

The significant majority (95%) of spoil samples have GAI values less than three, indicating they are not significantly enriched in metals and metalloids compared to average background concentrations. Four spoil samples returned GAI values of three or greater, as summarised in

Table 15. No potential coal reject samples were significantly enriched (*ie*. all had GAI values below 2).

Table 15. Geochemical abundance index results for 'enriched' spoil samples

Sample ID	General Location	Sample lithology	Elements enriched	GAI
BY127-6	South Pit 1	Basalt (highly weathered)	Nickel (Ni)	3
BY132-3	South Pit 1/2	Sandstone, f-m; (weathered)	Mercury (Hg)	4
BY082-10	South Pit 1	Carb. Mudstone	Arsenic (As)	6
BY132-11	South Pit 1/2	Sandstone (near GL floor)	Arsenic (As)	3

The environmental significance of identified metal concentrations in overburden and potential reject materials and their water solubility in terms of risk is discussed in **Section 4**.

3.4 Initial solubility of spoil and potential coal reject samples

To evaluate the initial solubility of multi-elements in solids, water extract (1:5 sample:water) tests and toxicity characterisation leaching procedure (TCLP) tests were completed for selected individual and composite samples. The results from these tests are provided in **Appendix B – Table B5** (spoil) and **Table B6** (potential coal reject) and summarised below. The composition of each sample subjected to multi-element testing is provided in **Appendix B – Table B3**. The ALS laboratory certificates for the samples subjected to soluble multi-element analysis are provided in **Appendix D**.

Water extract (1:5) results

Soluble multi-element results for 1:5 (solid:water) water extract solutions from 16 spoil samples and 11 potential coal reject samples show that most metal and metalloid concentrations have limited solubility. The exceptions are some soluble concentrations of molybdenum (Mo), selenium (Se) and vanadium (V), which are above the applied livestock drinking water quality guideline levels for some samples.

Leachate from about half of the spoil samples and almost all of the potential coal reject samples contained soluble Mo concentrations marginally above the applied NEPC (1999b) groundwater investigation level (0.01 mg/L) for livestock drinking water, but below the applied ANZECC (2000) livestock drinking water quality guideline value (0.15 mg/L). Exceeding values ranged from 0.02 to 0.08 mg/L.

Leachate from about one-third of the spoil and potential coal reject samples contained soluble Se concentrations marginally above the applied NEPC (1999b) and ANZECC (2000) livestock drinking water quality guideline value (0.02 mg/L). Exceeding values ranged from 0.04 to 0.06 mg/L.

Leachate from one spoil sample and one potential coal reject sample contained soluble V at concentrations marginally above the applied livestock drinking water quality guideline value (0.1 mg/L). Exceeding values were 0.18 mg/L (spoil) and 0.12 mg/L (potential coal reject).

The remaining soluble elements and ions were at concentrations below the applied livestock drinking water quality guidelines, and in many cases, below the laboratory limit of reporting (LOR).

TCLP results

Soluble multi-element results show that soluble metal and metalloid concentrations in TCLP leachates from 63 spoil samples and 7 potential coal reject samples tested are low. No element concentrations exceeded the applied NEPC (1999b) and ANZECC (2000) livestock drinking water quality guideline values (where guideline values exist). Most soluble metals were at concentrations below the laboratory limit of reporting (LOR).

The environmental significance of identified metal concentrations in spoil and potential coal reject materials and their water solubility in terms of risk is discussed in **Section 4**.

3.5 Cation exchange capacity, sodicity and dispersion of spoil

To evaluate the potential 'soil quality' of spoil materials, exchangeable cation concentrations were measured on 13 samples and the results are provided in **Table 16**. The ALS laboratory certificates for the samples subjected to exchangeable cation analysis are provided in **Appendix D**.

The effective cation exchange capacity (eCEC) of spoil samples ranged from 3.7 to 86.5 meq/100g, with a relatively high median eCEC value of 28.6 meq/100g. The exchangeable sodium percentage (ESP) results indicate that the ESP is high in most spoil samples, ranging from 7% to 42%, with a median ESP of 20%.

Table 16. Exchangeable cation results for spoil samples

Sample ID	Location	Lithology	Fmt.	Exchangeable cations (meq/100g)						ESP
				Al	Ca	Mg	Na	K	eCEC	
BY082-2	South Pit 1	Claystone (highly weathered)	Ter.	<0.2	6.6	22	20.9	0.4	49.9	42%
BY082-7	South Pit 1	Basalt	Ter.	<0.2	53.8	20.1	12.3	0.3	86.5	14%
BY264-003	West Pit 1	Claystone (highly weathered)	MCM	<0.1	0.5	1.7	1.4	<0.1	3.7	38%
BY263-003	West Pit 1	Mudstone (slightly weathered)	MCM	0.1	5.2	8.5	2.1	0.2	16	13%
BY195-2	West Pit 1	Claystone & Mudstone (moderately to highly weathered)	MCM	0.1	3	6.4	2.2	0.3	11.9	18%
BY264-005	West Pit 1	Siltstone	MCM	<0.1	2.2	4.6	1.7	0.2	8.7	20%
BY082-8	South Pit 1	Mudstone	MCM	<0.2	18.4	25.4	15.2	1.8	60.8	25%
BY082-9	South Pit 1	Sandstone, medium-coarse	MCM	<0.2	40.1	10.6	6.0	0.8	57.6	10%
BY195-5	West Pit 1	Sandstone, fine	MCM	<0.1	6.4	4.5	0.8	0.2	11.9	6.7%
BY082-10	South Pit 1	Mudstone, carbonaceous.	MCM	<0.2	7.0	13.4	7.8	1.2	29.3	27%
BY056-13	West Pit 1	Igneous (intrusive at GM seam)	MCM	<0.2	11.9	13.7	9.0	0.7	35.5	25%
BY195-7	West Pit 1	Siltstone	MCM	0.2	6.6	3.9	1.8	0.3	12.7	14%
BY082-13	South Pit 1	Sandstone, fine.	Exmoor	<0.2	12.3	7.6	7.5	1.1	28.6	26%

From a soil chemistry viewpoint the spoil materials have different characteristics compared to the potential coal reject materials, and coal reject materials will not report to final landform surfaces as they will be covered by spoil material. Furthermore, about 97% of all mining waste will be mined spoil. With this in mind, the suitability of mining waste materials for use in revegetation and rehabilitation is focused on the spoil materials.

Many of the tested spoil materials had relatively high Exchangeable Sodium Percentage (ESP) values (median 20%) (**Table 16**). An ESP value of 6% or greater generally indicates that these materials are regarded as sodic and may be prone to dispersion (Isbell, 2002) and soil with an ESP value greater than 14% is regarded as strongly sodic (Northcote and Skene, 1972). Other important factors, such as clay mineralogy, soil sodium concentration, soil salinity and irrigation water (rainwater) chemistry may enhance or limit that potential for soil to be sodic or become sodic over time. Therefore values of 6% ESP and 14% ESP to represent soils as being sodic or strongly sodic are used as a guide and should not be taken as definitive.

All samples had ESP values greater than 6%. Ten (out of 13) samples had ESP values greater than 14%. Strongly sodic materials are likely to have structural stability problems related to potential dispersion (Van de Graaff and Patterson, 2001). There was no distinction between weathered versus unweathered samples with respect to ESP values.

Sixteen spoil samples (total) from six drill-holes underwent Emerson Class tests to determine whether these samples were dispersive (**Table 17**). Emerson Class tests are a direct measure of soil dispersion, whereas ESP values are used as an indirect measure of the *potential* for a sample to have structural stability problems – and hence *may be* dispersive. Of the 16 spoil samples that underwent Emerson Class tests, 10 samples were dispersive (Classes 1, 2, 3 and 5). Seven of the 10 'dispersive' samples were weathered spoil and three were unweathered spoil. The Emerson Class test results support the ESP results in that a significant proportion of spoil may be prone to erosion. The Emerson Class test results also suggest that weathered spoil may be more prone to dispersion than unweathered spoil (albeit the sample size is relatively small).

Table 17. Emerson Class results for spoil samples

Sample ID	Location	Lithology	Fmt.	Emerson Class No.	Comment
BY107-1	South Pit 1	Silty clay (very highly weathered)	Qa.	1	Complete dispersion
BY127-1	South Pit 1	Silty clay (very highly weathered)	Qa.	5	
BY047-1	West Pit 2 / 3	Silty clay (highly weathered)	Qa.	1	Complete dispersion
BY132-1	South Pit 1 / 2	Silty clay (extremely weathered)	Qa.	5	
BY073-1	North of West Pit 3	Silty clay (highly weathered)	Qa. & Ter.	1	Complete dispersion
BY082-1	South Pit 1	Claystone (very highly weathered)	Qa. & Ter.	6	
BY132-2	South Pit 1 / 2	Sandstone, f-m. (weathered)	MCM	2	Some dispersion
BY132-3	South Pit 1 / 2	Sandstone, f-m. (weathered)	MCM	5	
BY132-4	South Pit 1 / 2	Sandstone, m.	MCM	2	Some dispersion
BY132-5	South Pit 1 / 2	Siltstone	MCM	4	
BY132-7	South Pit 1 / 2	Mudstone & Siltstone	MCM	3	Dispersion when remoulded to 'plastic' limit
BY132-8	South Pit 1 / 2	Sandstone, m.	MCM	5	
BY132-9	South Pit 1 / 2	Sandstone, silty	MCM	4	
BY132-10	South Pit 1 / 2	Mudstone & Siltstone	MCM	4	
BY132-11	South Pit 1 / 2	Sandstone	MCM	6	
BY132-12	South Pit 1 / 2	Mudstone, carbonaceous	MCM	6	

Ideally, highly sodic and dispersive materials should be identified, selectively handled and placed within the core of spoil piles away from final surfaces, or returned to voids during mining. However, since most spoil is expected to be sodic (to varying degrees), this method of managing sodic material may not be possible. Furthermore, the ESP and exchangeable cation data show little relationship between lithology, spoil zone and/or sample depth, although weathered materials are expected to have a greater propensity to be sodic then unweathered materials. Therefore, it is likely that material designated for use on final surfaces would require a topsoil cover or amendment if used as an additional source of topsoil.

In addition to potential dispersion problems, sodic soils often have unbalanced nutrient ratios that can lead to macro-nutrient deficiencies (Hazelton and Murphy, 2007). The proportions of each exchangeable cation relative to eCEC are shown in **Table 18**. The 'desirable' proportions of each major cation for plant growth are also shown (Abbott, 1989, in Hazelton and Murphy, 2007).

Table 18. Proportion of CEC of major exchangeable cations

Exchangeable Cation	Desirable ranges for plant growth (% eCEC)	Spoil samples (% eCEC)	eCEC of spoil samples compared to 'desirable' ranges
Calcium (Ca)	65 - 80	13 – 70 (median 33)	Very Low
Magnesium (Mg)	10 - 15	18 – 54 (median 42)	Very high
Potassium (K)	1 - 5	0.3 – 4.1 (median 2.0)	Acceptable
Sodium (Na)	0 - 1	7 – 42 (median 20)	Very high
Aluminium (Al)	<5	0.1 – 1.6 (median 0.3)	Acceptable

When compared to the desirable ranges for exchangeable cations in soil (**Table 18**), exchangeable Ca proportions in spoil are very low and exchangeable Mg and Na proportions are very high. The imbalanced Ca:Mg proportions become clearer when considering that exchangeable Ca:Mg ratios less than two typically require amelioration before these materials can be used as a growth layer. Spoil samples have exchangeable Ca:Mg ratios ranging from 0.3 to 3.8 (median 0.7).

In summary, all of the spoil materials are alkaline and, as a bulk material, are moderately saline (median EC = 539 µS/cm) and display moderate to high eCEC values. Most spoil materials are 'strongly' sodic, with an increased *potential* for erosion, and have a significant exchangeable cation imbalance, particularly with respect to exchangeable Ca:Mg ratios.

It is beyond the scope of this report to provide a detailed soil assessment for the purposes of spoil revegetation. Information in this report regarding potential 'soil quality' of spoil materials is regarded as indicative of potential soil quality, is not definitive and readers are referred to other sections of the EIS for specific soil resources and rehabilitation information.

The environmental significance of exchangeable cation values and sodicity levels in spoil materials in terms of risk and potential revegetation management is discussed in **Section 4**.

4 Geochemical Characteristics of Spoil and Potential Coal Reject

The geochemical characteristics of spoil (overburden and interburden) and potential coal reject materials have been assessed.

The characterisation and assessment program has been undertaken to enable the proponent to understand the existing environmental geochemical characteristics of these materials, the potential operational impacts these materials may have on the Project and the potential environmental impacts these materials may have on the Project and neighbouring area.

The environmental geochemical characteristics of the materials are summarised below.

The main focus is on spoil materials, as these materials will comprise almost all of the mining waste for the Project, with coal reject materials comprising a very small proportion (less than 3% of all mining waste). To place this into perspective, spoil will be mined at an average annual rate of about 210 Mt/a and coal reject will be produced (from the CHPPs) at an average annual rate of about 5 Mt/a. Therefore, spoil will comprise over 97% of the mining waste generated by the Project.

The characteristics of spoil materials are discussed as a bulk material, with comments made (where appropriate) to distinguish between weathered and unweathered 'fresh' spoil materials.

The characteristics of potential coal reject materials are also outlined as a bulk material and not separated by sample (drill-hole) location or by seam or roof or floor, since the assessment has found that there is generally little difference between the properties of potential coal reject materials from different locations or seams (*ie*. between the P seam samples, which comprised about 22% of the samples and the GM seam samples, which comprised about 73% of the samples). Potential coal reject samples from the GL seam are represented by only 2 samples (~5% of the samples), therefore the geochemical characteristics of potential coal reject from the GL seam (and other seams, such as the Rangal Coal Measures) needs further definition in future, which will be addressed by the proponent as the Project develops.

Spoil

- Spoil, as a bulk material, is expected to generate alkaline, potentially medium- to high-salinity surface run-off and seepage following surface exposure. Weathered spoil, particularly Quaternary and Tertiary material, can be expected to initially generate medium- to high-salinity surface run-off and seepage, whereas unweathered spoil, primarily from the Moranbah Coal Measures, can be expected to initially generate lower salinity surface run-off and seepage.
- The salinity of spoil materials is unlikely to significantly impact local groundwater resources, as groundwater at the Project is naturally highly saline. Groundwater EC values measured from monitoring bores at the Project (by Rob Lait & Associates) range from 1,560 to 22,400 µS/cm (average ~6,500 µS/cm).
- The total sulfur and sulfide concentrations of the large majority of spoil samples assessed is very low (almost negligible). Almost all samples (97%) were classified as NAF and most of these NAF samples were further classified as 'barren' with respect to sulfur concentrations.

- Total metal and metalloid concentrations in spoil samples were generally low and typically well below the applied health-based guideline levels for soils. One spoil sample contained slightly elevated arsenic concentration (relative to the applied health-based guideline value), as did one other spoil sample with respect to nickel concentration. Multi-element results indicate that leachate from bulk spoil *may* contain slightly elevated soluble Mo, Se and potentially V concentrations compared to applied water quality guideline concentrations. Slightly elevated Mo, Se and V concentrations are common for spoil and coal reject materials at coal mines in the Bowen Basin and generally do not result in any significant water quality issues[10].

  It should be noted that the results presented in this report represent an assumed 'worst case' scenario as the samples are pulverised prior to testing at ALS laboratory and have a very high surface area compared to materials in the field. Materials will also be well mixed at storage locations, hence, it is expected that the concentration of these metal/metalloids in surface run-off and seepage from spoil and coal reject materials will be less than applied guideline concentrations in the field.

- Spoil materials are generally expected to be moderately to highly sodic. Weathered materials (primarily Quaternary and Tertiary) are expected to have a greater potential for dispersion (erosion) than unweathered materials, which are mostly Permian. Weathered and unweathered materials are expected to be present in approximately equal proportions. Therefore about half of all spoil mined may have a greater propensity for dispersion and potential erosion.

Potential coal reject

- Potential coal reject materials are expected to generate alkaline, low- to medium-salinity surface run-off and seepage following surface exposure.

- The total sulfur concentration of all samples is generally low (75th percentile = 0.19%; 90th percentile = 0.4%), however some samples contain sulfide concentrations sufficient to generate acid. Generally, sulfide-sulfur (Scr) comprises about 77% (based on median values) of the total sulfur concentration. As the total sulfur concentrations are generally low, hence the sulfide-sulfur concentrations for these materials (as a bulk material) are also expected to be low.

- About 20% of potential coal reject samples have been classified as PAF, with most of these 'PAF' samples further classified as 'Low Capacity'. Coal reject identified as 'PAF' is likely to have relatively low total sulfur concentrations - less than 1% (mostly less than 0.5%). Therefore, coal reject materials are regarded as relatively low risk with the main potential for environmental impact likely to be the generation of sulfate salts. About 5% of samples had an 'Uncertain' classification, but the sulfur concentrations of these samples are also low, and therefore these samples are also regarded as being a relatively 'low risk'.

- About 75% of potential coal reject samples, and therefore the bulk coal reject material, is expected to be NAF – with three quarters of these NAF samples further classified as 'barren' with respect to sulfur concentrations.

[10] Based on RGS-Terrenus' experience undertaking environmental geochemical assessments for numerous coal projects and mines extracting spoil, coal and coal reject from the Moranbah Coal Measures.

- Total metal and metalloid concentrations in potential coal reject samples were low and below the applied health-based investigation levels for soils. Some potential coal reject materials may produce leachate containing slightly elevated soluble Mo, Se and V concentrations, as is common from Permian coal measures in the Bowen Basin10. As discussed above, the results presented in this report represent an assumed 'worst case' scenario.
- Coal reject materials from individual and discrete seams (and plys/zones) are unlikely to be selectively handled and processed. Therefore, all coal reject will be 'mixed' and therefore potentially elevated concentrations of soluble metals from isolated coal reject sources will be diluted amongst the bulk reject material.
- The discussion of potential coal reject materials within this report must be read in context, since actual CHPP coal reject (coarse reject and/or tailings) from the operational CHPPs may have slightly different geochemical characteristics to these potential coal reject materials obtained from drill-core roof, parting and floor samples.

4.1 Summary

The geochemical characteristics of spoil and potential coal reject at the Project are expected to be broadly consistent with the characteristics of these materials from similar coal projects and mines in the Bowen Basin, mining the Moranbah Coal Measures - *ie*. largely NAF materials producing pH-neutral to alkaline leachate with moderate (to high) salinity, varying degrees of sodicity and low soluble metals concentrations.

As shown in **Figure 1**, the samples available for use in the assessment were focused on the area of West Pit 1 and South Pit 1 (areas to be mined during the first 10 to 15 years of mining), with less samples available from 'later' mining areas. The geology (lithology, seams, depositional environment) of West Pit 1 and South Pit 1 is relatively consistent across the other West and South Pits, and North Pit, therefore the geochemical characteristics are also expected to be comparable in these other areas. East Pits are also expected to have broadly similar environmental geochemical characteristics, however no samples have been assessed from the Rangal Coal Measures.

5 Management and Mitigation Measures

5.1 Spoil and coal reject management planning

A Mine Waste Management Plan will be developed prior to project operations. The plan will provide a blueprint for classifying spoil zones (on the basis of acid forming potential, salinity, sodicity, *etc*), placement and use of spoil materials and appropriate disposal (burial) of PAF waste or waste designated as not suitable for use on final surfaces. The Mine Waste Management Plan will address the day-to-day management of coal reject materials, both from the CHPPs and at disposal into a co-disposal facility or directly into spoil.

Generally, the Mine Waste Management Plan will address:

(a) Effective characterisation of the mining waste to predict under the proposed placement and disposal strategy the quality of run-off and seepage generated concerning potentially environmentally significant effects including salinity, acidity, alkalinity and dissolved metals, metalloids and non-metallic inorganic substances.

(b) A program of progressive sampling and characterisation to identify dispersive and non-dispersive spoil and the salinity, acid and alkali producing potential and metal concentrations of mining waste – particularly from those areas to be mined beyond year 10 of operations (*ie*. later mining areas not addressed by this current assessment). Such further assessment will also include the collection, characterisation, assessment and management evaluation of actual spoil and actual coal reject from the CHPPs and the coal reject disposal area(s) to confirm the expected geochemical properties of these materials discussed in this report.

(c) A materials balance and disposal plan demonstrating how PAF and acid forming mining waste will be selectively placed and/or encapsulated to minimise the potential generation of AMD.

(d) A sampling program to verify encapsulation and/or placement of PAF and acid-forming mining waste.

(e) How often the performance of the plan will be assessed, and the criteria on which the performance of the plan will be assessed.

(f) A rehabilitation strategy.

(g) Monitoring or rehabilitation, research and/or trials to verify the requirements and methods for decommissioning and final rehabilitation of the placed materials, including the prevention and management of AMD, erosion minimisation and establishment of vegetation cover.

Although spoil throughout the entire Project Area is expected to be benign with a negligible risk of acid generation (and low metals concentrations), the broad strategy will be to ensure that uneconomic coal seams/plys mined as spoil will not report to final surfaces, as these 'carbonaceous' zones can be associated with sulfide minerals. Such pit control will be determined and dictated by the site geologists as part of the waste scheduling and day-to-day mining operations.

Similarly, the strategy outlined by the Mine Waste Management Plan will be used for coal reject disposed directly into spoil (either in-pit disposal or out-of-pit disposal) and covered by a minimum

of five metres final thickness of spoil (taking into account re-shaping of spoil areas during rehabilitation activities), such that coal reject does not report to final surfaces.

5.2 Spoil pile management strategy

Spoil is overwhelmingly NAF with excess ANC and has a negligible risk of developing acid conditions. However, most spoil has some capacity to generate salinity, and in some weathered materials the salinity level could be moderate to high.

Typically in an open-pit mining operation weathered spoil would be mined before unweathered materials. At the Project this is likely to be the case with weathered spoil most likely reporting to the base of spoil piles and being covered by unweathered spoil. Therefore, weathered spoil (not including topsoil) should not report to final surfaces to any significant extent, and should not pose significant management issues for the Project. Spoil used for final landform covering will primarily comprise unweathered material, which has a relatively low salinity and low potential for dispersion.

Where spoil will be used for construction activities, especially where engineering or geotechnical stability is required, testing will be undertaken by the proponent to determine the propensity of such materials to erode given the potential sodicity of the material. Such testing will also form part of the Mine Waste Management Plan, as discussed in Section 5.1 above.

As with most coal mines that generate sodic materials in the Bowen Basin, Permian materials (Moranbah, Fort Cooper and Rangal Coal Measures) are generally more amenable to amelioration and vegetation growth, through the addition of fertilizer, than Tertiary materials (BMA, 2008). Ensuring that slopes are well stabilised against erosion will also reduce the risk of significant erosion of potentially dispersive sodic Permian materials.

For final rehabilitation of spoil storage areas at the Project, it is proposed that Permian spoil be used for the outer slopes to limit potential for dispersion and erosion. This approach aligns with guideline information used by other large mining companies for coal mine rehabilitation in the Bowen Basin (BMA, 2008). The BMA (2008) guideline lists two options for dealing with Tertiary materials on outer slopes: either establish a slope gradient of less than 10% with a cover of non-dispersive Permian material or if steep outer slopes are required, a thick cover of durable rock must be placed, which may or may not be Permian material. The BMA (2008) guideline also recognises that poor quality Permian material may also require covering with selective benign and erosion resistant material.

Under certain circumstances sodic spoil can be disposed close to final surfaces if the salinity is high and if the rate of salt release is low (leaching is controlled), as under these conditions the ability for the spoil to become dispersive is balanced to some degree by the inherent salt concentration in the spoil (which limits cation exchange processes). Research on some Australian mines has shown this to occur (Vacher *et al*., 2004), however the balance between the inherent salt concentration, the initial sodicity and the expected or potential rate of leaching (flushing) of salts must be carefully understood.

Notwithstanding, the proponent has committed to undertaking revegetation/ rehabilitation field trials on spoil materials when operations commence and bulk materials become available.

This assessment has focussed on the areas to be mined during the first 10 to 15 years (nominally) of mining. The proponent will undertake further assessment of spoil materials obtained from North Pit and East Pit areas (and similar ‘late mining’ areas) as the Project develops. Until such further assessment of post-Year 10 mining areas is undertaken, the proponent will assume the same

strategies for the management of 'later' mining materials as for materials from West Pit 1, and the early year stages of South Pit 1 and 2 – as outlined above.

Surface run-off and seepage from spoil piles, including any rehabilitated areas, will be monitored for 'standard' water quality parameters, including pH, EC, sulfate (and other major ions) and a broad suite of soluble metals – including Mo, Se and V.

5.3 Coal reject management strategy

The large majority of potential coal reject materials will not pose a significant risk of developing acid conditions, and the generally low sulfur concentration within this material suggests that the magnitude of any acid generation, if it occurs, is likely to be small.

Based on sample numbers, about 20% of potential coal reject materials may have a *low capacity to generate acidity*. However, when managed as a bulk material at the co-disposal facility this small proportion of PAF waste (mostly PAF-Low Capacity) would be expected to pose a low environmental risk when mixed/disposed amongst the broader NAF coal reject bulk material. Furthermore, bulk coal reject is expected to be alkaline, which assists with neutralising any acid generated.

Two coal reject disposal strategies are currently being evaluated by the proponent, and essentially differ by the disposal strategy for mid-sized and fine reject (which comprise size fractions <12 mm). The two options are outlined in **Section 1.2**. The EIS has adopted a conservative approach with respect to the coal reject disposal options being evaluated and assumed that Option 1 will be adopted. Under this option, coarse reject will be disposed directly amongst spoil. Mid-sized and fine reject will be disposed (as a slurry) to an above-ground co-disposal facility constructed at each CHPP. At some stage during mine life the above-ground co-disposal facility may be discontinued and, at that point, mid-sized and fine reject will report to an in-pit co-disposal facility.

Management of in-pit coal reject and out-of-pit coarse reject

Coal reject disposed into a pit, whether as coarse reject or as co-disposed reject, will be progressively covered (buried) with spoil. Coarse reject may be disposed initially into voids between spoil piles in out-of-pit areas, however the management of coarse reject disposed under this scenario is essentially the same as for in-pit disposal. (*ie*. progressive burial by a thick layer (at least several metres) of spoil, and managed thereafter as spoil (refer to **Section 5.2** above).

Co-disposed reject managed under an in-pit disposal strategy will likely be disposed into cells in a nominated area of the pit (below the natural lip of the pit). As the cells are filled, they will be progressively buried by backfilled mine spoil.

Coal reject, whether disposed in-pit amongst out-of-pit spoil, will not report within at least 5 m of final (re-profiled) landform surfaces.

Construction and operation of out-of-pit co-disposal facilities

It is beyond the scope of this report to outline the engineering details for the construction and operation of the co-disposal facilities, however the following general principles will be adopted to minimise potential environmental impacts:

- The out-of-pit co-disposal facilities will be constructed on a prepared low-permeability base to minimise seepage from the base and basal edges of the facility;
- The co-disposal facilities will be operated to minimise the level (volume) of decant water in the facility and maintain a safe water depth (low hydrostatic pressure) at dam walls;
- Decant water will be reused, as much as practical, in the CHPPs; and
- Design and operation will include inspection and monitoring of integrity and seepage loss.

Operational monitoring of out-of-pit co-disposal facilities

Surface run-off and seepage from, and groundwater in the vicinity of, coal reject disposal facilities will be monitored for 'standard' water quality parameters, including pH, EC, sulfate (and other major ions) and a broad suite of soluble metals – including Mo, Se and V.

This assessment has focussed on the areas to be mined during the first 15 years (nominally) of mining. The proponent will undertake further assessment of potential coal reject materials obtained from North Pit and East Pit areas (and similar 'late mining' areas) as the Project develops.

Decommissioning, rehabilitation and closure of out-of-pit co-disposal facilities

The decommissioning, closure and post-closure aspects of coal reject disposal facilities, particularly the out-of-pit co-disposal facilities, will be addressed by a Mine Closure Plan. During operations, the environmental characteristics of the out-of-pit co-disposed coal reject will be assessed and understood such that an appropriate Rehabilitation Plan can be adopted.

It is outside the scope of this report to detail the closure aspects of out-of-pit coal reject facilities, however the following general principles will be adopted.

Generally, as out-of-pit co-disposal facilities (including discrete cells) are decommissioned, they will be covered with an appropriate soil cover system, such as a store-and-release soil cover, and rehabilitated/ revegetated. The design of the soil cover system will be documented in the Mine Rehabilitation Plan.

Spoil will be suitable to use as a soil cover, as it is alkaline, has low sulfur, is likely to have a high factor of safety and very low probability of acid generation, and will have excess capacity to neutralise any acidity generated by coal reject materials. However spoil may potentially generate medium- to high-salinity surface run-off and seepage and will require a topsoil 'cap' to use as a growth medium.

Once the soil cover system is installed (and the out-of-pit co-disposal facility is 'closed'), surface water and groundwater will continue to be monitored for the same or similar suite of parameters as during operations of the facility.

5.4 ROM pad and CHPP

Potential ROM coal (and product coal) has not been specifically assessed, however based on the characteristics of potential coal reject samples it is considered likely that ROM coal will have similar characteristics to potential coal reject materials. The proponent will undertake assessment

of ROM coal materials as the Project develops to assist with their management plans for ROM pads.

ROM coal and Product coal may be stored at the site for a relatively short period of time (weeks) compared to mining waste materials, which will be stored at the site in perpetuity. Management practices are therefore different for coal and will largely be based around managing surface run-off and seepage water from ROM pads and coal stockpiles – as is currently accepted practice at coal mines in Australia.

Surface run-off and seepage from ROM and Product coal stockpiles will be monitored for 'standard' water quality parameters, including pH, EC and a broad suite of soluble metals.

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Appendix A

Summary of Drill-holes utilised in the Geochemical Assessment

Table A1. Drill-hole locations and types of samples collected from each drill-hole

Drill-hole ID	Sample Types Collected	Easting (GDA94; z55)	Northing (GDA94; z55)
BY02GW	Spoil	589,234	7,654,174
BY031	Spoil	585,549	7,655,623
BY03GW	Spoil	592,420	7,645,989
BY04GW	Spoil	591,997	7,642,201
BY054	Spoil	588,278	7,647,227
BY056	Spoil	588,457	7,647,535
BY059	Spoil	587,818	7,647,094
BY064	Spoil	587,545	7,650,779
BY067	Spoil	587,711	7,644,659
BY073	Spoil	587,136	7,656,973
BY082	Spoil	587,841	7,643,641
BY096	Spoil	587,367	7,642,868
BY09GW	Spoil	585,085	7,665,068
BY107	Spoil	588,600	7,642,796
BY116	Spoil	589,227	7,642,249
BY127	Spoil	588,639	7,642,433
BY195	Spoil	587,661	7,645,437
BY264	Spoil	587,520	7,646,364
BY047	Spoil and potential coal reject (P seam)	588,128	7,650,493
BY114C	Spoil and potential coal reject (P & GM seams)	588,742	7,642,240
BY160C & 160X	Spoil and potential coal reject (P, GM & GL seams)	588,384	7,641,836
BY083C	Spoil and potential coal reject (GM seam)	587,664	7,643,359
BY093 & 093Y	Spoil and potential coal reject (GM seam)	588,241	7,642,265
BY132	Spoil and potential coal reject (GM seam)	588,893	7,641,126
BY263 & 263C	Spoil and potential coal reject (GM seam)	586,782	7,646,168
BY111C	Potential coal reject (P & GM seams)	588,476	7,642,561
BY076C	Potential coal reject (GM seam)	587,962	7,643,117
BY097C	Potential coal reject (GM seam)	587,664	7,642,880
BY124C	Potential coal reject (GM seam)	588,283	7,641,315
BY248C	Potential coal reject (GM seam)	587,142	7,646,284
BY268C	Potential coal reject (GM seam)	587,374	7,645,769
BY272C	Potential coal reject (GM seam)	586,837	7,646,949
BY275C	Potential coal reject (GM seam)	586,845	7,646,461
BY078C	Potential coal reject (GL seam)	588,681	7,641,118

Appendix B

Static Geochemical Results Tables
and
Sample Composition Table for Multi-Element Composite Samples

- Table B1 – ABA test results for spoil samples
- Table B2 – ABA test results for potential coal reject samples
- Table B3 – Composite sample details (sample composition)
- Table B4 – Total multi-element (solid) results
- Table B5 – Soluble multi-element (1:5 water extract) results for spoil samples
- Table B6 – Soluble multi-element (1:5 water extract) results for potential coal reject samples
- Table B7 – Soluble multi-element (TCLP) results

Table B1. Acid-base characteristics of spoil samples

ALS Laboratory Sample ID	Drill Hole ID	General Location	Sample ID	Sample Interval (m)			Lithology	Formation / Zone	pH[1]	EC[1]	Total Sulfur	Sulfide Sulfur	Sulfate Sulfur	MPA[2,3]	ANC[2]	NAPP[2]	ANC/MPA ratio	Tot. Org. Carbon	NAGpH[2]	NAG[2] @pH4.5	NAG[2] @pH7.0	Sample Classification[3]
				From	To	Int.				(µS/cm)	(%)			(kg H_2SO_4/t)				(%)		(kg H_2SO_4/t)		
Spoil																						
ES1118644-001	BY132	South Pit 1 / 2	BY132-1	0	1	1	Soil (extremely weath.)	Quaternary	8.0	58	<0.01	<0.01	<0.01	0.2	1.4	-1.2	9.1	0.25	7.1	<0.1	<0.1	NAF (barren)
ES1118644-013	BY127	South Pit 1	BY127-1	0	1	1	Soil (v.highly weath.)	Quaternary	8.9	100	<0.01	<0.01	<0.01	0.2	56	-56	366	0.55	9.2	<0.1	<0.1	NAF (barren)
EB1125857-011	BY107	South Pit 1	BY107-1	0	2	2	Soil (v.highly weath.)	Quaternary	8.8	1280	<0.01	-	-	0.2	25	-25	161	-	-	-	-	NAF (barren)
EB1125857-138	BY047	West Pit 2 / 3	BY047-1	0	4	4	Soil (highly weath.)	Quaternary	9.0	922	<0.01	-	-	0.2	22	-22	143	-	-	-	-	NAF (barren)
EB1125857-067	BY096	South Pit 1	BY096-1	0	2	2	Soil (extremely weath.)	Quat. & Ter.	8.5	116	<0.01	-	-	0.2	17	-16	108	-	-	-	-	NAF (barren)
EB1125857-092	BY082	South Pit 1	BY082-1	0	3	3	Claystone (v. highly weath.)	Quat. & Ter.	7.7	3200	0.02	-	-	0.6	34	-33	55	-	-	-	-	NAF (barren)
EB1118517-025	BY073	north of West Pit 3	BY073-1	0	3.5	3.5	Clay, silty (highly weath.)	Quat. & Ter.	7.5	1150	0.04	<0.01	0.03	0.2	6.0	-5.8	39	0.23	8.3	<0.1	<0.1	NAF (barren)
EB1125857-105	BY056	West Pit 1	BY056-1	0	5	5	Claystone, sandy (v. highly weath.)	Quat. & Ter.	8.6	797	<0.01	-	-	0.2	37	-37	243	-	-	-	-	NAF (barren)
EB1125857-123	BY059	West Pit 1	BY059-1	0	5	5	Claystone (mod. - highly weath.)	Quat. & Ter.	8.7	1570	0.02	-	-	0.6	30	-29	49	-	-	-	-	NAF (barren)
EB1222663-008	BY263	West Pit 1	BY263-001	0	5	5	Soil & Clay (highly weath.)	Quat. & Ter.	8.9	343	0.01	-	-	0.3	5.3	-5.0	17	-	-	-	-	NAF (barren)
EB1222663-012	BY264	West Pit 1	BY264-001	0	6	6	Clay (highly weath.)	Quat. & Ter.	8.6	1030	0.02	-	-	0.6	9.9	-9.3	16	-	-	-	-	NAF (barren)
EB1118698-020	BY054	West Pit 1	BY054-1	0	9	9	Claystone (highly weath.)	Quat. & Ter.	8.4	1760	0.02	<0.01	0.01	0.2	9.2	-9.0	60	0.18	9.0	<0.1	<0.1	NAF (barren)
EB1125857-001	BY116	South Pit 1	BY116-1	0	26	26	Basalt & some Claystone (extr. weath.)	Quat. & Ter.	7.4	2410	<0.01	-	-	0.2	51	-51	333	-	-	-	-	NAF (barren)
EB1125857-169	BY04GW	btw South Pit 1 & East Pit 2	BYGW004-1	0	11	11	Clay (highly weath.)	Tertiary	8.6	818	0.02	-	-	0.6	26	-26	43	-	-	-	-	NAF (barren)
EB1125857-162	BY03GW	East Pit 1	BYGW003-1	0	12	12	Clay (highly weath.)	Tertiary	8.7	748	0.01	-	-	0.3	89	-88	290	-	-	-	-	NAF (barren)
EB1125857-068	BY096	South Pit 1	BY096-2	3	9	6	Clay (extremely weath.)	Tertiary	8.2	2120	<0.01	-	-	0.2	16	-15	101	-	-	-	-	NAF (barren)
EB1125857-182	BY09GW	near North Pit 1	BYG009-3	31.5	44	12.5	Clay (highly weath.)	Tertiary	6.0	93	0.01	-	-	0.3	2.7	-2.4	8.8	-	-	-	-	NAF (barren)
EB1125857-173	BY04GW	btw South Pit 1 & East Pit 2	BYGW004-5	34	45.5	11.5	Clay (weathered)	Tertiary	8.4	640	0.02	-	-	0.6	33	-32	54	-	-	-	-	NAF (barren)
EB1125857-180	BY09GW	near North Pit 1	BYG009-1	0	28	28	Clay & Claystone (highly weath.)	Tertiary	6.3	73	0.01	-	-	0.3	2.3	-2.0	7.5	-	-	-	-	NAF (barren)
EB1125857-081	BY031	north of West Pit 3	BY031-1	0	15	15	Clay & Sandstone (highly weath.)	Tertiary	8.0	284	<0.01	-	-	0.2	0.5	-0.3	3.3	-	-	-	-	NAF (barren)
EB1118698-027	BY064	West Pit 3	BY064-1	0	17	17	Clay & Basalt (extr. weath.)	Tertiary	5.8	271	0.02	<0.01	0.01	0.2	2.8	-2.6	18	0.03	6.5	<0.1	0.3	NAF (barren)
EB1125857-038	BY093	South Pit 1	BY093-1	0	20	20	Claystone (extremely weath.)	Tertiary	8.4	1940	0.01	-	-	0.3	35	-34	113	-	-	-	-	NAF (barren)
EB1118698-015	BY067	South Pit 1	BY067-1	0	31	31	Claystone (highly weath.)	Tertiary	7.3	730	<0.01	<0.01	<0.01	0.2	6.8	-6.6	44	0.06	7.1	<0.1	<0.1	NAF (barren)
EB1222663-001	BY195	West Pit 1	BY195-1	0	52	52	Clay & Claystone (highly weath.)	Tertiary	8.2	2050	0.01	-	-	0.3	9.7	-9.4	32	-	-	-	-	NAF (barren)
ES1118644-014	BY127	South Pit 1	BY127-2	2	9	7	Claystone (mod. to highly weath.)	Tertiary	7.5	735	0.02	0.01	<0.01	0.3	5.2	-4.9	17	0.12	8.6	<0.1	<0.1	NAF (barren)
EB1118517-026	BY073	north of West Pit 3	BY073-2	3.5	12	8.5	Claystone (highly weath.)	Tertiary	8.1	1950	0.04	<0.01	0.03	0.2	32	-32	212	0.07	9.0	<0.1	<0.1	NAF (barren)
EB1125857-093	BY082	South Pit 1	BY082-2	4	6	2	Claystone (highly weath.)	Tertiary	7.5	3430	0.02	-	-	0.6	2.7	-2.1	4.4	-	-	-	-	NAF (barren)
EB1125857-139	BY047	West Pit 2 / 3	BY047-2	5	7	2	Claystone (highly weath.)	Tertiary	8.5	925	<0.01	-	-	0.2	21	-21	138	-	-	-	-	NAF (barren)
EB1125857-124	BY059	West Pit 1	BY059-2	6	8	2	Claystone (moderately weath.)	Tertiary	8.5	1440	0.03	-	-	0.9	19	-18	20	-	-	-	-	NAF (barren)
EB1125857-106	BY056	West Pit 1	BY056-2	6	20	14	Claystone (weathered)	Tertiary	8.2	1590	0.02	-	-	0.6	5.2	-4.6	8.5	-	-	-	-	NAF (barren)
EB1125857-125	BY059	West Pit 1	BY059-3	9	13	4	Claystone (moderately weath.)	Tertiary	8.4	1880	0.03	-	-	0.9	9.5	-8.6	10	-	-	-	-	NAF (barren)
EB1118698-021	BY054	West Pit 1	BY054-2	9	15	6	Claystone, sandy (slightly weath.)	Tertiary	7.7	3130	0.02	<0.01	0.02	0.2	3.6	-3.4	23.5	0.02	6.4	<0.1	0.9	NAF (barren)
ES1118644-015	BY127	South Pit 1	BY127-3	10	15	5	Claystone (moderately weath.)	Tertiary	9.3	1930	<0.01	<0.01	<0.01	0.2	9.4	-9.2	61	0.09	8.3	<0.1	<0.1	NAF (barren)
EB1125857-069	BY096	South Pit 1	BY096-3	10	16	6	Claystone (extremely weath.)	Tertiary	7.6	3310	<0.01	-	-	0.2	7.6	-7.4	50	-	-	-	-	NAF (barren)
EB1125857-163	BY03GW	East Pit 1	BYGW003-2	12	16	4	Claystone (highly weath.)	Tertiary	8.7	556	0.01	-	-	0.3	30	-30	99	-	-	-	-	NAF (barren)
EB1125857-126	BY059	West Pit 1	BY059-4	14	30	16	Claystone (moderately weath.)	Tertiary	8.5	1080	0.12	<0.01	-	0.2	2.7	-2.5	17.6	-	-	-	-	NAF
ES1118644-017	BY127	South Pit 1	BY127-5	18	20	2	Claystone (highly weath.)	Tertiary	8.3	1740	0.02	0.01	<0.01	0.3	11	-11	36	0.02	8.4	<0.1	<0.1	NAF (barren)
EB1125857-107	BY056	West Pit 1	BY056-3	21	23	2	Claystone, sandy (weathered)	Tertiary	7.8	2860	0.02	-	-	0.6	3.6	-3.0	5.9	-	-	-	-	NAF (barren)
EB1125857-141	BY047	West Pit 2 / 3	BY047-4	22	23	1	Claystone (highly weath.)	Tertiary	9.4	732	<0.01	-	-	0.2	60	-59	389	-	-	-	-	NAF (barren)
ES1118644-019	BY127	South Pit 1	BY127-7	27	29	2	Claystone (slightly weath.)	Tertiary	8.2	1620	0.01	<0.01	<0.01	0.2	7.0	-6.8	46	0.29	7.9	<0.1	<0.1	NAF (barren)
EB1125857-109	BY056	West Pit 1	BY056-5	31	32	1	Claystone (weathered)	Tertiary	8.0	2080	0.02	-	-	0.6	8.5	-7.9	14	-	-	-	-	NAF (barren)
EB1125857-003	BY116	South Pit 1	BY116-3	39	40	1	Claystone (weathered)	Tertiary	7.8	1170	<0.01	-	-	0.2	16	-16	106	-	-	-	-	NAF (barren)
EB1125857-012	BY107	South Pit 1	BY107-2	3	45	42	Claystone & Basalt (mod. weath.)	Tertiary	8.2	2110	0.01	-	-	0.3	12	-12	40	-	-	-	-	NAF (barren)

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

Table B1 (cont.). Acid-base characteristics of spoil samples

ALS Laboratory Sample ID	Drill Hole ID	General Location	Sample ID	Sample Interval (m)			Lithology	Formation / Zone	pH[1]	EC[1]	Total Sulfur	Sulfide Sulfur	Sulfate Sulfur	MPA[2,3]	ANC[2]	NAPP[2]	ANC/MPA ratio	Tot. Org. Carbon	NAGpH[2]	NAG[2] @pH4.5	NAG[2] @pH7.0	Sample Classification[3]
				From	To	Int.				(µS/cm)	(%)			(kg H_2SO_4/t)				(%)		(kg H_2SO_4/t)		
Spoil																						
EB1125857-094	BY082	South Pit 1	BY082-3	7	17	10	Claystone & Basalt (highly weath.)	Tertiary	7.4	3770	0.01	-	-	0.3	2.3	-2.0	7.5	-	-	-	-	NAF (barren)
EB1125857-140	BY047	West Pit 2 / 3	BY047-3	8	21	13	Basalt (mod. to highly weath.)	Tertiary	9.7	808	<0.01	-	-	0.2	22	-22	142	-	-	-	-	NAF (barren)
EB1125857-170	BY04GW	btw South Pit 1 & East Pit 2	BYGW004-2	11	26	15	Basalt (highly weath.)	Tertiary	8.2	1020	0.02	-	-	0.6	23	-23	38	-	-	-	-	NAF (barren)
EB1118517-027	BY073	north of West Pit 3	BY073-3	12	21	9	Basalt (weathered)	Tertiary	8.9	283	<0.01	<0.01	<0.01	0.2	33	-33	216	<0.02	9.3	<0.1	<0.1	NAF (barren)
ES1118644-016	BY127	South Pit 1	BY127-4	16	17	1	Basalt (highly weath.)	Tertiary	8.5	2020	<0.01	<0.01	<0.01	0.2	11	-11	73	0.20	8.4	<0.1	<0.1	NAF (barren)
EB1125857-164	BY03GW	East Pit 1	BYGW003-3	16	25	9	Basalt (moderately weath.)	Tertiary	9.3	418	<0.01	-	-	0.2	56	-56	365	-	-	-	-	NAF (barren)
EB1125857-070	BY096	South Pit 1	BY096-4	17	21	4	Basalt (extremely weath.)	Tertiary	7.6	3160	0.02	-	-	0.6	4.8	-4.2	7.8	-	-	-	-	NAF (barren)
EB1118698-028	BY064	West Pit 3	BY064-2	17	33	16	Basalt (extremely weath.)	Tertiary	6.8	291	<0.01	<0.01	<0.01	0.2	4.4	-4.2	29	<0.02	8.2	<0.1	<0.1	NAF (barren)
EB1125857-095	BY082	South Pit 1	BY082-4	18	24	6	Basalt (highly weath.)	Tertiary	7.6	1990	0.01	-	-	0.3	5.2	-4.9	17	-	-	-	-	NAF (barren)
EB1125857-039	BY093	South Pit 1	BY093-2	20	35	15	Basalt (highly weath.)	Tertiary	8.4	2130	0.01	-	-	0.3	9.9	-9.6	32	-	-	-	-	NAF (barren)
ES1118644-018	BY127	South Pit 1	BY127-6	21	26	5	Basalt (highly weath.)	Tertiary	8.5	2400	<0.01	<0.01	<0.01	0.2	4.0	-3.8	26	<0.02	7.7	<0.1	<0.1	NAF (barren)
EB1125857-071	BY096	South Pit 1	BY096-5	22	26	4	Basalt (extremely weath.)	Tertiary	7.6	3150	0.02	-	-	0.6	4.9	-4.3	8.0	-	-	-	-	NAF (barren)
EB1125857-108	BY056	West Pit 1	BY056-4	24	30	6	Basalt (weathered)	Tertiary	7.9	2800	0.02	-	-	0.6	2.7	-2.1	4.4	-	-	-	-	NAF (barren)
EB1125857-096	BY082	South Pit 1	BY082-5	25	34	9	Basalt (moderately weath.)	Tertiary	7.9	910	<0.01	-	-	0.2	21	-21	136	-	-	-	-	NAF (barren)
EB1125857-171	BY04GW	btw South Pit 1 & East Pit 2	BYGW004-3	26	28	2	Basalt (highly weath.)	Tertiary	8.2	544	<0.01	-	-	0.2	30	-30	195	-	-	-	-	NAF (barren)
EB1125857-002	BY116	South Pit 1	BY116-2	26	39	13	Basalt (mod. to extremely weath.)	Tertiary	8.2	1010	<0.01	-	-	0.2	20	-20	129	-	-	-	-	NAF (barren)
EB1125857-072	BY096	South Pit 1	BY096-6	27	33	6	Basalt (extremely weath.)	Tertiary	7.6	3300	0.01	-	-	0.3	2.7	-2.4	8.8	-	-	-	-	NAF (barren)
EB1125857-172	BY04GW	btw South Pit 1 & East Pit 2	BYGW004-4	28	34	6	Basalt, clayey (mod. to highly weath.)	Tertiary	8.6	607	<0.01	-	-	0.2	31	-31	202	-	-	-	-	NAF (barren)
EB1125857-127	BY059	West Pit 1	BY059-5	31	47	16	Basalt (weathered)	Tertiary	8.8	1230	0.01	-	-	0.3	3.3	-3.0	11	-	-	-	-	NAF (barren)
EB1118698-016	BY067	South Pit 1	BY067-2	31	54	23	Basalt (weathered)	Tertiary	8.8	691	<0.01	<0.01	<0.01	0.2	23	-23	150	0.04	9.2	<0.1	<0.1	NAF (barren)
EB1118698-029	BY064	West Pit 3	BY064-3	33	57	24	Basalt (highly weath.)	Tertiary	8.6	63	<0.01	<0.01	<0.01	0.2	29	-29	191	<0.02	8.8	<0.1	<0.1	NAF (barren)
EB1125857-073	BY096	South Pit 1	BY096-7	34	43	9	Basalt (extremely weath.)	Tertiary	8.0	2650	<0.01	-	-	0.2	3.3	-3.1	22	-	-	-	-	NAF (barren)
EB1125857-097	BY082	South Pit 1	BY082-6	35	44	9	Basalt (slightly weath.)	Tertiary	9.1	591	<0.01	-	-	0.2	18	-17	115	-	-	-	-	NAF (barren)
EB1125857-074	BY096	South Pit 1	BY096-8	44	47	3	Basalt (weathered)	Tertiary	9.5	989	<0.01	-	-	0.2	10	-10	66	-	-	-	-	NAF (barren)
EB1118698-030	BY064	West Pit 3	BY064-4	57	65	8	Basalt (slightly weath.)	Tertiary	9.1	367	<0.01	<0.01	<0.01	0.2	110	-110	718	0.05	9.9	<0.1	<0.1	NAF (barren)
EB1125857-083	BY031	north of West Pit 3	BY031-3	24	27	3	Coal (slightly weath.) un-named seam	Tertiary	3.3	2780	7.07	6.33	-	194	5.8	188	0.03	-	-	-	-	PAF
EB1125857-082	BY031	north of West Pit 3	BY031-2	16	24	8	Mudstone & Sandstone (highly weath.)	Tertiary	7.4	240	0.02	-	-	0.6	2.7	-2.1	4.4	-	-	-	-	NAF (barren)
EB1125857-181	BY09GW	near North Pit 1	BYG009-2	28	31.5	3.5	Sand, f (mod. weath.)	Tertiary	6.2	58	0.01	-	-	0.3	2.7	-2.4	8.8	-	-	-	-	NAF (barren)
EB1125857-183	BY09GW	near North Pit 1	BYG009-4	44	49	5	Sand, f-c (mod. weath.)	Tertiary	6.3	31	<0.01	-	-	0.2	2.1	-1.9	14	-	-	-	-	NAF (barren)
EB1125857-184	BY09GW	near North Pit 1	BYG009-5	49	67.5	18.5	Sand, m-vc (mod. weath.)	Tertiary	6.0	72	0.01	-	-	0.3	3.0	-2.7	9.8	-	-	-	-	NAF (barren)
EB1125857-165	BY03GW	East Pit 1	BYGW003-4	25	36	11	Sandstone, vf-f (mod. weath.)	Tertiary	9.2	433	<0.01	-	-	0.2	82	-82	536	-	-	-	-	NAF (barren)
EB1118517-028	BY073	north of West Pit 3	BY073-4	21	69	48	Basalt	Tertiary	8.9	360	0.04	0.03	0.01	0.9	55	-54	60	0.02	9.0	<0.1	<0.1	NAF (barren)
EB1125857-084	BY031	north of West Pit 3	BY031-4	27	62	35	Basalt	Tertiary	8.0	156	0.02	-	-	0.6	3.1	-2.5	5.1	-	-	-	-	NAF (barren)
EB1125857-166	BY03GW	East Pit 1	BYGW003-5	36	53	17	Basalt	Tertiary	9.2	228	0.03	-	-	0.9	37	-36	40	-	-	-	-	NAF (barren)
EB1125857-098	BY082	South Pit 1	BY082-7	45	53	8	Basalt	Tertiary	9.2	717	0.13	0.12	-	3.6	20	-17	5.6	-	-	-	-	NAF
EB1125857-013	BY107	South Pit 1	BY107-3	46	47	1	Claystone	Tertiary	8.9	906	0.01	-	-	0.3	8.3	-8.0	27	-	-	-	-	NAF (barren)
EB1125857-128	BY059	West Pit 1	BY059-6	48	57	9	Basalt	Tertiary	9.6	384	0.02	-	-	0.6	20	-19	32	-	-	-	-	NAF (barren)
EB1125857-075	BY096	South Pit 1	BY096-9	48	91	43	Basalt	Tertiary	9.5	742	0.04	-	-	1.2	22	-21	18	-	-	-	-	NAF (barren)
EB1118698-031	BY064	West Pit 3	BY064-5	65	120	55	Basalt	Tertiary	9.0	344	0.03	0.02	<0.01	0.6	36	-36	59	<0.02	9.1	<0.1	<0.1	NAF (barren)
EB1118517-029	BY073	north of West Pit 3	BY073-5	69	96.5	27.5	Quartzose loose sands	Tertiary	8.8	181	0.12	0.12	<0.01	3.7	5.3	-1.6	1.4	0.22	6.0	<0.1	0.2	Uncertain
EB1125857-155	BY02GW	east of West Pit 3	BYGW002-1	0	9	9	Clay & Claystone (highly weath.)	Ter. & FCCM	8.7	1140	0.05	-	-	1.5	2.7	-1.2	1.8	-	-	-	-	NAF (barren)
EB1125857-156	BY02GW	east of West Pit 3	BYGW002-2	9	10.5	1.5	Mudstone (slightly weath.)	FCCM	9.4	1380	0.14	-	-	4.3	188	-184	44	-	-	-	-	NAF
EB1125857-157	BY02GW	east of West Pit 3	BYGW002-3	10.5	24.5	14	Coal; Tuff; Carb. Mudstone (weathered)	FCCM	6.9	824	0.12	-	-	3.7	22	-19	6.1	-	-	-	-	NAF

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

Table B1 (cont.). Acid-base characteristics of spoil samples

ALS Laboratory Sample ID	Drill Hole ID	General Location	Sample ID	Sample Interval (m)			Lithology	Formation / Zone	pH[1]	EC[1]	Total Sulfur	Sulfide Sulfur	Sulfate Sulfur	MPA[2,3]	ANC[2]	NAPP[2]	ANC/MPA ratio	Tot. Org. Carbon	NAGpH[2]	NAG[2] @pH4.5	NAG[2] @pH7.0	Sample Classification[3]
				From	To	Int.				(µS/cm)	(%)			(kg H_2SO_4/t)				(%)		(kg H_2SO_4/t)		
Spoil																						
EB1125857-158	BY02GW	east of West Pit 3	BYGW002-4	24.5	38	13.5	Coal	FCCM	8.0	365	0.66	0.17	-	5.2	7.9	-2.7	1.5	-	-	-	-	Uncertain
EB1125857-159	BY02GW	east of West Pit 3	BYGW002-5	38	44.5	6.5	Mudstone (tuffaceous) & Carb. Shale	FCCM	9.5	426	0.09	-	-	2.8	48	-45	17	-	-	-	-	NAF (barren)
EB1125857-160	BY02GW	east of West Pit 3	BYGW002-6	44.5	53	8.5	Coal & Cind. coal, Mudst. & Carb. Shale	FCCM	9.5	486	0.18	-	-	5.5	28	-22	5.0	-	-	-	-	NAF
EB1125857-174	BY04GW	btw South Pit 1 & East Pit 2	BYGW004-6	45.5	48	2.5	Mudstone, some coal	FCCM	8.3	576	0.15	-	-	4.6	24	-19	5.1	-	-	-	-	NAF
EB1125857-175	BY04GW	btw South Pit 1 & East Pit 2	BYGW004-7	48	55	7	Mudstone	FCCM	8.6	559	0.17	0.10	-	3.1	12	-9.3	4.0	-	-	-	-	NAF
EB1125857-161	BY02GW	east of West Pit 3	BYGW002-7	53	60	7	Basalt / Intrusive	FCCM	9.5	560	0.08	-	-	2.5	30	-27	12	-	-	-	-	NAF (barren)
EB1125857-167	BY03GW	East Pit 1	BYGW003-6	53	61	8	Sandstone, vf; Mudstone; wood frag.	FCCM	8.9	368	0.09	-	-	2.8	19	-16	6.8	-	-	-	-	NAF (barren)
EB1125857-176	BY04GW	btw South Pit 1 & East Pit 2	BYGW004-8	55	67	12	Sandstone, vf-f; some coal	FCCM	9.1	507	0.15	-	-	4.6	58	-53	13	-	-	-	-	NAF
EB1125857-168	BY03GW	East Pit 1	BYGW003-7	61	66	5	Sandstone, f-m; coaly	FCCM	8.7	352	0.24	0.22	-	6.6	28	-21	4.2	-	-	-	-	NAF
EB1125857-177	BY04GW	btw South Pit 1 & East Pit 2	BYGW004-9	67	74	7	Siltstone; some Sandstone	FCCM	8.9	978	0.07	-	-	2.1	74	-71	34	-	-	-	-	NAF (barren)
EB1125857-178	BY04GW	btw South Pit 1 & East Pit 2	BYGW004-10	74	102	28	Sandstone, m-c	FCCM	8.9	786	0.06	-	-	1.8	78	-76	42	-	-	-	-	NAF (barren)
EB1125857-179	BY04GW	btw South Pit 1 & East Pit 2	BYGW004-11	102	120	18	Siltstone, f-m; some coal	FCCM	8.9	914	0.02	-	-	0.6	83	-82	135	-	-	-	-	NAF (barren)
EB1222663-009	BY263	West Pit 1	BY263-002	5	13	8	Claystone (highly weath.)	Ter. & MCM	9.4	711	0.02	-	-	0.6	18	-18	30	-	-	-	-	NAF (barren)
EB1125857-004	BY116	South Pit 1	BY116-4	40	58	18	Clayst., Sandst., f-m (mod. weath.)	Ter. & MCM	7.7	1280	0.08	-	-	2.5	7.6	-5.2	3.1	-	-	-	-	NAF (barren)
ES1118644-002	BY132	South Pit 1 / 2	BY132-2	2	45	43	Sandstone, f-m (weathered)	MCM	8.4	987	<0.01	<0.01	<0.01	0.2	3.6	-3.4	24	0.05	7.2	<0.1	<0.1	NAF (barren)
EB1222663-013	BY264	West Pit 1	BY264-002	6	11	5	Sandstone (highly weath.)	MCM	9.2	177	<0.01	-	-	0.2	9.8	-9.6	64	-	-	-	-	NAF (barren)
EB1222663-014	BY264	West Pit 1	BY264-003	11	28	17	Claystone (highly weath.)	MCM	8.4	1010	0.02	-	-	0.6	4.7	-4.1	7.7	-	-	-	-	NAF (barren)
EB1222663-010	BY263	West Pit 1	BY263-003	13	19	6	Mudstone (slightly weath.)	MCM	9.5	517	0.02	-	-	0.6	56	-56	92	-	-	-	-	NAF (barren)
EB1118698-022	BY054	West Pit 1	BY054-3	16	34	18	Claystone (weathered)	MCM	8.0	557	0.03	0.02	<0.01	0.6	2.2	-1.6	3.6	0.05	7.1	<0.1	<0.1	NAF (barren)
EB1222663-011	BY263	West Pit 1	BY263-004	19	26	7	Siltstone (moderately weath.)	MCM	8.6	555	0.03	-	-	0.9	6.7	-5.8	7.3	-	-	-	-	NAF (barren)
EB1125857-142	BY047	West Pit 2 / 3	BY047-5	23	36	13	Sandstone, f-m (highly weath.)	MCM	9.7	370	<0.01	-	-	0.2	11	-11	71	-	-	-	-	NAF (barren)
EB1222663-015	BY264	West Pit 1	BY264-004	28	35	7	Siltstone (highly weath.)	MCM	9.7	842	0.01	-	-	0.3	46	-45	149	-	-	-	-	NAF (barren)
ES1118644-020	BY127	South Pit 1	BY127-8	30	40	10	Sandstone, f-m (mod. weathered)	MCM	8.3	635	<0.01	<0.01	<0.01	0.2	10	-9.8	65	0.07	7.7	<0.1	<0.1	NAF (barren)
EB1125857-110	BY056	West Pit 1	BY056-6	33	46	13	Claystone, sandy (weathered)	MCM	8.8	1140	0.01	-	-	0.3	3.9	-3.6	13	-	-	-	-	NAF (barren)
EB1125857-040	BY093	South Pit 1	BY093-3	35	47	12	Sandst., f; Siltst. & Clayst. (highly weath.)	MCM	8.0	1650	<0.01	-	-	0.2	18	-18	119	-	-	-	-	NAF (barren)
EB1125857-143	BY047	West Pit 2 / 3	BY047-6	37	38	1	Sandstone, clayey (mod. weath.)	MCM	9.6	292	0.01	-	-	0.3	126	-126	411	-	-	-	-	NAF (barren)
ES1118644-021	BY127	South Pit 1	BY127-9	41	48	7	Sandstone, f-m (slightly weath.)	MCM	8.7	709	<0.01	<0.01	<0.01	0.2	36	-36	238	0.13	8.4	<0.1	<0.1	NAF (barren)
ES1118644-003	BY132	South Pit 1 / 2	BY132-3	45	46	1	Sandstone, f-m (weathered, near coal)	MCM (P)	8.1	1240	<0.01	<0.01	<0.01	0.2	8.8	-8.6	57	0.66	8.1	<0.1	<0.1	NAF (barren)
EB1222663-002	BY195	West Pit 1	BY195-2	52	61	9	Claystone & Mudstone (mod. to highly weath.)	MCM	8.8	951	0.05	-	-	1.5	33	-31	21	-	-	-	-	NAF (barren)
EB1125857-185	BY09GW	near North Pit 1	BYG009-6	67.5	72	4.5	Siltstone (highly weath.)	MCM	5.9	87	<0.01	-	-	0.2	1.6	-1.4	10	-	-	-	-	NAF (barren)
EB1125857-186	BY09GW	near North Pit 1	BYG009-7	72	77.5	5.5	Mudstone (highly weath.)	MCM	5.8	195	0.13	0.13	-	3.8	7.9	-4.1	2.1	-	-	-	-	NAF
EB1118698-032	BY064	West Pit 3	BY064-6	120	133	13	Claystone & Siltstone	Ter. & MCM	9.4	321	0.01	<0.01	<0.01	0.2	9.6	-9.4	63	0.11	8.2	<0.1	<0.1	NAF (barren)
EB1203143-013	BY160X	South Pit 1	E16005	33.50	33.92	0.42	Igneous (above P)	MCM	8.4	636	0.06	0.06	-	1.7	48	-46	28	-	-	-	-	NAF (barren)
EB1222663-016	BY264	West Pit 1	BY264-005	35	42.6	7.6	Siltstone (above GM)	MCM	9.1	559	0.07	-	-	2.1	57	-55	27	-	-	-	-	NAF (barren)
EB1118698-023	BY054	West Pit 1	BY054-4	37	70	33	Mudstone, Siltstone & Sandstone	MCM	9.9	528	0.03	0.02	<0.01	0.6	127	-126	207	0.21	10.3	<0.1	<0.1	NAF (barren)
EB1125857-144	BY047	West Pit 2 / 3	BY047-7	39	42	3	Sandstone, lithic	MCM	9.6	331	0.01	-	-	0.3	128	-128	418	-	-	-	-	NAF (barren)
EB1125857-145	BY047	West Pit 2 / 3	BY047-8	43	54	11	Sandstone, quartz lithic	MCM	9.8	275	0.02	-	-	0.6	138	-137	225	-	-	-	-	NAF (barren)
EB1125857-111	BY056	West Pit 1	BY056-7	47	51	4	Claystone, sandy	MCM	9.4	769	0.02	-	-	0.6	25	-24	40	-	-	-	-	NAF (barren)
EB1125857-041	BY093	South Pit 1	BY093-4	47	103	56	Sandstone, f-c; Siltstone beds (rare)	MCM	9.2	840	0.02	-	-	0.6	2.1	-1.5	3.4	-	-	-	-	NAF (barren)
EB1125857-014	BY107	South Pit 1	BY107-4	48	65	17	Sandstone, f-m; some Siltstone	MCM	9.4	648	0.06	-	-	1.8	37	-35	20	-	-	-	-	NAF (barren)
ES1118644-022	BY127	South Pit 1	BY127-10	49	51	2	Sandstone (clayey)	MCM	8.9	839	0.05	0.05	<0.01	1.5	16	-14	10	0.50	7.7	<0.1	<0.1	NAF (barren)
EB1125857-112	BY056	West Pit 1	BY056-8	52	57	5	Sandstone, m	MCM	9.5	511	0.02	-	-	0.6	56	-55	91	-	-	-	-	NAF (barren)
ES1118644-023	BY127	South Pit 1	BY127-11	54	60	6	Siltstone	MCM	9.0	480	0.05	0.05	<0.01	1.5	18	-16	12	1.1	8.1	<0.1	<0.1	NAF (barren)

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

Table B1 (cont.). Acid-base characteristics of spoil samples

ALS Laboratory Sample ID	Drill Hole ID	General Location	Sample ID	Sample Interval (m)			Lithology	Formation / Zone	pH[1]	EC[1]	Total Sulfur	Sulfide Sulfur	Sulfate Sulfur	MPA[2,3]	ANC[2]	NAPP[2]	ANC/MPA ratio	Tot. Org. Carbon	NAGpH[2]	NAG[2] @pH4.5	NAG[2] @pH7.0	Sample Classification[3]
				From	To	Int.				(µS/cm)	(%)			(kg H_2SO_4/t)				(%)		(kg H_2SO_4/t)		
Spoil																						
EB1125857-146	BY047	West Pit 2 / 3	BY047-9	55	57	2	Shale, carb.	MCM	9.8	316	0.05	-	-	1.5	127	-125	83	-	-	-	-	NAF (barren)
EB1125857-099	BY082	South Pit 1	BY082-8	57	60	3	Mudstone	MCM	9.0	980	0.03	-	-	0.9	99	-98	108	-	-	-	-	NAF (barren)
ES1118644-004	BY132	South Pit 1 / 2	BY132-4	57	111	54	Sandstone, m	MCM	9.4	460	0.01	<0.01	<0.01	0.2	102	-102	666	0.22	9.1	<0.1	<0.1	NAF (barren)
EB1125857-147	BY047	West Pit 2 / 3	BY047-10	58	78	20	Sandstone, vf-f; & Siltstone	MCM	9.9	318	0.04	-	-	1.2	37	-36	30	-	-	-	-	NAF (barren)
EB1125857-113	BY056	West Pit 1	BY056-9	58	65	7	Siltstone & Coal (banded)	MCM (P)	9.5	490	0.05	-	-	1.5	55	-53	36	-	-	-	-	NAF (barren)
EB1125857-129	BY059	West Pit 1	BY059-7	58	61	3	Intrusive (igneous)	MCM (GM)	9.2	1270	0.25	0.22	-	6.6	52	-46	7.9	-	-	-	-	NAF
ES1118644-024	BY127	South Pit 1	BY127-12	61	81	20	Sandstone, f-c	MCM	9.1	691	0.24	0.24	<0.01	7.4	200	-193	27	0.35	9.2	<0.1	<0.1	NAF
EB1222663-003	BY195	West Pit 1	BY195-3	61	91	30	Siltstone (above GM)	MCM	9.7	627	0.04	-	-	1.2	119	-118	97	-	-	-	-	NAF (barren)
EB1125857-100	BY082	South Pit 1	BY082-9	61	103	42	Sandstone, m-c	MCM	9.8	374	0.02	-	-	0.6	9.0	-8.4	15	-	-	-	-	NAF (barren)
EB1125857-085	BY031	north of West Pit 3	BY031-5	62	65	3	Mudstone	MCM	7.8	349	0.47	0.41	-	13	14	-1.0	1.1	-	-	-	-	Uncertain
EB1118698-017	BY067	South Pit 1	BY067-3	63	97	34	Sandstone, f-vc	MCM	9.4	466	<0.01	<0.01	<0.01	0.2	81	-81	532	0.43	10.0	<0.1	<0.1	NAF (barren)
EB1125857-086	BY031	north of West Pit 3	BY031-6	65	101	36	Sandstone, m	MCM	7.9	79	0.06	-	-	1.8	12	-11	6.7	-	-	-	-	NAF (barren)
EB1125857-005	BY116	South Pit 1	BY116-5	65	119	54	Sandstone, m-c	MCM	9.2	630	0.03	-	-	0.9	8.6	-7.7	9.4	-	-	-	-	NAF (barren)
EB1125857-114	BY056	West Pit 1	BY056-10	66	68	2	Siltstone	MCM	8.9	288	0.18	-	-	5.5	26	-21	4.8	-	-	-	-	NAF
EB1125857-130	BY059	West Pit 1	BY059-8	67	71	4	Mudstone, carb. & Siltstone	MCM	9.2	557	0.14	-	-	4.3	26	-21	6.0	-	-	-	-	NAF
EB1125857-015	BY107	South Pit 1	BY107-5	68	71	3	Sandstone, f	MCM	9.3	487	0.14	-	-	4.3	167	-163	39	-	-	-	-	NAF
EB1125857-115	BY056	West Pit 1	BY056-11	69	112	43	Sandstone, vf-c	MCM	9.8	359	0.03	-	-	0.9	2.8	-1.9	3.0	-	-	-	-	NAF (barren)
EB1118698-024	BY054	West Pit 1	BY054-5	71	95	24	Siltstone & Sandstone, vf-f	MCM	9.8	454	0.04	0.03	<0.01	0.9	87	-86	94	0.87	9.3	<0.1	<0.1	NAF (barren)
EB1125857-131	BY059	West Pit 1	BY059-9	72	131	59	Sandstone, m; some Siltstone	MCM	9.6	417	0.05	-	-	1.5	7.6	-6.1	5.0	-	-	-	-	NAF (barren)
EB1125857-016	BY107	South Pit 1	BY107-6	72	76	4	Sandstone, f	MCM	9.7	581	0.07	-	-	2.1	32	-29	15	-	-	-	-	NAF (barren)
EB1125857-017	BY107	South Pit 1	BY107-7	77	92	15	Sandstone	MCM	9.8	473	0.03	-	-	0.9	125	-124	136	-	-	-	-	NAF (barren)
EB1125857-187	BY09GW	near North Pit 1	BYG009-8	77.5	81	3.5	Mudstone	MCM	7.3	222	0.09	-	-	2.8	12	-9.2	4.4	-	-	-	-	NAF (barren)
EB1125857-148	BY047	West Pit 2 / 3	BY047-11	79	82	3	Mudstone	MCM	9.8	346	0.07	-	-	2.1	134	-132	63	-	-	-	-	NAF (barren)
EB1125857-188	BY09GW	near North Pit 1	BYG009-9	81	88	7	Sandstone, f-m	MCM	7.5	193	0.05	-	-	1.5	15	-13	10	-	-	-	-	NAF (barren)
ES1118644-025	BY127	South Pit 1	BY127-13	82	91	9	Siltstone	MCM	9.4	1040	0.03	0.03	<0.01	0.9	80	-79	87	0.89	8.7	<0.1	<0.1	NAF (barren)
EB1125857-149	BY047	West Pit 2 / 3	BY047-12	88	100	12	Mudstone and Siltstone	MCM	9.8	327	0.04	-	-	1.2	64	-63	53	-	-	-	-	NAF (barren)
EB1125857-189	BY09GW	near North Pit 1	BYG009-10	88	97	9	Sandstone, f-c; with Siltstone	MCM	7.8	165	0.05	-	-	1.5	64	-63	42	-	-	-	-	NAF (barren)
EB1125857-018	BY107	South Pit 1	BY107-8	93	100	7	Siltstone	MCM	9.6	566	0.06	-	-	1.8	127	-125	69	-	-	-	-	NAF (barren)
EB1118517-036	BY073	north of West Pit 3	BY073-12	96.5	100	3.5	Cindered coal & Intru. (un-named seam)	MCM	9.4	286	0.08	0.08	<0.01	2.5	72	-70	30	4.5	9.4	<0.1	<0.1	NAF (barren)
EB1203143-004	BY114C	South Pit 1	E11404	96.66	97.20	0.54	Mudstone	MCM	9.2	602	0.05	0.04	-	1.1	27	-26	25	-	-	-	-	NAF (barren)
ES1118644-026	BY127	South Pit 1	BY127-14	97	109	12	Sandstone, f	MCM	9.3	1160	0.03	0.02	<0.01	0.6	68	-67	111	0.67	8.5	<0.1	<0.1	NAF (barren)
EB1203143-016	BY083C	South Pit 1	E08302	97.18	97.68	0.50	Siltstone	MCM	9.1	284	0.04	0.03	-	0.9	5.6	-4.7	5.9	-	-	-	-	NAF (barren)
EB1222663-004	BY195	West Pit 1	BY195-4	99	104	5	Mudstone (below GM)	MCM	9.2	564	0.06	-	-	1.8	10	-8.5	5.6	-	-	-	-	NAF (barren)
EB1118517-030	BY073	north of West Pit 3	BY073-6	100	123	23	Sandstone, vf-c	MCM	9.8	248	0.07	0.07	<0.01	2.1	93	-91	43	0.63	10.4	<0.1	<0.1	NAF (barren)
EB1125857-087	BY031	north of West Pit 3	BY031-7	101	104	3	Intrusive (igneous)	MCM	9.3	117	0.14	0.14	-	4.2	5.6	-1.4	1.3	-	-	-	-	Uncertain
EB1125857-088	BY031	north of West Pit 3	BY031-8	104	126	22	Sandstone, vf	MCM	8.3	369	0.54	0.47	-	14	139	-125	9.6	-	-	-	-	NAF
EB1222663-005	BY195	West Pit 1	BY195-5	104	142	38	Sandstone, f (btw GM & GL)	MCM	9.7	472	0.05	-	-	1.5	128	-126	84	-	-	-	-	NAF (barren)
EB1125857-076	BY096	South Pit 1	BY096-10	105	106	1	Sandstone, vf	MCM	9.5	539	0.09	-	-	2.8	86	-84	31	-	-	-	-	NAF (barren)
EB1125857-101	BY082	South Pit 1	BY082-10	106	107	1	Mudstone, carb.	MCM	9.2	373	0.87	0.70	-	21	152	-131	7.1	-	-	-	-	NAF
EB1125857-151	BY047	West Pit 2 / 3	BY047-14	107	109	2	Siltstone (floor+)	MCM (P)	9.9	293	0.10	-	-	3.1	41	-38	13	-	-	-	-	NAF (barren)
EB1125857-077	BY096	South Pit 1	BY096-11	107	108	1	Siltstone, carb.	MCM	9.2	985	0.10	-	-	3.1	5.2	-2.1	1.7	-	-	-	-	NAF (barren)
EB1125857-019	BY107	South Pit 1	BY107-9	107	108	1	Siltstone	MCM	9.5	766	0.05	-	-	1.5	52	-51	34	-	-	-	-	NAF (barren)
EB1125857-078	BY096	South Pit 1	BY096-12	108	110	2	Intrusive (igneous)	MCM (GL)	9.6	1180	0.30	0.27	-	8.3	7.6	0.7	0.9	-	-	-	-	PAF (low cap.)

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

Table B1 (cont.). Acid-base characteristics of spoil samples

ALS Laboratory Sample ID	Drill Hole ID	General Location	Sample ID	Sample Interval (m)			Lithology	Formation / Zone	pH[1]	EC[1]	Total Sulfur	Sulfide Sulfur	Sulfate Sulfur	MPA[2,3]	ANC[2]	NAPP[2]	ANC/MPA ratio	Tot. Org. Carbon	NAGpH[2]	NAG[2] @pH4.5	NAG[2] @pH7.0	Sample Classification[3]
				From	To	Int.				(µS/cm)	(%)			(kg H_2SO_4/t)				(%)		(kg H_2SO_4/t)		
Spoil																						
EB1125857-020	BY107	South Pit 1	BY107-10	109	132	23	Sandstone, m-c	MCM	9.4	656	0.01	-	-	0.3	13	-13	43	-	-	-	-	NAF (barren)
EB1125857-152	BY047	West Pit 2 / 3	BY047-15	110	136	26	Siltstone & Sandstone, m-c	MCM	10.0	263	0.05	-	-	1.5	27	-25	17	-	-	-	-	NAF (barren)
EB1125857-079	BY096	South Pit 1	BY096-13	110	120	10	Siltstone	MCM	9.8	539	0.05	-	-	1.5	16	-15	11	-	-	-	-	NAF (barren)
ES1118644-027	BY127	South Pit 1	BY127-15	110	129	19	Sandstone, m-c	MCM	9.4	653	0.01	0.01	<0.01	0.3	105	-105	343	0.44	9.3	<0.1	<0.1	NAF (barren)
EB1118698-025	BY054	West Pit 1	BY054-6	112	135	23	Mudstone & Siltstone	MCM	9.6	389	0.03	0.03	<0.01	0.9	40	-39	43	0.50	9.0	<0.1	<0.1	NAF (barren)
ES1118644-005	BY132	South Pit 1 / 2	BY132-5	112	117	5	Siltstone	MCM	8.9	419	0.03	0.02	<0.01	0.6	56	-55	91	0.59	8.5	<0.1	<0.1	NAF (barren)
EB1125857-116	BY056	West Pit 1	BY056-12	113	122	9	Siltstone	MCM	9.7	297	0.03	-	-	0.9	75	-74	81	-	-	-	-	NAF (barren)
EB1125857-042	BY093	South Pit 1	BY093-5	113	120	7	Mudstone; Siltstone & Sandstone, vf-f	MCM	9.2	915	0.12	-	-	3.7	37	-34	10	-	-	-	-	NAF
EB1118698-018	BY067	South Pit 1	BY067-4	118	157	39	Sandstone, f-m	MCM	9.4	400	0.06	0.06	<0.01	1.8	66	-64	36	1.2	9.9	<0.1	<0.1	NAF (barren)
EB1125857-102	BY082	South Pit 1	BY082-11	118	152	34	Mudstone & Sandstone, f-m	MCM	9.6	656	0.10	-	-	3.1	5.2	-2.1	1.7	-	-	-	-	NAF (barren)
EB1125857-043	BY093	South Pit 1	BY093-6	120	150	30	Sandstone, vf-c; some Siltstone	MCM	9.4	838	0.04	-	-	1.2	4.9	-3.7	4.0	-	-	-	-	NAF (barren)
EB1125857-117	BY056	West Pit 1	BY056-13	123	125	2	Intrusive (igneous)	MCM (GM)	9.6	466	0.21	0.20	-	6.2	72	-66	12	-	-	-	-	NAF
EB1118517-037	BY073	north of West Pit 3	BY073-13	123	125	2	Cindered coal & Siltstone	MCM	9.7	227	0.33	0.33	<0.01	10	22	-12	2.2	20.2	8.4	<0.1	<0.1	NAF
EB1118517-031	BY073	north of West Pit 3	BY073-7	125	137	12	Sandstone, m-vc	MCM	9.7	296	0.05	0.05	<0.01	1.5	72	-70	47	1.01	9.8	<0.1	<0.1	NAF (barren)
EB1125857-089	BY031	north of West Pit 3	BY031-9	126	147	21	Mudstone	MCM	9.2	205	0.30	0.20	-	6.2	20	-14	3.2	-	-	-	-	NAF
EB1125857-006	BY116	South Pit 1	BY116-6	128	188	60	Sandstone, m-c	MCM	9.4	664	0.02	-	-	0.6	134	-133	219	-	-	-	-	NAF (barren)
ES1118644-028	BY127	South Pit 1	BY127-16	130	144	14	Siltstone & Sandstone, f-c	MCM	9.6	782	0.03	0.03	<0.01	0.9	106	-105	115	0.84	8.8	<0.1	<0.1	NAF (barren)
ES1118644-007	BY132	South Pit 1 / 2	BY132-7	130	133	3	Mudstone & Siltstone (floor+)	MCM (GM)	9.0	310	1.08	1.08	<0.01	33	6.4	27	0.2	6.3	2.5	24.5	29.6	PAF
EB1125857-132	BY059	West Pit 1	BY059-10	132	133	1	Intrusive (igneous)	MCM (GL)	9.7	440	0.65	0.23	-	7.1	72	-65	10	-	-	-	-	NAF
EB1118698-033	BY064	West Pit 3	BY064-7	133	158	25	Sandstone, Siltstone & Mudstone, carb.	MCM	9.6	337	0.05	0.04	<0.01	1.2	94	-93	77	<0.02	9.1	<0.1	<0.1	NAF (barren)
EB1125857-021	BY107	South Pit 1	BY107-11	133	156	23	Siltstone	MCM	9.4	465	0.04	-	-	1.2	128	-127	104	-	-	-	-	NAF (barren)
EB1125857-133	BY059	West Pit 1	BY059-11	134	137	3	Intrusive (igneous)	MCM (GL)	9.9	311	0.23	0.22	-	6.6	32	-26	4.9	-	-	-	-	NAF
ES1118644-008	BY132	South Pit 1 / 2	BY132-8	134	155	21	Sandstone, m	MCM	9.7	319	0.02	0.02	<0.01	0.6	65	-64	106	0.42	8.5	<0.1	<0.1	NAF (barren)
EB1125857-118	BY056	West Pit 1	BY056-14	135	174	39	Siltstone; some Sandstone	MCM	9.6	347	0.31	0.25	-	7.6	21	-13	2.7	-	-	-	-	NAF
EB1125857-153	BY047	West Pit 2 / 3	BY047-16	136	144	8	Siltstone	MCM	10.0	264	0.03	-	-	0.9	128	-127	139	-	-	-	-	NAF (barren)
EB1118698-026	BY054	West Pit 1	BY054-7	136	137	1	Mudstone, carb.	MCM	9.7	293	0.37	0.37	<0.01	11	105	-94	9.3	0.19	8.6	<0.1	<0.1	NAF
EB1118517-032	BY073	north of West Pit 3	BY073-8	137	143	6	Siltstone	MCM	9.6	271	0.12	0.12	<0.01	3.7	33	-29	8.8	2.7	8.7	<0.1	<0.1	NAF
EB1125857-134	BY059	West Pit 1	BY059-12	138	140	2	Intrusive (ign.), cind. coal; sec. Py (fract.)	MCM (GL)	9.6	804	0.24	0.19	-	5.9	138	-132	23	-	-	-	-	NAF
EB1118517-033	BY073	north of West Pit 3	BY073-9	143	148	5	Sandstone, f	MCM	9.7	313	0.03	0.03	<0.01	0.9	116	-115	126	0.34	6.8	<0.1	<0.1	NAF (barren)
EB1125857-154	BY047	West Pit 2 / 3	BY047-17	144.5	146.5	2	Coal, cindered	MCM (GM)	9.4	221	0.51	0.28	-	8.7	66	-57	7.5	-	-	-	-	NAF
EB1125857-135	BY059	West Pit 1	BY059-13	145	148	3	Sandstone, f	MCM	9.2	564	0.11	-	-	3.4	37	-34	11	-	-	-	-	NAF
ES1118644-029	BY127	South Pit 1	BY127-17	145	147	2	Siltstone	MCM	9.5	657	0.06	0.06	<0.01	1.8	23	-22	13	1.3	8.7	<0.1	<0.1	NAF (barren)
EB1125857-136	BY059	West Pit 1	BY059-14	148	161	13	Siltstone	MCM	9.8	506	0.04	-	-	1.2	17	-16	14	-	-	-	-	NAF (barren)
EB1118517-034	BY073	north of West Pit 3	BY073-10	148	197	49	Siltstone & Sandstone	MCM	9.7	325	0.07	0.07	<0.01	2.1	75	-73	35	1.2	8.9	<0.1	<0.1	NAF (barren)
EB1203143-012	BY160C	South Pit 1	E16004	149.10	150.20	1.10	Sandstone	MCM	8.9	347	0.09	0.01	-	0.4	5.5	-5.1	13.8					NAF (barren)
ES1118644-009	BY132	South Pit 1 / 2	BY132-9	156	164	8	Sandstone, silty	MCM	9.6	288	0.06	0.06	<0.01	1.8	28	-26	15	0.83	8.5	<0.1	<0.1	NAF (barren)
ES1118644-030	BY127	South Pit 1	BY127-18	157	162	5	Mudstone & Siltstone	MCM	9.6	643	0.06	0.06	<0.01	1.8	7.6	-5.8	4.1	2.1	8.4	<0.1	<0.1	NAF (barren)
EB1125857-044	BY093	South Pit 1	BY093-7	161	182	21	Sandstone, vf; some Siltstone	MCM	9.8	482	0.04	-	-	1.2	78	-77	64	-	-	-	-	NAF (barren)
EB1118698-034	BY064	West Pit 3	BY064-8	162	200	38	Mudstone & Siltstone	MCM	9.6	306	0.07	0.06	<0.01	1.8	55	-54	30	0.87	8.9	<0.1	<0.1	NAF (barren)
EB1222663-006	BY195	West Pit 1	BY195-6	162	170	8	Sandstone, vf; & Siltstone	MCM	9.2	815	0.09	-	-	2.8	48	-45	17	-	-	-	-	NAF (barren)
ES1118644-031	BY127	South Pit 1	BY127-19	163	174	11	Sandstone, m-c	MCM	9.7	531	0.03	0.03	<0.01	0.9	36	-35	40	0.28	8.6	<0.1	<0.1	NAF (barren)
ES1118644-010	BY132	South Pit 1 / 2	BY132-10	165	170	5	Mudstone & Siltstone (roof+)	MCM (GL)	9.4	252	0.09	0.08	<0.01	2.5	21	-18	8.5	6.0	8.7	<0.1	<0.1	NAF (barren)
EB1125857-022	BY107	South Pit 1	BY107-12	169	198	29	Sandstone, m	MCM	9.5	542	0.04	-	-	1.2	36	-35	29	-	-	-	-	NAF (barren)

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

Table B1 (cont.). Acid-base characteristics of spoil samples

ALS Laboratory Sample ID	Drill Hole ID	General Location	Sample ID	Sample Interval (m)			Lithology	Formation / Zone	pH[1]	EC[1]	Total Sulfur	Sulfide Sulfur	Sulfate Sulfur	MPA[2,3]	ANC[2]	NAPP[2]	ANC/MPA ratio	Tot. Org. Carbon	NAGpH[2]	NAG[2] @pH4.5	NAG[2] @pH7.0	Sample Classification[3]
				From	To	Int.				(µS/cm)	(%)			(kg H_2SO_4/t)				(%)		(kg H_2SO_4/t)		
Spoil																						
EB1222663-007	BY195	West Pit 1	BY195-7	170	192	22	Siltstone (below GL to Exmoor)	MCM	9.8	226	0.06	-	-	1.8	49	-47	26	-	-	-	-	NAF (barren)
EB1118698-019	BY067	South Pit 1	BY067-5	172	191	19	Siltstone & Sandstone	MCM	9.5	387	0.07	0.07	<0.01	2.1	36	-33	17	3.5	9.0	<0.1	<0.1	NAF (barren)
EB1125857-103	BY082	South Pit 1	BY082-12	172	182	10	Siltstone	MCM	9.7	408	0.03	-	-	0.9	37	-36	40	-	-	-	-	NAF (barren)
EB1125857-119	BY056	West Pit 1	BY056-15	174	175.5	1.5	Intrusive (igneous)	MCM (GL)	9.6	430	0.10	-	-	3.1	66	-63	21	-	-	-	-	NAF (barren)
ES1118644-011	BY132	South Pit 1 / 2	BY132-11	178	182	4	Sandstone (floor+)	MCM (GL)	7.2	799	0.16	0.15	<0.01	4.6	<0.5	4.6	0.1	3.4	7.5	<0.1	<0.1	Uncertain
EB1125857-120	BY056	West Pit 1	BY056-16	180	191	11	Intrusive (igneous)	MCM (GL)	9.8	405	0.04	-	-	1.2	166	-165	136	-	-	-	-	NAF (barren)
EB1125857-045	BY093	South Pit 1	BY093-8	182	188	6	Intrusive (igneous)	MCM (GL)	10.0	405	0.02	-	-	0.6	41	-40	66	-	-	-	-	NAF (barren)
ES1118644-012	BY132	South Pit 1 / 2	BY132-12	183	187	4	Mudstone, carb.	MCM	7.2	33	0.16	0.16	<0.01	4.9	38	-33	7.8	3.1	8.5	<0.1	<0.1	NAF
EB1125857-121	BY056	West Pit 1	BY056-17	197	221	24	Siltstone	MCM	9.7	353	0.04	-	-	1.2	164	-163	134	-	-	-	-	NAF (barren)
EB1118517-035	BY073	north of West Pit 3	BY073-11	197	202	5	Cindered coal & Intru. (un-named seam)	MCM	9.7	336	0.30	0.30	<0.01	9.2	57	-47	6.2	4.9	9.1	<0.1	<0.1	NAF
EB1125857-023	BY107	South Pit 1	BY107-13	199	209	10	Siltstone	MCM	9.6	581	0.07	-	-	2.1	77	-75	36	-	-	-	-	NAF (barren)
EB1125857-007	BY116	South Pit 1	BY116-7	200	230	30	Sandstone, vf-m	MCM	9.8	348	0.02	-	-	0.6	78	-77	127	-	-	-	-	NAF (barren)
EB1125857-024	BY107	South Pit 1	BY107-14	226	249	23	Siltstone	MCM	9.9	595	0.05	-	-	1.5	67	-66	44	-	-	-	-	NAF (barren)
EB1125857-008	BY116	South Pit 1	BY116-8	230	240	10	Siltstone & Mudstone	MCM	9.8	490	0.06	-	-	1.8	57	-55	31	-	-	-	-	NAF (barren)
EB1125857-009	BY116	South Pit 1	BY116-9	246	252	6	Sandstone, m-c; Mudstone, carb.	MCM	9.7	295	0.06	-	-	1.8	30	-28	16	-	-	-	-	NAF (barren)
EB1125857-010	BY116	South Pit 1	BY116-10	252	260	8	Siltstone & Mudstone, carb.	MCM	9.9	306	0.04	-	-	1.2	31	-30	25	-	-	-	-	NAF (barren)
EB1125857-046	BY093	South Pit 1	BY093-9	188	197	9	Sandstone, f; Siltst. & Mudst., carb.	MCM & Exmoor	9.7	313	0.08	-	-	2.5	60	-57	24	-	-	-	-	NAF (barren)
EB1125857-080	BY096	South Pit 1	BY096-14	132	140	8	Siltstone; some Mudstone	Exmoor	9.8	460	0.09	-	-	2.8	19	-16	6.7	-	-	-	-	NAF (barren)
EB1125857-090	BY031	north of West Pit 3	BY031-10	153	163	10	Siltstone	Exmoor	9.6	161	0.10	-	-	3.1	19	-16	6.2	-	-	-	-	NAF (barren)
EB1125857-137	BY059	West Pit 1	BY059-15	170	180	10	Sandstone, vf-f; & Siltstone	Exmoor	9.8	427	0.06	-	-	1.8	37	-35	20	-	-	-	-	NAF (barren)
EB1125857-091	BY031	north of West Pit 3	BY031-11	173	188	15	Siltstone & Mudstone, carb.	Exmoor	9.6	164	0.44	0.36	-	11	33	-22	3.0	-	-	-	-	NAF
EB1125857-104	BY082	South Pit 1	BY082-13	198	205	7	Sandstone, f	Exmoor	9.7	351	0.14	0.12	-	3.6	43	-39	12	-	-	-	-	NAF
EB1125857-122	BY056	West Pit 1	BY056-18	227	234	7	Siltstone	Exmoor	9.7	298	0.08	-	-	2.5	26	-23	10	-	-	-	-	NAF (barren)

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

Table B2. Acid-base characteristics of potential coal reject samples

ALS Laboratory Sample ID	Drill Hole ID	General Location	Sample ID	Sample Interval (m)			Lithology	Seam	pH[1]	EC[1]	Total Sulfur	Sulfide Sulfur	Sulfate Sulfur	MPA[2,3]	ANC[2]	NAPP[2]	ANC/MPA ratio	Tot. Org. Carbon	NAGpH[2]	NAG[2] @pH4.5	NAG[2] @pH7.0	Sample Classification[3]
				From	To	Int.				(µS/cm)	(%)			(kg H_2SO_4/t)				(%)		(kg H_2SO_4/t)		
Potential Coal Reject (roof, parting and floor)																						
EB1203143-001	BY114C	South Pit 1	E11401	56.03	56.54	0.51	Siltstone	P Rider roof	9.3	639	0.06	0.04	-	1.3	18	-17	14	-	-	-	-	NAF (barren)
EB1203143-002	BY114C	South Pit 1	E11402	58.57	59.15	0.58	Mudstone	P Rider floor	9.3	563	0.05	0.03	-	0.9	20	-19	23	-	-	-	-	NAF (barren)
EB1122664-001	BY160X	South Pit 1	X16001	36.85	37.03	0.18	Carb. mudstone, minor coal	P roof	6.5	2390	0.13	0.03	-	1.0	21	-20	21	-	-	-	-	NAF
EB1203143-019	BY111C	South Pit 1	E11101	78.80	79.13	0.33	Mudstone, minor coal	P roof	9.2	550	0.04	0.03	-	1.0	27	-26	28	-	-	-	-	NAF (barren)
EB1203143-003	BY114C	South Pit 1	E11403	88.40	88.84	0.44	Mudstone, slightly tuffaceous	P roof	9.2	634	0.06	0.04	-	1.3	24	-23	18	-	-	-	-	NAF (barren)
EB1203143-020	BY111C	South Pit 1	E11102	82.80	83.25	0.45	Tuff (P Tuff)	P parting	9.4	540	0.04	0.05	-	1.5	40	-39	27	-	-	-	-	NAF (barren)
EB1125857-150	BY047	West Pit 2 / 3	BY047-13	103.50	105.00	1.50	Tuff (P Tuff)	P parting	9.9	294	0.09	-	-	2.8	37	-35	14	-	-	-	-	NAF (barren)
EB1203143-014	BY160X	South Pit 1	E16006	38.65	39.00	0.35	Mudstone, slightly tuffaceous	P floor	6.8	1950	0.14	0.10	-	3.2	6.4	-3.2	2.0	-	-	-	-	NAF
EB1203143-021	BY111C	South Pit 1	E11103	85.13	85.49	0.36	Mudstone	P floor	9.3	499	0.04	0.03	-	0.9	14	-13	16	-	-	-	-	NAF (barren)
EB1222663-018	BY263C	West Pit 1	263RF	29.34	29.84	0.50	Siltstone & Mudstone	GM roof	8.3	322	0.31	0.11	-	3.5	2.7	0.8	0.8	-	-	-	-	PAF (low cap.)
EB1222663-017	BY248C	West Pit 1	248RF	44.00	44.38	0.38	Siltstone & Mudstone	GM roof	9.2	397	0.31	0.28	-	8.6	4.7	3.9	0.5	-	-	-	-	PAF (low cap.)
EB1120637-006	BY124C	South Pit 1	W12401	53.68	55.00	1.32	Cind. coal, stoney, some carb. mudst.	GM roof	8.2	270	0.02	0.02	<0.01	0.6	2.8	-2.2	4.6	49.1	6.3	<0.1	2.0	NAF (barren)
EB1222663-020	BY275C	West Pit 1	275RF	58.34	58.74	0.40	Siltstone & Mudstone	GM roof	9.2	342	0.02	0.02	-	0.5	3.5	-3.0	6.7	-	-	-	-	NAF (barren)
EB1222663-019	BY272C	West Pit 1	272RF	72.54	72.94	0.40	Siltstone & Mudstone	GM roof	9.0	331	0.08	0.05	-	1.6	4.0	-2.4	2.5	-	-	-	-	NAF (barren)
EB1203143-017	BY097C	South Pit 1	E09701	84.10	84.60	0.50	Mudstone	GM roof	8.6	380	0.10	0.08	-	2.5	5.4	-2.9	2.2	-	-	-	-	NAF (barren)
EB1203143-015	BY083C	South Pit 1	E08301	86.37	86.87	0.50	Mudstone	GM roof	8.2	380	0.06	0.04	-	1.2	4.4	-3.2	3.8	-	-	-	-	NAF (barren)
EB1203143-009	BY160C	South Pit 1	E16001	90.00	90.55	0.55	Mudstone	GM roof	8.3	1040	0.93	0.89	-	27	74	-47	2.7	-	-	-	-	NAF
EB1203143-007	BY093Y	South Pit 1	E09301	106.21	106.75	0.54	Sandstone, tuffaceous	GM roof	9.3	609	0.02	0.01	-	0.4	143	-143	359	-	-	-	-	NAF (barren)
EB1120637-003	BY093Y	South Pit 1	X09301	106.75	106.99	0.24	Coal, dull, stoney, carb.	GM roof	9.1	355	0.43	0.42	<0.01	13	2.9	10	0.2	22.3	3.1	22.2	64.7	PAF (low cap.)
EB1120637-001	BY076C	South Pit 1	W07601	110.12	110.23	0.11	Carb. mudstone - minor coal	GM roof	7.9	470	0.10	0.09	0.01	2.8	1.6	1.2	0.6	8.5	3.7	<0.1	3.8	NAF (barren)
ES1118644-006	BY132	South Pit 1 / 2	BY132-6	118.00	119.00	1.00	Siltstone	GM roof	8.4	479	0.39	0.39	<0.01	12	11	1.2	0.9	19.1	7.3	<0.1	<0.1	PAF (low cap.)
EB1203143-022	BY111C	South Pit 1	E11104	137.85	138.27	0.42	Mudstone (above HE coal)	GM roof	8.5	512	0.03	0.02	-	0.6	5.6	-5.0	10	-	-	-	-	NAF (barren)
EB1203143-005	BY114C	South Pit 1	E11405	148.13	148.63	0.50	Mudstone, slightly tuffaceous	GM roof	8.8	367	0.05	0.02	-	0.7	11	-11	17	-	-	-	-	NAF (barren)
EB1222663-022	BY263C	West Pit 1	263FL	35.65	36.10	0.45	Mudstone	GM floor	9.0	630	0.14	0.12	-	3.6	2.8	0.8	0.8	-	-	-	-	Uncertain
EB1222663-021	BY248C	West Pit 1	248FL	52.59	53.00	0.41	Mudstone	GM floor	9.3	345	0.10	0.10	-	3.1	2.4	0.7	0.8	-	-	-	-	NAF (barren)
EB1222663-023	BY268C	West Pit 1	268FL	62.00	62.45	0.45	Mudstone	GM floor	9.3	306	0.03	0.03	-	0.8	3.2	-2.4	4.2	-	-	-	-	NAF (barren)
EB1120637-005	BY124C	South Pit 1	W12410	64.80	65.60	0.80	Cindered coal, stoney, mudstone	GM floor	8.3	218	0.67	0.66	<0.01	20	3.0	17	0.1	41.3	2.8	36.5	86.7	PAF
EB1222663-025	BY275C	West Pit 1	275F	67.98	68.39	0.41	Mudstone	GM floor	9.0	456	0.06	0.04	-	1.1	3.6	-2.5	3.2	-	-	-	-	NAF (barren)
EB1222663-024	BY272C	West Pit 1	272FL	82.60	83.00	0.40	Mudstone	GM floor	9.3	310	0.12	0.11	-	3.5	3.3	0.2	1.0	-	-	-	-	Uncertain
EB1203143-018	BY097C	South Pit 1	E09702	94.60	94.91	0.31	Mudstone, slightly carb.	GM floor	9.0	340	0.06	0.05	-	1.4	5.4	-4.0	3.8	-	-	-	-	NAF (barren)
EB1122664-003	BY160C	South Pit 1	W16009	99.30	99.55	0.25	Carb. mudstone, some coal bands	GM floor	9.7	278	0.17	0.08	-	2.3	4.9	-2.6	2.1	-	-	-	-	NAF
EB1203143-010	BY160C	South Pit 1	E16002	99.56	100.00	0.44	Mudstone	GM floor	8.9	976	0.12	0.10	-	3.0	7.0	-4.0	2.3	-	-	-	-	NAF
EB1122664-005	BY078C	South Pit 1 / 2	W07809	103.44	103.80	0.36	Tuffaceous mudstone and coal	GM floor	9.1	296	0.50	0.38	-	12	5.0	6.6	0.4	-	-	-	-	PAF (low cap.)
EB1120637-004	BY093Y	South Pit 1	X09310	116.67	117.00	0.33	Carb. mudstone - minor coal	GM floor	9.3	367	0.32	0.31	<0.01	9.5	3.6	5.9	0.4	24.1	3.1	45.7	93.5	PAF (low cap.)
EB1203143-008	BY093Y	South Pit 1	E09302	117.00	117.52	0.52	Mudstone & Siltstone	GM floor	9.0	345	0.04	0.03	-	0.9	6.5	-5.6	7.1	-	-	-	-	NAF (barren)
EB1120637-002	BY076C	South Pit 1	W07612	120.97	121.20	0.23	Carb. mudstone - minor coal	GM floor	9.2	244	0.40	0.38	0.02	12	3.6	8.0	0.3	23.8	3.2	32.9	83.3	PAF (low cap.)
EB1203143-023	BY111C	South Pit 1	E11105	148.74	149.24	0.50	Mudstone, slightly tuffaceous and coally	GM floor	9.2	270	0.03	0.02	-	0.6	5.8	-5.2	9.5	-	-	-	-	NAF (barren)
EB1122664-004	BY114C	South Pit 1	W11418	158.70	159.00	0.30	Carb. mudstone, some coal bands	GM floor	9.5	416	0.19	0.06	-	1.8	6.0	-4.2	3.4	-	-	-	-	NAF
EB1203143-006	BY114C	South Pit 1	E11406	159.00	159.64	0.64	Mudstone, slightly carbonaceous	GM floor	8.9	503	0.09	0.04	-	1.3	9.0	-7.7	7.0	-	-	-	-	NAF (barren)
EB1203143-011	BY160C	South Pit 1	E16003	140.00	140.53	0.53	Mudstone, slightly carb.	GL roof	9.3	415	0.03	0.02	-	0.7	8.4	-7.7	11	-	-	-	-	NAF (barren)
EB1122664-002	BY078C	South Pit 1 / 2	W07810	144.37	144.68	0.31	Mudstone, slightly tuffaceous; & Coal	GL roof	9.2	248	0.32	0.24	-	7.4	5.0	2.4	0.7	-	-	-	-	PAF (low cap.)

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

Table B3. Composite sample details

General Location	Drill Hole ID	Discrete Sample ID	Lithology	Sample Type	Composite Sample ID
Spoil					
West Pit 1	BY059	BY059-10	Igneous (intrusive)	between GM & GL	GL-s C1
	BY059	BY059-11	Igneous (intrusive)		
	BY059	BY059-12	Igneous (intrusive), cindered coal; secondary Py (fract.)		
Potential Coal Reject (roof and floor)					
South Pit 1	BY114C	E11401	Siltstone	P Rider roof & floor	PR C2
	BY114C	E11402	Mudstone		
South Pit 1	BY111C	E11103	Mudstone	P floor	P-f C3
	BY160X	E16006	Mudstone, slightly tuffaceous		
South Pit 1	BY111C	E11101	Mudstone, minor coal laminae	P roof	P-r C4
	BY114C	E11403	Mudstone, slightly tuffaceous		
	BY160X	X16001	Carbonaceous mudstone, minor coaly laminae		
West Pit 1	BY248C	248RF	Siltstone and Mudstone	GM roof	GM-r C5
	BY263C	263RF	Siltstone and Mudstone		
	BY272C	272RF	Siltstone and Mudstone		
	BY275C	275RF	Siltstone and Mudstone		
West Pit 1	BY248C	248FL	Mudstone	GM floor	GM-f C6
	BY263C	263FL	Mudstone		
	BY268C	268FL	Mudstone		
	BY272C	272FL	Mudstone		
	BY275C	275FL	Mudstone		

Table B4. Multi-element concentrations in spoil and potential coal reject samples

				Aluminium (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Potassium (K)	Selenium (Se)	Sodium (Na)	Vanadium (V)	Zinc (Zn)
Units:				all units mg/kg																						
Laboratory LOR:				50	5	5	10	1	50	1	10	2	2	5	50	5	10	5	0.1	2	2	10	5	10	5	5
NEPC (1999a) Health-based investigation level E:				-	-	200	-	40	6000	40	-	-*	200	2000	-	600	-	3000	30	-	600	-	-	-	-	14000
Average 'background' concentrations in earth's crust (Berkman, 1995):				82000	0.2	1.8	425	2.8	10	0.2	41000	100	25	55	41000	12.5	23000	950	0.08	1.5	75	21000	0.05	23000	135	70
Location	**Sample ID**	**Material Description**	**Fmt./Zone**	**Spoil**																						
South Pit 1 / 2	BY132-1	Soil (extremely weath.)	Quat.	-	-	<5	40	<1	-	<1	-	180	16	17	-	9	-	338	<0.1	-	36	-	-	-	89	18
South Pit 1	BY127-1	Soil (very highly weath.)	Quat.	-	-	<5	70	<1	-	<1	-	242	20	30	-	8	-	542	<0.1	-	53	-	-	-	94	20
nth of West Pit 3	BY073-1	Clay, silty (highly weath.)	Qa. & Ter.	-	-	<5	70	<1	-	<1	-	74	33	18	-	<5	-	480	<0.1	-	44	-	-	-	74	24
West Pit 1	BY054-1	Claystone (highly weath.)	Qa. & Ter.	-	-	<5	50	<1	-	<1	-	98	18	30	-	<5	-	433	<0.1	-	43	-	-	-	114	24
South Pit 1	BY067-1	Claystone (highly weath.)	Tertiary	-	-	<5	50	<1	-	<1	-	103	40	19	-	<5	-	280	<0.1	-	107	-	-	-	79	51
South Pit 1	BY127-2	Claystone (mod. to highly weath.)	Tertiary	-	-	<5	90	<1	-	<1	-	78	16	37	-	<5	-	175	<0.1	-	41	-	-	-	60	20
nth of West Pit 3	BY073-2	Claystone (highly weath.)	Tertiary	-	-	<5	20	<1	-	<1	-	14	46	25	-	10	-	223	<0.1	-	62	-	-	-	36	35
South Pit 1	BY082-2	Claystone (highly weath.)	Tertiary	13800	<5	<5	-	-	<50	<1	800	270	13	39	108000	5	1710	380	<0.1	<2	132	140	<5	2500	267	53
West Pit 1	BY054-2	Claystone, sandy (slightly weath.)	Tertiary	-	-	<5	20	<1	-	<1	-	36	<2	<5	-	<5	-	22	<0.1	-	5	-	-	-	51	<5
South Pit 1	BY127-3	Claystone (moderately weath.)	Tertiary	-	-	<5	20	1	-	<1	-	162	29	43	-	<5	-	207	<0.1	-	98	-	-	-	87	67
South Pit 1	BY127-5	Claystone (highly weath.)	Tertiary	-	-	<5	370	3	-	<1	-	148	142	110	-	9	-	841	<0.1	-	550	-	-	-	84	415
South Pit 1	BY127-7	Claystone (slightly weath.)	Tertiary	-	-	<5	100	3	-	<1	-	185	36	82	-	14	-	73	0.2	-	186	-	-	-	71	82
West Pit 3	BY064-1	Clay & Basalt (extremely weath.)	Tertiary	-	-	<5	60	<1	-	<1	-	105	6	12	-	<5	-	114	<0.1	-	22	-	-	-	105	8
nth of West Pit 3	BY073-3	Basalt (weathered)	Tertiary	-	-	<5	30	<1	-	<1	-	154	31	32	-	<5	-	517	<0.1	-	130	-	-	-	84	88
South Pit 1	BY127-4	Basalt (highly weath.)	Tertiary	-	-	<5	<10	2	-	<1	-	229	94	68	-	<5	-	262	<0.1	-	343	-	-	-	96	213
West Pit 3	BY064-2	Basalt (extremely weath.)	Tertiary	-	-	<5	130	<1	-	<1	-	90	52	35	-	<5	-	1290	<0.1	-	57	-	-	-	93	18
South Pit 1	BY127-6	Basalt (highly weath.)	Tertiary	-	-	<5	190	4	-	<1	-	244	172	66	-	8	-	656	<0.1	-	662	-	-	-	90	407
nth of West Pit 3	BY073-4	Basalt	Tertiary	-	-	<5	130	<1	-	<1	-	41	22	41	-	<5	-	444	<0.1	-	93	-	-	-	29	52
South Pit 1	BY067-2	Basalt (weathered)	Tertiary	-	-	<5	100	<1	-	<1	-	118	28	38	-	<5	-	486	<0.1	-	125	-	-	-	72	84
West Pit 3	BY064-3	Basalt (highly weath.)	Tertiary	-	-	<5	360	<1	-	<1	-	132	146	75	-	<5	-	2550	<0.1	-	394	-	-	-	69	181
South Pit 1	BY082-7	Basalt	Tertiary	14000	<5	<5	-	-	<50	<1	37400	112	23	32	39400	<5	21500	1130	<0.1	2	79	260	<5	3400	70	66
West Pit 3	BY064-4	Basalt (slightly weath.)	Tertiary	-	-	<5	30	<1	-	<1	-	74	37	54	-	<5	-	1200	<0.1	-	159	-	-	-	51	76
West Pit 3	BY064-5	Basalt	Tertiary	-	-	<5	20	<1	-	<1	-	62	24	34	-	<5	-	594	<0.1	-	105	-	-	-	41	51
nth of West Pit 3	BY073-5	Quartzose loose sands	Tertiary	-	-	<5	50	<1	-	<1	-	3	3	<5	-	<5	-	34	<0.1	-	3	-	-	-	7	10
east of West Pit 3	BYGW002-4	Coal (un-named seam)	FCCM	6520	<5	9	-	-	<50	<1	3390	6	10	139	10900	14	1630	354	<0.1	<2	6	1530	<5	1160	20	78
West Pit 3	BY064-6	Claystone & Siltstone	Ter./MCM	-	-	<5	20	<1	-	<1	-	26	13	24	-	11	-	141	<0.1	-	45	-	-	-	34	45
South Pit 1 / 2	BY132-2	Sandstone, f-m (weathered)	MCM	-	-	6	90	<1	-	<1	-	77	30	43	-	9	-	393	<0.1	-	99	-	-	-	134	108
West Pit 1	BY264-003	Claystone (highly weath.)	MCM	12800	<5	<5	-	-	<50	1	870	146	22	36	74100	<5	3140	431	<0.1	<2	71	140	<5	3320	143	35
West Pit 1	BY263-003	Mudstone (slightly weath.)	MCM	4410	<5	11	-	-	<50	1	14600	18	26	52	56000	18	7430	1880	<0.1	<2	74	890	<5	1870	51	108
West Pit 1	BY054-3	Claystone (weathered)	MCM	-	-	<5	80	2	-	<1	-	23	62	49	-	7	-	248	<0.1	-	97	-	-	-	56	84
South Pit 1	BY127-8	Sandstone, f-m (moderately weath.)	MCM	-	-	8	210	1	-	<1	-	105	59	51	-	8	-	722	0.2	-	182	-	-	-	136	114
South Pit 1	BY127-9	Sandstone, f-m (slightly weath.)	MCM	-	-	<5	110	<1	-	<1	-	120	31	26	-	<5	-	493	<0.1	-	79	-	-	-	120	82
South Pit 1 / 2	BY132-3	Sandstone, f-m (weath., near coal)	MCM (P)	-	-	10	40	<1	-	<1	-	44	56	49	-	13	-	668	1.8	-	100	-	-	-	96	158

Table B4 (cont.). Multi-element concentrations in spoil and potential coal reject samples

				Aluminium (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Potassium (K)	Selenium (Se)	Sodium (Na)	Vanadium (V)	Zinc (Zn)
Units:				all units mg/kg																						
Laboratory LOR:				50	5	5	10	1	50	1	10	2	2	5	50	5	10	5	0.1	2	2	10	5	10	5	5
NEPC (1999a) Health-based investigation level E:				-	-	200	-	40	6000	40	-	-*	200	2000	-	600	-	3000	30	-	600	-	-	-	-	14000
Average 'background' concentrations in earth's crust (Berkman, 1995):				82000	0.2	1.8	425	2.8	10	0.2	41000	100	25	55	41000	12.5	23000	950	0.08	1.5	75	21000	0.05	23000	135	70
Location	**Sample ID**	**Material Description**	**Fmt./Zone**	**Spoil**																						
West Pit 1	BY195-2	Clayst. & Mudst. (mod. to highly weath.)	MCM	4630	<5	8	-	-	<50	1	6650	14	23	46	45400	16	7230	650	<0.1	<2	66	1100	<5	2170	36	107
West Pit 1	BY264-005	Siltstone (above GM)	MCM	2520	<5	9	-	-	<50	<1	9580	9	19	41	48200	14	5520	1120	<0.1	<2	37	780	<5	1420	33	78
West Pit 1	BY054-4	Mudstone, Siltstone & Sandstone	MCM	-	-	<5	60	<1	-	<1	-	18	16	16	-	7	-	700	<0.1	-	34	-	-	-	49	61
South Pit 1	BY127-10	Sandstone (clayey)	MCM	-	-	8	20	1	-	<1	-	108	39	61	-	10	-	2500	0.3	-	66	-	-	-	112	124
South Pit 1	BY127-11	Siltstone	MCM	-	-	<5	70	1	-	<1	-	23	16	65	-	16	-	808	<0.1	-	40	-	-	-	55	72
South Pit 1	BY082-8	Mudstone	MCM	6660	<5	<5	-	-	<50	<1	2860	16	5	26	5520	16	2930	72	<0.1	<2	23	1470	<5	1950	14	40
South Pit 1 / 2	BY132-4	Sandstone, m	MCM	-	-	<5	140	<1	-	<1	-	23	15	19	-	10	-	748	<0.1	-	44	-	-	-	51	69
South Pit 1	BY082-9	Sandstone, m-c	MCM	4530	<5	<5	-	-	<50	<1	42000	21	17	15	37900	10	13500	1000	<0.1	<2	33	780	<5	970	46	64
South Pit 1	BY127-12	Sandstone, f-c	MCM	-	-	<5	100	<1	-	<1	-	28	14	21	-	8	-	752	<0.1	-	23	-	-	-	64	66
South Pit 1	BY067-3	Sandstone, f-vc	MCM	-	-	<5	80	<1	-	<1	-	17	17	17	-	7	-	893	<0.1	-	39	-	-	-	43	60
West Pit 1	BY054-5	Siltstone & Sandstone, vf-f	MCM	-	-	8	50	<1	-	<1	-	8	14	29	-	12	-	694	<0.1	-	36	-	-	-	23	74
South Pit 1	BY127-13	Siltstone	MCM	-	-	10	150	1	-	<1	-	16	14	43	-	13	-	1160	<0.1	-	31	-	-	-	46	61
nth of West Pit 3	BY073-12	Cind. coal & Intrusives	MCM	-	-	<5	80	<1	-	<1	-	3	13	56	-	<5	-	800	<0.1	-	26	-	-	-	58	91
South Pit 1	BY127-14	Sandstone, f	MCM	-	-	5	120	<1	-	<1	-	6	12	38	-	15	-	82	<0.1	-	30	-	-	-	14	78
nth of West Pit 3	BY073-6	Sandstone, vf-c	MCM	-	-	<5	50	<1	-	<1	-	2	13	19	-	7	-	473	<0.1	-	18	-	-	-	21	49
West Pit 1	BY195-5	Sandstone, f (bwt. GM & GL)	MCM	2330	<5	6	-	-	<50	<1	25700	8	18	21	30300	11	11600	758	<0.1	<2	41	780	<5	1120	24	51
South Pit 1	BY082-10	Mudstone, carb.	MCM	4000	<5	212	-	-	<50	<1	1270	6	10	32	10800	17	1450	79	0.2	<2	29	1360	<5	990	18	66
South Pit 1	BY127-15	Sandstone, m-c	MCM	-	-	6	140	<1	-	<1	-	24	21	17	-	10	-	1050	<0.1	-	53	-	-	-	67	56
West Pit 1	BY054-6	Mudstone & Siltstone	MCM	-	-	9	30	<1	-	<1	-	6	18	25	-	37	-	1490	<0.1	-	46	-	-	-	23	105
South Pit 1 / 2	BY132-5	Siltstone	MCM	-	-	12	190	<1	-	<1	-	16	19	36	-	14	-	828	<0.1	-	101	-	-	-	19	61
South Pit 1	BY067-4	Sandstone, f-m	MCM	-	-	5	60	<1	-	<1	-	11	15	20	-	9	-	595	<0.1	-	39	-	-	-	20	52
West Pit 1	BY056-13	Intrusive (igneous)	MCM (GM)	7240	<5	<5	-	-	<50	<1	8150	10	25	67	51400	<5	7440	972	0.2	<2	24	1340	<5	1260	77	78
nth of West Pit 3	BY073-13	Cindered coal & Siltstone	MCM	-	-	<5	130	<1	-	<1	-	<2	9	34	-	12	-	276	<0.1	-	22	-	-	-	7	81
nth of West Pit 3	BY073-7	Sandstone, m-vc	MCM	-	-	12	120	<1	-	<1	-	5	14	12	-	10	-	611	<0.1	-	22	-	-	-	20	38
South Pit 1	BY127-16	Siltstone & Sandstone, f-c	MCM	-	-	7	110	<1	-	<1	-	13	20	30	-	12	-	1020	<0.1	-	67	-	-	-	40	60
South Pit 1 / 2	BY132-7	Mudstone & Siltstone (floor+)	MCM (GM)	-	-	<5	50	<1	-	<1	-	<2	6	33	-	16	-	36	<0.1	-	14	-	-	-	6	97
West Pit 1	GL-s C1	Igneous; cind. coal; sec. Py (fract.)	MCM (GL)	10400	<5	<5	-	-	<50	<1	14000	31	22	36	51000	<5	17800	836	<0.1	<2	125	2190	<5	2760	36	52
West Pit 3	BY064-7	Sandst., Siltst. & Mudst., carb.	MCM	-	-	7	90	<1	-	<1	-	8	11	27	-	12	-	1060	<0.1	-	27	-	-	-	23	59
South Pit 1 / 2	BY132-8	Sandstone, m	MCM	-	-	10	120	<1	-	<1	-	6	24	26	-	12	-	707	<0.1	-	35	-	-	-	24	68
West Pit 1	BY054-7	Mudstone, carb.	MCM	-	-	7	50	<1	-	<1	-	11	15	63	-	<5	-	1120	<0.1	-	39	-	-	-	38	36
nth of West Pit 3	BY073-8	Siltstone	MCM	-	-	8	180	1	-	<1	-	3	7	47	-	15	-	717	<0.1	-	21	-	-	-	14	60
nth of West Pit 3	BY073-9	Sandstone, f	MCM	-	-	13	140	<1	-	<1	-	22	13	28	-	11	-	1290	<0.1	-	23	-	-	-	39	66
West Pit 2 / 3	BY047-17	Coal, cindered	MCM (GM)	8740	<5	<5	-	-	<50	<1	12800	9	6	23	12700	11	2090	261	<0.1	<2	10	1070	<5	550	26	26

Table B4 (cont.). Multi-element concentrations in spoil and potential coal reject samples

				Aluminium (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Potassium (K)	Selenium (Se)	Sodium (Na)	Vanadium (V)	Zinc (Zn)
Units:				all units mg/kg																						
Laboratory LOR:				50	5	5	10	1	50	1	10	2	2	5	50	5	10	5	0.1	2	2	10	5	10	5	5
NEPC (1999a) Health-based investigation level E:				-	-	200	-	40	6000	40	-	-*	200	2000	-	600	-	3000	30	-	600	-	-	-	-	14000
Average 'background' concentrations in earth's crust (Berkman, 1995):				82000	0.2	1.8	425	2.8	10	0.2	41000	100	25	55	41000	12.5	23000	950	0.08	1.5	75	21000	0.05	23000	135	70
Location	**Sample ID**	**Material Description**	**Fmt./Zone**	**Spoil**																						
South Pit 1	BY127-17	Siltstone	MCM	-	-	9	180	1	-	<1	-	14	12	45	-	15	-	870	<0.1	-	58	-	-	-	32	70
nth of West Pit 3	BY073-10	Siltstone & Sandstone	MCM	-	-	<5	200	<1	-	<1	-	6	13	33	-	14	-	1230	<0.1	-	29	-	-	-	22	53
South Pit 1 / 2	BY132-9	Sandstone, silty	MCM	-	-	9	90	<1	-	<1	-	7	15	39	-	17	-	875	<0.1	-	28	-	-	-	20	69
South Pit 1	BY127-18	Mudstone & Siltstone	MCM	-	-	5	40	1	-	<1	-	3	3	48	-	23	-	28	0.1	-	12	-	-	-	8	91
West Pit 3	BY064-8	Mudstone & Siltstone	MCM	-	-	6	60	<1	-	<1	-	6	12	35	-	18	-	759	<0.1	-	32	-	-	-	19	78
South Pit 1	BY127-19	Sandstone, m-c	MCM	-	-	7	120	<1	-	<1	-	6	11	17	-	10	-	698	<0.1	-	18	-	-	-	21	57
South Pit 1 / 2	BY132-10	Mudstone & Siltstone (roof+)	MCM (GL)	-	-	6	80	1	-	<1	-	8	10	38	-	17	-	1350	<0.1	-	20	-	-	-	31	56
West Pit 1	BY195-7	Siltstone (below GL to Exmoor)	MCM	2690	<5	5	-	-	<50	<1	18700	15	22	28	43600	16	11100	1030	<0.1	<2	77	960	<5	1000	27	77
South Pit 1	BY067-5	Siltstone & Sandstone	MCM	-	-	7	60	<1	-	<1	-	6	19	26	-	20	-	672	<0.1	-	27	-	-	-	11	67
South Pit 1 / 2	BY132-11	Sandstone (floor+)	MCM (GL)	-	-	17	90	<1	-	<1	-	4	20	18	-	15	-	278	<0.1	-	32	-	-	-	8	64
South Pit 1 / 2	BY132-12	Mudstone, carb.	MCM	-	-	9	70	1	-	<1	-	<2	10	25	-	20	-	434	<0.1	-	10	-	-	-	8	63
nth of West Pit 3	BY073-11	Cind. coal & Intrusives	MCM	-	-	6	140	<1	-	<1	-	8	20	56	-	9	-	1120	0.1	-	28	-	-	-	61	59
South Pit 1	BY082-13	Sandstone, f	Exmoor	3290	<5	8	-	-	<50	<1	8880	8	8	19	18100	16	4440	375	<0.1	<2	10	1100	<5	980	10	60
Location	**Sample ID**	**Material Description**	**Seam**	**Potential Coal Reject (roof, parting and floor)**																						
South Pit 1	PR C2	Siltstone & Mudstone	P Rider (r&f)	2840	<5	5	-	-	<50	<1	1070	5	3	32	9640	16	3010	50	<0.1	<2	21	1370	<5	1650	8	47
South Pit 1	P-r C4	Mudst.; Carb. Mudst.; minor Coal	P roof	3300	<5	<5	-	-	<50	<1	3900	7	10	34	6870	17	3200	86	<0.1	<2	39	1400	<5	1780	14	56
South Pit 1	E11102	Tuff (P Tuff)	P parting	5080	<5	<5	-	-	<50	<1	9530	<2	2	6	7570	35	7190	102	<0.1	<2	1	960	<5	1990	6	61
South Pit 1	P-f C3	Mudstone, slightly tuffaceous	P floor	3820	<5	<5	-	-	<50	1	1040	2	34	110	2380	11	1920	<5	0.2	<2	60	1430	<5	2130	<5	12
West Pit 1	GM-r C5	Siltstone & Mudstone	GM roof	2360	<5	8	-	-	<50	<1	630	2	9	48	1040	17	880	<5	<0.1	<2	26	820	<5	1120	11	31
South Pit 1	W12401	Cind. coal, stoney, carb. mudst.	GM roof	-	-	<5	<10	<1	-	<1	-	3	<2	6	-	<5	-	<5	<0.1	-	<2	-	-	-	17	<5
South Pit 1	E16001	Mudstone	GM roof	7160	<5	7	-	-	<50	<1	22500	17	11	39	29300	16	3100	707	0.2	<2	58	2400	<5	890	33	23
South Pit 1	X09301	Coal, dull, stoney, carb.	GM roof	-	-	<5	<10	<1	-	<1	-	<2	7	29	-	9	-	<5	<0.1	-	49	-	-	-	10	26
South Pit 1	W07601	Carb. mudstone - minor coal	GM roof	-	-	<5	30	<1	-	<1	-	<2	4	27	-	13	-	<5	<0.1	-	48	-	-	-	9	28
South Pit 1 / 2	BY132-6	Siltstone	GM roof	-	-	7	100	<1	-	<1	-	7	8	19	-	9	-	150	<0.1	-	33	-	-	-	21	32
West Pit 1	GM-f C6	Mudstone	GM floor	2190	<5	<5	-	-	<50	<1	690	2	7	41	870	19	1080	<5	<0.1	<2	19	990	<5	1230	5	16
South Pit 1	W12410	Cindered coal, stoney, mudstone	GM floor	-	-	54	<10	<1	-	<1	-	<2	11	39	-	12	-	<5	<0.1	-	10	-	-	-	<5	107
South Pit 1	W16009	Carb. mudst., some coal bands	GM floor	3980	<5	<5	-	-	<50	<1	590	3	4	36	880	19	1050	<5	<0.1	<2	6	1950	<5	950	6	51
South Pit 1 / 2	W07809	Tuffaceous mudstone and coal	GM floor	3260	<5	<5	-	-	<50	<1	510	3	10	37	3430	14	710	<5	<0.1	2	14	1260	<5	730	8	110
South Pit 1	X09310	Carb. mudstone - minor coal	GM floor	-	-	<5	150	<1	-	<1	-	<2	<2	32	-	13	-	<5	<0.1	-	<2	-	-	-	<5	66
South Pit 1	W07612	Carb. mudstone - minor coal	GM floor	-	-	10	280	<1	-	<1	-	<2	<2	28	-	11	-	<5	<0.1	-	7	-	-	-	<5	42
South Pit 1	E16003	Mudstone, slightly carb.	GL roof	6570	<5	<5	-	-	<50	<1	1870	5	6	31	820	16	1190	5	<0.1	<2	17	2570	<5	970	13	140
South Pit 1 / 2	W07810	Mudst., slightly tuffaceous; & Coal	GL roof	3710	<5	<5	-	-	<50	<1	560	5	9	38	1600	20	930	<5	0.1	<2	22	1780	<5	740	10	91

Notes: '<' indicates less than the laboratory limit of reporting. '-' indicates no result (no analysis) for the given element. Shaded cells indicates values that exceed the applied health-based trigger value

1. NEPC (1999)a. Guideline on investigation levels for soil. HIL(E); parks, recreation open space and playing fields. * Guideline level for Cr(VI) = 200 mg/kg. Guideline level for Cr(III) = 24% of total Cr.

Table B5. Soluble multi-element concentrations in 1:5 water extracts from spoil samples

			Spoil															
		Sample ID:	BY082-2	BY082-7	BYGW002-4	BY264-003	BY263-003	BY195-2	BY264-005	BY195-5	BY195-7	BY082-8	BY082-9	BY082-10	BY056-13	BY047-17	GL-s C1	BY082-13
		Formation / Zone:	Ter	Ter	FCCM	MCM	MCM	MCM	MCM	MCM	MCM	MCM	MCM	MCM	MCM-GM	MCM-GM	MCM	Exmoor
		Material description:	Claystone (highly weathered)	Basalt	Coal (un-named seam)	Claystone (highly weathered)	Mudstone (slightly weathered)	Claystone & Mudstone (moderately to highly weathered)	Siltstone	Sandstone, f	Siltstone	Mudstone	Sandstone, m-c	Mudstone, carb.	Intrusive (igneous)	Coal, cindered	Intrusive (igneous), some cindered coal; trace Py	Sandstone, f
Parameters	Laboratory Limit of Reporting	Guideline Levels[1]																
pH	0.1 pH unit	-	6.5	8.6	8.6	8.4	9.5	8.8	9.1	9.7	9.8	8.6	9.5	8.5	9.3	8.5	9.4	9.6
Electrical Conductivity	1 µS/cm	-	3,070	753	569	1,010	517	951	559	472	226	941	440	505	468	386	634	455
Total Alkalinity ($mgCaCO_3/L$)	1 mg/L	-	34	158	96	15	72	34	64	41	62	125	122	27	119	83	25	127
Bicarbonate Alkalinity ($mgCaCO_3/L$)	1 mg/L	-	34	133	96	15	47	34	58	30	39	125	101	27	77	83	16	85
Carbonate Alkalinity ($mgCaCO_3/L$)	1 mg/L	-	<1	25	<1	<1	25	<1	6	11	22	<1	21	<1	42	<1	8	42
Major Ions	All element concentrations in mg/L																	
Calcium (Ca)	2	1,000	50	4	<2	<2	<2	<2	<2	<2	<2	2	<2	<2	<2	12	<2	<2
Magnesium (Mg)	2	-	118	4	<2	<2	<2	2	<2	<2	<2	2	<2	<2	<2	4	<2	<2
Sodium (Na)	2	-	432	144	112	209	109	203	118	91	47	174	86	90	96	64	128	86
Potassium (K)	2	-	6	<2	6	<2	<2	4	<2	2	<2	8	4	4	2	4	4	2
Chloride (Cl)	2	-	976	80	30	315	121	298	118	108	21	234	42	60	56	4	54	44
Sulphate (SO_4)	2	1,000	46	86	156	33	13	39	52	12	8	30	22	94	20	126	76	28
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	<0.2	<0.2	<0.2	<0.2	<0.2
Antimony (Sb)	0.02	-	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (As)	0.02	0.5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	0.06	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	0.040
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	<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	<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	<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	<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	<0.02
Iron (Fe)	0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Lead (Pb)	0.02	0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Manganese (Mn)	0.02	-	0.020	<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
Mercury (Hg)	0.0001	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum (Mo)	0.02	0.15 / 0.01	<0.02	0.02	0.04	<0.02	<0.02	0.04	<0.02	0.02	0.03	0.02	<0.02	<0.02	<0.02	0.04	<0.02	0.04
Nickel (Ni)	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	<0.02
Selenium (Se)	0.02	0.02	0.02	<0.02	0.04	0.02	<0.02	0.04	<0.02	<0.02	<0.02	0.02	0.02	0.06	<0.02	0.04	<0.02	0.04
Vanadium (V)	0.02	- / 0.1	<0.02	0.18	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.04	<0.02	<0.02	<0.02
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	<0.02

Notes: < Indicates concentration less than the detection limit. Shaded cells indicate values that exceed one or more of the applied ANZECC/NEPC guideline values.

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

Table B6. Soluble multi-element concentrations in 1:5 water extracts from potential coal reject samples

			Potential Coal Reject										
		Sample ID:	PR C2	P-r C4	E11102	P-f C3	E16001	GM-r C5	GM-f C6	W07809	W16009	E16003	W07810
		Seam:	P rider	P roof	P part	P floor	GM roof	GM roof	GM floor	GM floor	GM floor	GL roof	GL roof
		Material description:	Siltstone and Mudstone	Mudstone with minor coal laminae, slightly tuffaceous & carb.	Tuff (P Tuff)	Mudstone, slightly tuffaceous	Mudstone	Siltstone and Mudstone	Mudstone	Tuffaceous mudstone and coal	Carb. mudst., some coal bands	Mudstone, slightly carb.	Mudst., slightly tuffaceous; & Coal
Parameters	Laboratory Limit of Reporting	Guideline Levels[1]											
pH	0.1 pH unit	-	9.2	7.4	9.3	7.8	8.4	9.0	9.3	8.2	9.0	9.3	8.5
Electrical Conductivity	1 µS/cm	-	551	1,240	486	1,240	1,070	366	378	308	230	386	279
Total Alkalinity ($mgCaCO_3/L$)	1 mg/L	-	7	10	98	5	56	21	28	52	30	135	48
Bicarbonate Alkalinity ($mgCaCO_3/L$)	1 mg/L	-	5	10	77	5	56	21	12	52	30	110	48
Carbonate Alkalinity ($mgCaCO_3/L$)	1 mg/L	-	2	<1	21	<1	<1	<1	16	<1	<1	25	<1
Major Ions	All element concentrations in mg/L												
Calcium (Ca)	2	1,000	<2	4	<2	3	43	<2	<2	<2	<2	<2	<2
Magnesium (Mg)	2	-	<2	6	<2	3	20	<2	<2	<2	<2	<2	<2
Sodium (Na)	2	-	110	290	92	242	119	72	70	47	37	76	54
Potassium (K)	2	-	4	12	<2	9	25	<2	<2	2	2	6	2
Chloride (Cl)	2	-	128	336	88	232	60	83	79	33	29	40	28
Sulphate (SO_4)	2	1,000	16	68	8	195	357	23	22	33	10	12	52
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
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
Arsenic (As)	0.02	0.5	0.300	<0.02	<0.02	<0.02	<0.02	0.35	0.15	<0.02	0.06	0.06	<0.02
Boron (B)	0.2	5	<0.2	0.4	<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
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
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
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
Iron (Fe)	0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Lead (Pb)	0.02	0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<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
Mercury (Hg)	0.0001	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum (Mo)	0.02	0.15 / 0.01	0.04	0.08	0.06	0.03	<0.02	0.04	0.02	0.06	0.03	<0.02	0.02
Nickel (Ni)	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
Selenium (Se)	0.02	0.02	0.02	<0.02	<0.02	<0.02	0.02	0.06	0.04	0.02	0.02	<0.02	0.04
Vanadium (V)	0.02	- / 0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	0.12	<0.02
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

Notes: < Indicates concentration less than the detection limit. Shaded cells indicate values that exceed one or more of the applied ANZECC/NEPC guideline values.

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

Table B7. Soluble multi-element concentrations in TCLP leachate (pH 7) from spoil and potential coal reject samples

				Major Ions						N-Species		Metals and Metalloids													
				Sulfate (SO4)	Chloride (Cl)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Nitrite (as NO2)	Nitrate (as NO3)	Arsenic (As)	Barium (Ba)	Boron (B)	Cadmium (Cd)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Manganese (Mn)	Mercury (Hg)	Nickel (Ni)	Selenium (Se)	Vanadium (V)	Zinc (Zn)
		Laboratory LOR:		1	1	1	1	1	1	0.01	0.01	0.1	0.1	0.1	0.05	0.1	0.1	0.1	0.1	0.1	0.001	0.1	0.05	0.1	0.1
		ANZECC/NEPC[1] Livestock drinking water level:		1000 / -	-	1000	-	-	-	30	400	0.5	-	5	0.01	1 / -	1	1 / 0.5	0.1	-	0.002	1	0.02	- / 0.1	20
Location	**Sample ID**	**Material Description**	**Fmt./Zone**	**Spoil** (all units mg/L)																					
nth of West Pit 3	BY073-1	Clay, silty (highly weath.)	Qa. & Ter.	32	32	40	21	**	<1	<0.01	0.22	<0.1	0.3	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
nth of West Pit 3	BY073-2	Claystone (highly weath.)	Tertiary	45	72	47	40	**	3	<0.01	0.27	<0.1	3.1	1.4	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	0.8
nth of West Pit 3	BY073-3	Basalt (weathered)	Tertiary	2	10	24	51	**	1	<0.01	0.09	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
nth of West Pit 3	BY073-4	Basalt	Tertiary	5	8	42	28	**	2	<0.01	0.22	<0.1	0.4	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
nth of West Pit 3	BY073-5	Quartzose loose sands	Tertiary	4	11	8	7	**	1	<0.01	0.09	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
nth of West Pit 3	BY073-6	Sandstone, vf-c	MCM	3	13	27	9	**	3	<0.01	0.62	<0.1	0.8	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
nth of West Pit 3	BY073-7	Sandstone, m-vc	MCM	4	7	25	7	**	3	<0.01	0.35	<0.1	1.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
nth of West Pit 3	BY073-8	Siltstone	MCM	2	9	33	12	**	8	<0.01	0.18	<0.1	4.8	1.2	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	0.8
nth of West Pit 3	BY073-9	Sandstone, f	MCM	1	3	16	5	**	2	<0.01	0.27	<0.1	1.0	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
nth of West Pit 3	BY073-10	Siltstone & Sandstone	MCM	2	4	20	6	**	4	<0.01	0.09	<0.1	1.5	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
nth of West Pit 3	BY073-11	Cind. coal & Intrusives	MCM	1	8	28	6	**	5	<0.01	0.09	<0.1	1.8	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
nth of West Pit 3	BY073-12	Cind. coal & Intrusives	MCM	<1	9	27	12	**	4	<0.01	0.09	<0.1	0.4	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
nth of West Pit 3	BY073-13	Cindered coal & Siltstone	MCM	1	5	20	8	**	5	<0.01	0.18	<0.1	1.6	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY067-1	Claystone (highly weath.)	Tertiary	2	34	7	14	**	<1	<0.01	0.09	<0.1	0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY067-2	Basalt (weathered)	Tertiary	3	21	17	29	**	2	<0.01	0.09	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY067-3	Sandstone, f-vc	MCM	3	14	23	17	**	3	<0.01	0.09	<0.1	0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY067-4	Sandstone, f-m	MCM	5	15	21	16	**	4	<0.01	0.09	<0.1	0.3	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY067-5	Siltstone & Sandstone	MCM	3	12	19	14	**	4	<0.01	0.09	<0.1	0.4	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
West Pit 1	BY054-1	Claystone (highly weath.)	Qa. & Ter.	12	89	21	22	**	2	<0.01	0.18	<0.1	2.9	1.4	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	0.5
West Pit 1	BY054-2	Claystone, sandy (slightly weath.)	Tertiary	22	206	11	17	**	3	<0.01	0.13	<0.1	2.8	1.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	1.2
West Pit 1	BY054-3	Claystone (weathered)	MCM	7	77	8	13	**	3	<0.01	0.09	<0.1	3.3	1.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	1.6
West Pit 1	BY054-4	Mudstone, Siltstone & Sandstone	MCM	4	17	17	14	**	2	<0.01	0.09	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
West Pit 1	BY054-5	Siltstone & Sandstone, vf-f	MCM	5	12	18	14	**	3	<0.01	0.09	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
West Pit 1	BY054-6	Mudstone & Siltstone	MCM	6	12	23	17	**	7	<0.01	0.09	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
West Pit 1	BY054-7	Mudstone, carb.	MCM	4	10	16	12	**	5	<0.01	0.09	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
West Pit 3	BY064-1	Clay & Basalt (extremely weath.)	Tertiary	10	12	4	12	**	3	<0.01	3.59	<0.1	0.5	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
West Pit 3	BY064-2	Basalt (extremely weath.)	Tertiary	2	11	4	12	**	<1	<0.01	0.09	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
West Pit 3	BY064-3	Basalt (highly weath.)	Tertiary	2	8	37	68	**	5	<0.01	0.22	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
West Pit 3	BY064-4	Basalt (slightly weath.)	Tertiary	2	3	23	18	**	3	<0.01	1.51	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
West Pit 3	BY064-5	Basalt	Tertiary	5	8	58	11	**	4	<0.01	0.09	<0.1	0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
West Pit 3	BY064-6	Claystone & Siltstone	Ter./MCM	2	6	33	7	**	6	<0.01	0.09	<0.1	3.0	1.2	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	0.6
West Pit 3	BY064-7	Sandst., Siltst. & Mudst., carb.	MCM	7	8	45	12	**	7	<0.01	0.09	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
West Pit 3	BY064-8	Mudstone & Siltstone	MCM	6	6	23	10	**	6	<0.01	0.09	<0.1	0.4	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-1	Soil (very highly weath.)	Quat.	2	20	48	8	**	<1	-	0.03	<0.1	0.4	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-2	Claystone (mod. to highly weath.)	Tertiary	7	41	34	32	**	<1	-	1	<0.1	0.5	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1

Table B7 (cont.). Soluble multi-element concentrations in TCLP leachate (pH 7) from spoil and potential coal reject samples

				Major Ions						N-Species		Metals and Metalloids													
				Sulfate (SO4)	Chloride (Cl)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Nitrite (as NO2)	Nitrate (as NO3)	Arsenic (As)	Barium (Ba)	Boron (B)	Cadmium (Cd)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Manganese (Mn)	Mercury (Hg)	Nickel (Ni)	Selenium (Se)	Vanadium (V)	Zinc (Zn)
Laboratory LOR:				1	1	1	1	1	1	0.01	0.01	0.1	0.1	0.1	0.05	0.1	0.1	0.1	0.1	0.1	0.001	0.1	0.05	0.1	0.1
ANZECC/NEPC[1] Livestock drinking water level:				1000 / -	-	1000	-	-	-	30	400	0.5	-	5	0.01	1 / -	1	1 / 0.5	0.1	-	0.002	1	0.02	- / 0.1	20
Location	**Sample ID**	**Material Description**	**Fmt./Zone**	**Spoil** (all units mg/L)																					
South Pit 1	BY127-3	Claystone (moderately weath.)	Tertiary	6	132	30	35	**	1	-	0.01	<0.1	0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-4	Claystone (highly weath.)	Tertiary	8	157	36	57	**	<1	-	1	<0.1	0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-5	Claystone (slightly weath.)	Tertiary	9	138	32	62	**	<1	-	1	<0.1	0.7	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-6	Basalt (highly weath.)	Tertiary	9	134	30	66	**	<1	-	1	<0.1	0.8	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-7	Basalt (highly weath.)	Tertiary	6	104	25	53	**	2	-	1	<0.1	0.4	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-8	Sandstone, f-m (moderately weath.)	MCM	4	37	23	41	**	1	-	1	<0.1	0.4	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-9	Sandstone, f-m (slightly weath.)	MCM	10	38	33	46	-	1	-	1	<0.1	0.4	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-10	Sandstone (clayey)	MCM	8	65	27	38	-	2	-	0.02	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	0.9	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-11	Siltstone	MCM	8	25	25	25	-	4	-	1	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	0.2	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-12	Sandstone, f-c	MCM	5	42	29	20	-	3	-	1	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-13	Siltstone	MCM	5	56	31	23	-	4	-	1	<0.1	0.3	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-14	Sandstone, f	MCM	8	94	30	29	-	4	-	1	<0.1	0.6	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-15	Sandstone, m-c	MCM	3	60	30	20	-	2	-	1	<0.1	0.3	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-16	Siltstone & Sandstone, f-c	MCM	6	60	30	25	-	4	-	1	<0.1	0.4	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-17	Siltstone	MCM	8	51	28	21	-	4	-	1	<0.1	1.8	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	0.2	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-18	Mudstone & Siltstone	MCM	6	41	20	22	-	6	-	1	<0.1	0.5	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	0.1	<0.05	<0.1	<0.1
South Pit 1	BY127-19	Sandstone, m-c	MCM	7	39	25	19	-	3	-	1	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	0.1	<0.05	<0.1	<0.1
South Pit 1 / 2	BY132-1	Soil (extremely weath.)	Quat.	14	21	38	3	**	<1	-	0.02	<0.1	0.3	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1 / 2	BY132-2	Sandstone, f-m (weathered)	MCM	11	94	9	18	**	2	-	0.01	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1 / 2	BY132-3	Sandstone, f-m (weath., near coal)	MCM (P)	9	104	16	26	**	3	-	1	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1 / 2	BY132-4	Sandstone, m	MCM	11	31	30	19	**	4	-	1	<0.1	0.4	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1 / 2	BY132-5	Siltstone	MCM	16	22	40	23	**	6	-	1	<0.1	0.8	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	0.1	<0.001	0.3	<0.05	<0.1	<0.1
South Pit 1 / 2	BY132-7	Mudstone & Siltstone (floor+)	MCM (GM)	10	24	22	20	**	6	-	1	<0.1	1.0	<0.1	<0.05	<0.1	0.1	<0.1	<0.1	<0.1	<0.001	0.2	<0.05	<0.1	<0.1
South Pit 1 / 2	BY132-8	Sandstone, m	MCM	11	23	36	23	**	5	-	1	<0.1	0.8	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1 / 2	BY132-9	Sandstone, silty	MCM	8	20	34	24	**	6	-	1	<0.1	0.2	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1 / 2	BY132-10	Mudstone & Siltstone (roof+)	MCM (GL)	8	25	19	20	**	5	-	1	<0.1	0.4	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	0.2	<0.001	<0.1	<0.05	<0.1	<0.1
South Pit 1 / 2	BY132-11	Sandstone (floor+)	MCM (GL)	11	22	20	22	**	4	-	1	<0.1	0.6	<0.1	<0.05	<0.1	0.1	<0.1	<0.1	<0.1	<0.001	0.2	<0.05	<0.1	<0.1
South Pit 1 / 2	BY132-12	Mudstone, carb.	MCM	6	18	34	27	**	6	-	1	<0.1	0.3	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	<0.1
General Location	**Sample ID**	**Material Description**	**Seam**	**Potential Coal Reject (roof and floor)** (all units mg/L)																					
South Pit 1	W12401	Cind. coal, stoney, carb. mudst.	GM roof	1	16	7	4	<1	3	<0.01	0.22	<0.1	1.5	1.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	1.2
South Pit 1 / 2	BY132-6	Siltstone	GM roof	8	32	19	13	**	6	-	0.01	<0.1	0.6	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	0.2	<0.05	<0.1	<0.1
South Pit 1	W07601	Carb. mudstone - minor coal	GM roof	13	32	14	18	<1	5	<0.01	0.18	<0.1	2.2	1.3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	0.3	0.08	<0.1	1.5
South Pit 1	X09301	Coal, dull, stoney, carb.	GM roof	7	16	13	17	<1	5	<0.01	0.18	<0.1	1.9	1.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	0.2	<0.05	<0.1	1.3
South Pit 1	W12410	Cindered coal, stoney, mudstone	GM floor	11	15	9	10	<1	4	<0.01	0.22	<0.1	1.3	0.7	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	1.1
South Pit 1	X09310	Carb. mudstone - minor coal	GM floor	4	22	14	18	<1	7	<0.01	0.31	<0.1	2.6	1.4	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	1.4
South Pit 1	W07612	Carb. mudstone - minor coal	GM floor	6	17	15	18	<1	8	<0.01	0.18	<0.1	4.0	1.2	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.1	<0.05	<0.1	1.3

Notes: '<' indicates less than the laboratory limit of reporting. '-' indicates no result (no analysis) for the given element. ** indicates Na value is not representative due to NaOH added to buffer to pH 7.

2. The first guideline level shown refers to ANZECC (2000) and the second to NEPC (1999b) Livestock drinking water guidelines e.g. 0.15 / 0.01. Where the two guidelines limits for a given element are in agreement, only one value is shown.

A 'dash' represents no trigger value provided for this element.

Appendix C

Evaluation and Interpretation of Geochemical Test Data

C1. 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 sulfur 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:

$$FeS_2 + \tfrac{15}{4} O_2 + \tfrac{7}{2} H_2O \text{ ---> } Fe(OH)_3 + 2\ H_2SO_4$$

According to this reaction, the maximum potential acidity (MPA) of a sample containing one per cent sulfur as pyrite would be 30.6 kg H_2SO_4/t; *ie*. 30.6 kg of acid generated per tonne of rock.

The chemical components of the acid generation process consist of the above sulfide oxidation reaction and acid neutralisation, 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.

Determination of pH and Electrical Conductivity

pH and electrical conductivity (EC) are measured (and reported) on 1:5 weight/weight water extract. This gives an indication of the inherent acidity and salinity of the mineral waste material when initially exposed in an emplacement area.

Total sulfur (S), chromium-reducible sulfur (S_{CR}) and Maximum Potential Acidity (MPA)

Total sulfur concentration is determined by the LECO high temperature combustion method.

The total sulfur is typically used to calculate the Maximum Potential Acidity (MPA), which is based on the assumption that all sulfur is present as reactive pyrite.

If a more accurate estimate of the MPA is required, this can be achieved by determining pyritic sulfur and other sulfide forms directly, such as by determining S_{CR}. S_{CR} is determined by the reduction of inorganic sulfur in a hot acidic chromous chloride solution, where evolved H_2S is carried in nitrogen gas and trapped in a zinc acetate trapping solution as zinc sulfide. This solution is then titrated with iodine. For the Project, S_{CR} was used instead of total sulfur to determine MPA where S_{CR} data was available.

Acid neutralising capacity (ANC)

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

Net acid producing potential (NAPP)

Calculated from the MPA and ANC results. The NAPP represents the balance between a samples inherent capacity to generate acid (MPA) and neutralise acid (ANC). If the MPA is greater than the ANC (*ie*. a net excess of acidity) then the NAPP is positive. If the MPA is less than the ANC (*ie*. a net excess of alkalinity) then the NAPP is negative. A strongly positive NAPP result generally indicates that a sample is PAF, whereas a strongly negative NAPP generally indicates that a sample is NAF. By Australian convention, the NAPP result is expressed in units of kg H_2SO_4/t sample.

C2. Assessment of Element Enrichment and Solubility

In mineralised areas, including coal deposits, 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 at concentrations that may be of environmental concern with

respect to surface water quality and revegetation. The samples are typically analysed for the following elements, although the actual suite of elements tested is project specific:

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

The assay result for each element is compared to either average background concentrations to evaluate any potential concerns related to rock emplacement or process residue facility operation and final rehabilitation, or compared to soil quality guidelines where applicable.

Elements identified as enriched may not necessarily be a concern for revegetation, drainage water quality, or public health but their significance should be evaluated. Similarly, because an element is not enriched does not mean it will never be a concern, because under some conditions (*eg.* low pH) the geochemical behaviour of common environmentally important elements such as Al, Cu, Cd, Fe and Zn increases significantly.

Water extracts or leaching tests can be used to determine the element solubilities under the existing pH conditions of the sample (*eg*. bottle leaching tests) or under changing conditions (*eg*. kinetic leach column tests). Where applicable, element concentrations in water extracts or leachates have been compared with applied water quality guidelines to determine their potential environmental significance.

Appendix D

Laboratory Certificates of Analysis

CERTIFICATE OF ANALYSIS

Work Order	: **EB1118517**	Page	: 1 of 12
Amendment	: **1**		
Client	: **BYERWEN COAL P/L**	Laboratory	: Environmental Division Brisbane
Contact	: JORDAN BACHMANN	Contact	: Customer Services
Address	: 40 CREEK STREET BRISBANE QLD 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: jbachmann@qcoal.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3002 2900	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3002 2999	Facsimile	: +61 7 3243 7218
Project	: BYERWEN	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 09-SEP-2011
Sampler	: JORDAN BACHMANN	Issue Date	: 21-OCT-2011
Site	: ----		
		No. of samples received	: 46
Quote number	: BN/135/11 V7	No. of samples analysed	: 13

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

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*
Dianne Blane	Laboratory Supervisor	Newcastle
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Myles.Clark	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics

General Comments

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

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

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

- **ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.**
- **EG005T (Total Metals) Sample EB1118517 - 025 (BY073-1) & 035 (BY073-11) show poor duplicate results due to sample heterogeneity. Confirmed by visual inspection.**
- **EG005T (Total Metals) Sample EB1118517 - 026 (BY073-2) shows poor matrix spike recovery due to sample heterogeneity. Confirmed by visual inspection.**
- **TCLP conducted at pH 7 as per client request. Sodium Hydroxide used to buffer pH to required level.**
- **This report has been amended and re-released to allow additional pertinent comments to be added to the report. All analysis results are as per the previous report.**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY073-1	BY073-2	BY073-3	BY073-4	BY073-5
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1118517-025	EB1118517-026	EB1118517-027	EB1118517-028	EB1118517-029
EA150: Particle Sizing								
+75µm	----	1	%	**14**	----	----	----	----
+150µm	----	1	%	**10**	----	----	----	----
+300µm	----	1	%	**7**	----	----	----	----
+425µm	----	1	%	**5**	----	----	----	----
+600µm	----	1	%	**4**	----	----	----	----
+1180µm	----	1	%	**1**	----	----	----	----
+2.36mm	----	1	%	<1	----	----	----	----
+4.75mm	----	1	%	<1	----	----	----	----
+9.5mm	----	1	%	<1	----	----	----	----
+19.0mm	----	1	%	<1	----	----	----	----
+37.5mm	----	1	%	<1	----	----	----	----
+75.0mm	----	1	%	<1	----	----	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**7.5**	**8.1**	**8.9**	**8.9**	**8.8**
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Absorption Ratio	----	0.01	-	**10.7**	**23.4**	**32.6**	**24.4**	**9.94**
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	**-4.8**	**-31.2**	**-33.1**	**-54.2**	**-1.6**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1150**	**1950**	**283**	**360**	**181**
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**8.3**	**9.0**	**9.3**	**9.0**	**6.0**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	**0.2**
EA011A: Net Acid Generation - Sequential								
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	**0.2**
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	**8.3**	**9.0**	**9.3**	**9.0**	**6.0**
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	**0.2**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**6.0**	**32.4**	**33.1**	**55.4**	**5.3**
^ ANC as CaCO3	----	0.1	% CaCO3	**0.6**	**3.3**	**3.4**	**5.6**	**0.5**
Fizz Rating	----	0	Fizz Unit	**0**	**1**	**2**	**2**	**0**
EA055: Moisture Content								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY073-1	BY073-2	BY073-3	BY073-4	BY073-5
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1118517-025	EB1118517-026	EB1118517-027	EB1118517-028	EB1118517-029
EA055: Moisture Content - Continued								
^ Moisture Content (dried @ 103°C)	----	1.0	%	9.4	15.9	10.4	4.5	1.1
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	60	----	----	----	----
Silt (2-60 µm)	----	1	%	23	----	----	----	----
Sand (0.06-2.00 mm)	----	1	%	17	----	----	----	----
Gravel (>2mm)	----	1	%	<1	----	----	----	----
Cobbles (>6cm)	----	1	%	<1	----	----	----	----
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	<1	136	276	47
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	1140	1290	60	120	70
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	1000	1030	180	190	120
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.04	0.04	<0.01	0.04	0.12
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	1200	2580	150	30	80
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	50	70	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg	30	60	<10	<10	<10
Sodium	7440-23-5	10	mg/kg	1150	2250	360	490	190
Potassium	7440-09-7	10	mg/kg	<10	20	<10	<10	10
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg	70	20	30	130	50
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	74	14	154	41	3
Cobalt	7440-48-4	2	mg/kg	33	46	31	22	3
Copper	7440-50-8	5	mg/kg	18	25	32	41	<5
Lead	7439-92-1	5	mg/kg	<5	10	<5	<5	<5
Manganese	7439-96-5	5	mg/kg	480	223	517	444	34
Nickel	7440-02-0	2	mg/kg	44	62	130	93	3
Vanadium	7440-62-2	5	mg/kg	74	36	84	29	7
Zinc	7440-66-6	5	mg/kg	24	35	88	52	10
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY073-1	BY073-2	BY073-3	BY073-4	BY073-5
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1118517-025	EB1118517-026	EB1118517-027	EB1118517-028	EB1118517-029
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	**1.0**	**2.3**	**0.4**	**0.4**	**0.1**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	**1.0**	**2.3**	**0.4**	**0.4**	**0.1**
EK085M: Sulfide as S2-								
^ Sulfide as S	----	0.01	%	<0.01	<0.01	<0.01	**0.03**	**0.12**
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**0.23**	**0.07**	<0.02	**0.02**	**0.22**
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	**0.24**	**0.31**	**0.04**	**0.13**	**0.26**
EP003TIC: Total inorganic Carbon (TIC) in Soil								
^ Total Inorganic Carbon	----	0.02	%	<0.02	**0.24**	**0.04**	**0.11**	**0.04**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY073-6	BY073-7	BY073-8	BY073-9	BY073-10
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1118517-030	EB1118517-031	EB1118517-032	EB1118517-033	EB1118517-034
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.8**	**9.7**	**9.6**	**9.7**	**9.7**
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Absorption Ratio	----	0.01	-	**12.2**	**21.0**	**26.0**	**21.4**	**30.4**
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	**-90.6**	**-70.2**	**-28.8**	**-115**	**-72.6**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**248**	**296**	**271**	**313**	**325**
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**10.4**	**9.8**	**8.7**	**6.8**	**8.9**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011A: Net Acid Generation - Sequential								
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	**10.4**	**9.8**	**8.7**	**6.8**	**8.9**
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**92.8**	**71.7**	**32.5**	**116**	**74.7**
^ ANC as CaCO3	----	0.1	% CaCO3	**9.5**	**7.3**	**3.3**	**11.9**	**7.6**
Fizz Rating	----	0	Fizz Unit	**2**	**2**	**2**	**3**	**2**
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**1.4**	**2.3**	**3.3**	**4.0**	**2.7**
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	**533**	**544**	**487**	**573**	**608**
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**80**	**400**	**90**	**110**	**110**
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	**120**	<100	<100	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.07**	**0.05**	**0.12**	**0.03**	**0.07**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**10**	**20**	**20**	**20**	**20**
ED093S: Soluble Major Cations								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY073-6	BY073-7	BY073-8	BY073-9	BY073-10
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1118517-030	EB1118517-031	EB1118517-032	EB1118517-033	EB1118517-034
ED093S: Soluble Major Cations - Continued								
Calcium	7440-70-2	10	mg/kg	<10	<10	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg	<10	<10	<10	<10	<10
Sodium	7440-23-5	10	mg/kg	270	350	310	370	380
Potassium	7440-09-7	10	mg/kg	20	30	10	20	20
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	12	8	13	<5
Barium	7440-39-3	10	mg/kg	50	120	180	140	200
Beryllium	7440-41-7	1	mg/kg	<1	<1	1	<1	<1
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	2	5	3	22	6
Cobalt	7440-48-4	2	mg/kg	13	14	7	13	13
Copper	7440-50-8	5	mg/kg	19	12	47	28	33
Lead	7439-92-1	5	mg/kg	7	10	15	11	14
Manganese	7439-96-5	5	mg/kg	473	611	717	1290	1230
Nickel	7440-02-0	2	mg/kg	18	22	21	23	29
Vanadium	7440-62-2	5	mg/kg	21	20	14	39	22
Zinc	7440-66-6	5	mg/kg	49	38	60	66	53
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	0.4	0.4	0.3	0.3	0.4
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.4	0.4	0.3	0.3	0.4
EK085M: Sulfide as S2-								
^ Sulfide as S	----	0.01	%	0.07	0.05	0.12	0.03	0.07
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.63	1.01	2.65	0.34	1.23
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	2.36	2.53	4.26	2.98	3.52
EP003TIC: Total inorganic Carbon (TIC) in Soil								
^ Total Inorganic Carbon	----	0.02	%	1.73	1.52	1.61	2.64	2.29

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BY073-11	BY073-12	BY073-13	----	----
				Client sampling date / time	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	----	----
					EB1118517-035	EB1118517-036	EB1118517-037	----	----
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.7**	**9.4**	**9.7**	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Absorption Ratio	----	0.01	-		**26.8**	**14.7**	**28.7**	----	----
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-47.4**	**-69.8**	**-12.0**	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**336**	**286**	**227**	----	----
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit		**9.1**	**9.4**	**8.4**	----	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	----	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	----	----
EA011A: Net Acid Generation - Sequential									
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	----	----
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	----	----
EA011S: pH OX (Stage 1)									
pH OX (Stage 1)	----	0.1	pH Unit		**9.1**	**9.2**	**8.4**	----	----
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	----	----
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	----	----
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**56.6**	**72.3**	**22.1**	----	----
^ ANC as CaCO3	----	0.1	% CaCO3		**5.8**	**7.4**	**2.2**	----	----
Fizz Rating	----	0	Fizz Unit		**2**	**2**	**1**	----	----
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1.0	%		**2.2**	**2.7**	**3.2**	----	----
ED037: Alkalinity									
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		**676**	**444**	**415**	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		**100**	**20**	**60**	----	----
ED040T : Total Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	100	mg/kg		<100	<100	<100	----	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.30**	**0.08**	**0.33**	----	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		**20**	**10**	**20**	----	----
ED093S: Soluble Major Cations									

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BY073-11	BY073-12	BY073-13	----	----
				Client sampling date / time	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	----	----
					EB1118517-035	EB1118517-036	EB1118517-037	----	----
ED093S: Soluble Major Cations - Continued									
Calcium	7440-70-2	10	mg/kg		<10	<10	<10	----	----
Magnesium	7439-95-4	10	mg/kg		<10	<10	<10	----	----
Sodium	7440-23-5	10	mg/kg		**390**	**350**	**290**	----	----
Potassium	7440-09-7	10	mg/kg		**20**	**20**	<10	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		**6**	<5	<5	----	----
Barium	7440-39-3	10	mg/kg		**140**	**80**	**130**	----	----
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg		**8**	**3**	<2	----	----
Cobalt	7440-48-4	2	mg/kg		**20**	**13**	**9**	----	----
Copper	7440-50-8	5	mg/kg		**56**	**56**	**34**	----	----
Lead	7439-92-1	5	mg/kg		**9**	<5	**12**	----	----
Manganese	7439-96-5	5	mg/kg		**1120**	**800**	**276**	----	----
Nickel	7440-02-0	2	mg/kg		**28**	**26**	**22**	----	----
Vanadium	7440-62-2	5	mg/kg		**61**	**58**	**7**	----	----
Zinc	7440-66-6	5	mg/kg		**59**	**91**	**81**	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		**0.1**	<0.1	<0.1	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	----	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N (Sol.)	----	0.1	mg/kg		**0.3**	**0.2**	**0.4**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg		**0.3**	**0.2**	**0.4**	----	----
EK085M: Sulfide as S2-									
^ Sulfide as S	----	0.01	%		**0.30**	**0.08**	**0.33**	----	----
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		**4.94**	**4.47**	**20.2**	----	----
EP003TC: Total Carbon (TC) in Soil									
Total Carbon	----	0.02	%		**7.44**	**5.79**	**20.8**	----	----
EP003TIC: Total inorganic Carbon (TIC) in Soil									
^ Total Inorganic Carbon	----	0.02	%		**2.50**	**1.32**	**0.60**	----	----

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY073-1	BY073-2	BY073-3	BY073-4	BY073-5
				Client sampling date / time: 04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00
				EB1118517-025	EB1118517-026	EB1118517-027	EB1118517-028	EB1118517-029
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**32**	**45**	**2**	**5**	**4**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**32**	**72**	**10**	**8**	**11**
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**40**	**47**	**24**	**42**	**8**
Magnesium	7439-95-4	1	mg/L	**21**	**40**	**51**	**28**	**7**
Sodium	7440-23-5	1	mg/L	**1240**	**1830**	**1430**	**1840**	**1600**
Potassium	7440-09-7	1	mg/L	<1	**3**	**1**	**2**	**1**
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	**0.3**	**3.1**	**0.2**	**0.4**	**0.2**
Boron	7440-42-8	0.1	mg/L	<0.1	**1.4**	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	**0.8**	<0.1	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.05**	**0.06**	**0.02**	**0.05**	**0.02**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.05**	**0.06**	**0.02**	**0.05**	**0.02**

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY073-6	BY073-7	BY073-8	BY073-9	BY073-10
				Client sampling date / time: 04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00
				EB1118517-030	EB1118517-031	EB1118517-032	EB1118517-033	EB1118517-034
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**3**	**4**	**2**	**1**	**2**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**13**	**7**	**9**	**3**	**4**
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**27**	**25**	**33**	**16**	**20**
Magnesium	7439-95-4	1	mg/L	**9**	**7**	**12**	**5**	**6**
Sodium	7440-23-5	1	mg/L	**1680**	**1430**	**1600**	**826**	**1060**
Potassium	7440-09-7	1	mg/L	**3**	**3**	**8**	**2**	**4**
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	**0.8**	**1.2**	**4.8**	**1.0**	**1.5**
Boron	7440-42-8	0.1	mg/L	<0.1	<0.1	**1.2**	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	**0.8**	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.14**	**0.08**	**0.04**	**0.06**	**0.02**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.14**	**0.08**	**0.04**	**0.06**	**0.02**

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY073-11	BY073-12	BY073-13	----	----
				Client sampling date / time: 04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	----	----
				EB1118517-035	EB1118517-036	EB1118517-037	----	----
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**1**	<1	**1**	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**8**	**9**	**5**	----	----
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**28**	**27**	**20**	----	----
Magnesium	7439-95-4	1	mg/L	**6**	**12**	**8**	----	----
Sodium	7440-23-5	1	mg/L	**1670**	**1550**	**1130**	----	----
Potassium	7440-09-7	1	mg/L	**5**	**4**	**5**	----	----
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Barium	7440-39-3	0.1	mg/L	**1.8**	**0.4**	**1.6**	----	----
Boron	7440-42-8	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	----	----
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	----	----
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	<0.1	----	----
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.02**	**0.02**	**0.04**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.02**	**0.02**	**0.04**	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1118644**	Page	: 1 of 27
Amendment	: **1**		
Client	: **BYERWEN COAL P/L**	Laboratory	: Environmental Division Sydney
Contact	: JORDAN BACHMANN	Contact	: Client Services
Address	: 40 CREEK STREET BRISBANE QLD 4000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jbachmann@qcoal.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 07 3002 2900	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3002 2999	Facsimile	: +61-2-8784 8500
Project	: BYERWEN	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 25-SEP-2011
Sampler	: JB	Issue Date	: 24-OCT-2011
Site	: ----		
		No. of samples received	: 31
Quote number	: BN/135/11 V7	No. of samples analysed	: 31

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*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Dianne Blane	Laboratory Supervisor	Newcastle
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Myles.Clark	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Myles.Clark	Acid Sulfate Soils Supervisor	Brisbane Inorganics
Myles.Clark	Acid Sulfate Soils Supervisor	Stafford Minerals - AY
Raymond Commodor	Instrument Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics

General Comments

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

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

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

- **ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.**
- **ED093C: As NaOH was used to leach samples ES1118644-21 to 31 to produce a pH of 7, all samples have been invalidated for Na.**
- **EG005T: Poor precision and poor spike recovery was obtained for Chromium on sample ES1118644-1 due to sample heterogeneity. Results have been confirmed by re-extraction and reanalysis.**
- **EG005T: Poor precision was obtained for Manganese on sample ES1118644-11 due to sample heterogeneity. Results have been confirmed by re-extraction and reanalysis.**
- **EN35: As per client instructions, fluid # 1(Acetic acid and NaOH buffer) was adjusted to pH = 7 using NaOH and used as leaching solution.**
- **This report has been amended and re-released to allow additional pertinent comments to be added to the report. All analysis results are as per the previous report.**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY132-1 Client sampling date / time: 24-AUG-2011 15:00 ES1118644-001	BY132-2 24-AUG-2011 15:00 ES1118644-002	BY132-3 24-AUG-2011 15:00 ES1118644-003	BY132-4 24-AUG-2011 15:00 ES1118644-004	BY132-5 24-AUG-2011 15:00 ES1118644-005
EA150: Particle Sizing								
+75µm	----	1	%	**54**	----	----	----	----
+150µm	----	1	%	**43**	----	----	----	----
+300µm	----	1	%	**22**	----	----	----	----
+425µm	----	1	%	**14**	----	----	----	----
+600µm	----	1	%	**10**	----	----	----	----
+1180µm	----	1	%	**6**	----	----	----	----
+2.36mm	----	1	%	**2**	----	----	----	----
+4.75mm	----	1	%	<1	----	----	----	----
+9.5mm	----	1	%	<1	----	----	----	----
+19.0mm	----	1	%	<1	----	----	----	----
+37.5mm	----	1	%	<1	----	----	----	----
+75.0mm	----	1	%	<1	----	----	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.0**	**8.4**	**8.1**	**9.4**	**8.9**
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Absorption Ratio	----	0.01	-	**0.98**	**23.3**	**25.3**	**10.5**	**14.5**
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	**-1.4**	**-3.6**	**-8.8**	**-102**	**-55.1**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**58**	**987**	**1240**	**460**	**419**
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**7.1**	**7.2**	**8.1**	**9.1**	**8.5**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011A: Net Acid Generation - Sequential								
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	**7.1**	**7.2**	**8.1**	**9.1**	**8.5**
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**1.4**	**3.6**	**8.8**	**102**	**56.0**
^ ANC as CaCO3	----	0.1	% CaCO3	**0.1**	**0.4**	**0.9**	**10.4**	**5.7**
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**3**	**2**
EA055: Moisture Content								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY132-1 Client sampling date / time: 24-AUG-2011 15:00 ES1118644-001	BY132-2 24-AUG-2011 15:00 ES1118644-002	BY132-3 24-AUG-2011 15:00 ES1118644-003	BY132-4 24-AUG-2011 15:00 ES1118644-004	BY132-5 24-AUG-2011 15:00 ES1118644-005
EA055: Moisture Content - Continued								
^ Moisture Content (dried @ 103°C)	----	1.0	%	9.9	11.8	12.1	9.0	15.4
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	33	----	----	----	----
Silt (2-60 µm)	----	1	%	9	----	----	----	----
Sand (0.06-2.00 mm)	----	1	%	56	----	----	----	----
Gravel (>2mm)	----	1	%	2	----	----	----	----
Cobbles (>6cm)	----	1	%	<1	----	----	----	----
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	<1	<1	173	126
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	730	160	130	140	260
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	20	60	100	120	400
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	0.01	0.03
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	100	1760	2280	640	580
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	90	<10	<10	<10	10
Magnesium	7439-95-4	10	mg/kg	30	<10	20	<10	10
Sodium	7440-23-5	10	mg/kg	30	1260	1250	540	420
Potassium	7440-09-7	10	mg/kg	40	<10	<10	10	10
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	6	10	<5	12
Barium	7440-39-3	10	mg/kg	40	90	40	140	190
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	180	77	44	23	16
Cobalt	7440-48-4	2	mg/kg	16	30	56	15	19
Copper	7440-50-8	5	mg/kg	17	43	49	19	36
Lead	7439-92-1	5	mg/kg	9	9	13	10	14
Manganese	7439-96-5	5	mg/kg	338	393	668	748	828
Nickel	7440-02-0	2	mg/kg	36	99	100	44	101
Vanadium	7440-62-2	5	mg/kg	89	134	96	51	19
Zinc	7440-66-6	5	mg/kg	18	108	158	69	61
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	1.8	<0.1	<0.1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY132-1	BY132-2	BY132-3	BY132-4	BY132-5
				Client sampling date / time: 24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00
				ES1118644-001	ES1118644-002	ES1118644-003	ES1118644-004	ES1118644-005
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	2.3	0.2	0.1	<0.1	0.2
EK085M: Sulfide as S2-								
^ Sulfide as S	----	0.01	%	<0.01	<0.01	<0.01	<0.01	0.02
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.25	0.05	0.66	0.22	0.59
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	0.33	0.07	0.73	2.51	2.17
EP003TIC: Total inorganic Carbon (TIC) in Soil								
^ Total Inorganic Carbon	----	0.02	%	0.08	0.02	0.07	2.29	1.58

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY132-6	BY132-7	BY132-8	BY132-9	BY132-10
				Client sampling date / time: 24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00
				ES1118644-006	ES1118644-007	ES1118644-008	ES1118644-009	ES1118644-010
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.4**	**9.0**	**9.7**	**9.6**	**9.4**
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Absorption Ratio	----	0.01	-	**22.7**	**23.7**	**15.4**	**13.9**	**18.1**
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	**1.2**	**26.6**	**-64.5**	**-26.5**	**-18.1**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**479**	**310**	**319**	**288**	**252**
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**7.3**	**2.5**	**8.5**	**8.5**	**8.7**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	**18.0**	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	**24.6**	<0.1	<0.1	<0.1
EA011A: Net Acid Generation - Sequential								
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	**24.5**	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	<0.1	**29.6**	<0.1	<0.1	<0.1
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	**7.3**	**2.5**	**8.5**	**8.5**	**8.7**
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	**17.6**	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	**20.2**	<0.1	<0.1	<0.1
EA011S: pH OX (Stage 2)								
pH OX (Stage 2)	----	0.1	pH Unit	----	**3.8**	----	----	----
NAG at pH 4.5 (Stage 2)	----	0.1	kg H2SO4/t	----	**5.9**	----	----	----
NAG at pH 7.0 (Stage 2)	----	0.1	kg H2SO4/t	----	**7.4**	----	----	----
EA011S: pH OX (Stage 3)								
pH OX (Stage 3)	----	0.1	pH Unit	----	**4.0**	----	----	----
NAG at pH 4.5 (Stage 3)	----	0.1	kg H2SO4/t	----	**1.0**	----	----	----
NAG at pH 7.0 (Stage 3)	----	0.1	kg H2SO4/t	----	**2.0**	----	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**10.7**	**6.4**	**65.1**	**28.3**	**20.9**
^ ANC as CaCO3	----	0.1	% CaCO3	**1.1**	**0.6**	**6.6**	**2.9**	**2.1**
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**2**	**2**	**1**
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**13.8**	**10.1**	**10.7**	**10.5**	**10.3**
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	<1	**225**	**174**	**76**
ED040: Sulfur as SO4 2-								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY132-6	BY132-7	BY132-8	BY132-9	BY132-10
				Client sampling date / time: 24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00
				ES1118644-006	ES1118644-007	ES1118644-008	ES1118644-009	ES1118644-010
ED040: Sulfur as SO4 2- - Continued								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	130	140	130
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	140	70	110	140	160
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.39	1.08	0.02	0.06	0.09
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	770	350	270	230	220
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg	10	<10	<10	<10	10
Sodium	7440-23-5	10	mg/kg	380	310	450	460	360
Potassium	7440-09-7	10	mg/kg	10	<10	<10	<10	10
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	7	<5	10	9	6
Barium	7440-39-3	10	mg/kg	100	50	120	90	80
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	1
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	7	<2	6	7	8
Cobalt	7440-48-4	2	mg/kg	8	6	24	15	10
Copper	7440-50-8	5	mg/kg	19	33	26	39	38
Lead	7439-92-1	5	mg/kg	9	16	12	17	17
Manganese	7439-96-5	5	mg/kg	150	36	707	875	1350
Nickel	7440-02-0	2	mg/kg	33	14	35	28	20
Vanadium	7440-62-2	5	mg/kg	21	6	24	20	31
Zinc	7440-66-6	5	mg/kg	32	97	68	69	56
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
EK085M: Sulfide as S2-								
^ Sulfide as S	----	0.01	%	0.39	1.08	0.02	0.06	0.08
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	19.1	6.26	0.42	0.83	5.99
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	19.4	6.33	1.84	2.27	6.64
EP003TIC: Total inorganic Carbon (TIC) in Soil								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BY132-6	BY132-7	BY132-8	BY132-9	BY132-10
				Client sampling date / time	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00
					ES1118644-006	ES1118644-007	ES1118644-008	ES1118644-009	ES1118644-010
EP003TIC: Total inorganic Carbon (TIC) in Soil - Continued									
^ Total Inorganic Carbon	----	0.02	%		**0.30**	**0.07**	**1.42**	**1.44**	**0.65**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY132-11 Client sampling date / time: 24-AUG-2011 15:00 ES1118644-011	BY132-12 24-AUG-2011 15:00 ES1118644-012	BY127-1 24-AUG-2011 15:00 ES1118644-013	BY127-2 24-AUG-2011 15:00 ES1118644-014	BY127-3 24-AUG-2011 15:00 ES1118644-015
EA150: Particle Sizing								
+75µm	----	1	%	----	----	**58**	----	----
+150µm	----	1	%	----	----	**46**	----	----
+300µm	----	1	%	----	----	**20**	----	----
+425µm	----	1	%	----	----	**10**	----	----
+600µm	----	1	%	----	----	**6**	----	----
+1180µm	----	1	%	----	----	**3**	----	----
+2.36mm	----	1	%	----	----	**1**	----	----
+4.75mm	----	1	%	----	----	<1	----	----
+9.5mm	----	1	%	----	----	<1	----	----
+19.0mm	----	1	%	----	----	<1	----	----
+37.5mm	----	1	%	----	----	<1	----	----
+75.0mm	----	1	%	----	----	<1	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**7.2**	**7.2**	**8.9**	**7.5**	**9.3**
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Absorption Ratio	----	0.01	-	**16.2**	**22.0**	**0.27**	**20.8**	**13.1**
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	**4.9**	**-33.1**	**-56.0**	**-4.6**	**-9.4**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**799**	**33**	**100**	**735**	**1930**
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**7.5**	**8.5**	**9.2**	**8.6**	**8.3**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011A: Net Acid Generation - Sequential								
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	**7.5**	**8.5**	**9.2**	**8.6**	**8.3**
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	**38.0**	**56.0**	**5.2**	**9.4**
^ ANC as CaCO3	----	0.1	% CaCO3	<0.1	**3.9**	**5.7**	**0.5**	**1.0**
Fizz Rating	----	0	Fizz Unit	**0**	**2**	**2**	**0**	**0**
EA055: Moisture Content								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BY132-11	BY132-12	BY127-1	BY127-2	BY127-3
				Client sampling date / time	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00
					ES1118644-011	ES1118644-012	ES1118644-013	ES1118644-014	ES1118644-015
EA055: Moisture Content - Continued									
^ Moisture Content (dried @ 103°C)	----	1.0	%		12.2	9.5	10.8	26.4	14.2
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%		----	----	33	----	----
Silt (2-60 µm)	----	1	%		----	----	6	----	----
Sand (0.06-2.00 mm)	----	1	%		----	----	60	----	----
Gravel (>2mm)	----	1	%		----	----	1	----	----
Cobbles (>6cm)	----	1	%		----	----	<1	----	----
ED037: Alkalinity									
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		19	161	<1	177	<1
ED040: Sulfur as SO4 2-									
Sulfate as SO4 2-	14808-79-8	100	mg/kg		180	100	180	180	160
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		180	170	20	220	120
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.16	0.16	<0.01	0.02	<0.01
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		410	150	120	1070	3380
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		10	<10	50	<10	100
Magnesium	7439-95-4	10	mg/kg		20	<10	30	20	170
Sodium	7440-23-5	10	mg/kg		620	300	20	780	1960
Potassium	7440-09-7	10	mg/kg		160	<10	<10	<10	<10
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		17	9	<5	<5	<5
Barium	7440-39-3	10	mg/kg		90	70	70	90	20
Beryllium	7440-41-7	1	mg/kg		<1	1	<1	<1	1
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		4	<2	242	78	162
Cobalt	7440-48-4	2	mg/kg		20	10	20	16	29
Copper	7440-50-8	5	mg/kg		18	25	30	37	43
Lead	7439-92-1	5	mg/kg		15	20	8	<5	<5
Manganese	7439-96-5	5	mg/kg		278	434	542	175	207
Nickel	7440-02-0	2	mg/kg		32	10	53	41	98
Vanadium	7440-62-2	5	mg/kg		8	8	94	60	87
Zinc	7440-66-6	5	mg/kg		64	63	20	20	67
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY132-11	BY132-12	BY127-1	BY127-2	BY127-3
				Client sampling date / time: 24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00
				ES1118644-011	ES1118644-012	ES1118644-013	ES1118644-014	ES1118644-015
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	**0.2**	<0.1	**3.4**	<0.1	**0.5**
EK085M: Sulfide as S2-								
^ Sulfide as S	----	0.01	%	**0.15**	**0.16**	<0.01	**0.01**	<0.01
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**3.44**	**3.06**	**0.55**	**0.12**	**0.09**
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	**4.07**	**4.48**	**1.31**	**0.16**	**0.14**
EP003TIC: Total inorganic Carbon (TIC) in Soil								
^ Total Inorganic Carbon	----	0.02	%	**0.63**	**1.42**	**0.76**	**0.04**	**0.05**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY127-4	BY127-5	BY127-6	BY127-7	BY127-8
				Client sampling date / time: 24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00
				ES1118644-016	ES1118644-017	ES1118644-018	ES1118644-019	ES1118644-020
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.5**	**8.3**	**8.5**	**8.2**	**8.3**
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Absorption Ratio	----	0.01	-	**13.2**	**22.7**	**23.1**	**17.3**	**21.0**
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	**-11.2**	**-10.3**	**-4.0**	**-6.7**	**-10.0**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**2020**	**1740**	**2400**	**1620**	**635**
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**8.4**	**8.4**	**7.7**	**7.9**	**7.7**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011A: Net Acid Generation - Sequential								
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	**8.4**	**8.4**	**7.7**	**7.9**	**7.7**
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**11.2**	**10.9**	**4.0**	**7.0**	**10.0**
^ ANC as CaCO3	----	0.1	% CaCO3	**1.1**	**1.1**	**0.4**	**0.7**	**1.0**
Fizz Rating	----	0	Fizz Unit	**0**	**1**	**0**	**0**	**0**
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**20.5**	**22.4**	**22.2**	**15.8**	**48.4**
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	<1	<1	<1	<1
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**150**	**180**	**240**	**120**	**170**
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**150**	**170**	**210**	**90**	**90**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	**0.02**	<0.01	**0.01**	<0.01
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**3670**	**3180**	**4390**	**2800**	**1440**
ED093S: Soluble Major Cations								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY127-4	BY127-5	BY127-6	BY127-7	BY127-8
				Client sampling date / time: 24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00
				ES1118644-016	ES1118644-017	ES1118644-018	ES1118644-019	ES1118644-020
ED093S: Soluble Major Cations - Continued								
Calcium	7440-70-2	10	mg/kg	**50**	**20**	**30**	**20**	<10
Magnesium	7439-95-4	10	mg/kg	**110**	**40**	**80**	**50**	<10
Sodium	7440-23-5	10	mg/kg	**2540**	**2500**	**3200**	**2020**	**1030**
Potassium	7440-09-7	10	mg/kg	<10	<10	<10	<10	<10
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	**8**
Barium	7440-39-3	10	mg/kg	<10	**370**	**190**	**100**	**210**
Beryllium	7440-41-7	1	mg/kg	**2**	**3**	**4**	**3**	**1**
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**229**	**148**	**244**	**185**	**105**
Cobalt	7440-48-4	2	mg/kg	**94**	**142**	**172**	**36**	**59**
Copper	7440-50-8	5	mg/kg	**68**	**110**	**66**	**82**	**51**
Lead	7439-92-1	5	mg/kg	<5	**9**	**8**	**14**	**8**
Manganese	7439-96-5	5	mg/kg	**262**	**841**	**656**	**73**	**722**
Nickel	7440-02-0	2	mg/kg	**343**	**550**	**662**	**186**	**182**
Vanadium	7440-62-2	5	mg/kg	**96**	**84**	**90**	**71**	**136**
Zinc	7440-66-6	5	mg/kg	**213**	**415**	**407**	**82**	**114**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	**0.2**	**0.2**
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	<0.1	**0.3**	**0.2**
EK085M: Sulfide as S2-								
^ Sulfide as S	----	0.01	%	<0.01	**0.01**	<0.01	<0.01	<0.01
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**0.20**	**0.02**	<0.02	**0.29**	**0.07**
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	**0.33**	**0.04**	**0.02**	**0.30**	**0.07**
EP003TIC: Total inorganic Carbon (TIC) in Soil								
^ Total Inorganic Carbon	----	0.02	%	**0.13**	**0.02**	**0.02**	<0.02	<0.02

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY127-9 Client sampling date / time: 24-AUG-2011 15:00 ES1118644-021	BY127-10 24-AUG-2011 15:00 ES1118644-022	BY127-11 24-AUG-2011 15:00 ES1118644-023	BY127-12 24-AUG-2011 15:00 ES1118644-024	BY127-13 24-AUG-2011 15:00 ES1118644-025
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.7**	**8.9**	**9.0**	**9.1**	**9.4**
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Absorption Ratio	----	0.01	-	**25.6**	**16.1**	**27.3**	**16.0**	**19.7**
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	**-36.4**	**-14.5**	**-16.2**	**-193**	**-79.2**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**709**	**839**	**480**	**691**	**1040**
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**8.4**	**7.7**	**8.1**	**9.2**	**8.7**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011A: Net Acid Generation - Sequential								
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	**8.4**	**7.7**	**8.1**	**9.2**	**8.7**
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**36.4**	**16.0**	**17.7**	**200**	**80.1**
^ ANC as CaCO3	----	0.1	% CaCO3	**3.7**	**1.6**	**1.8**	**20.4**	**8.2**
Fizz Rating	----	0	Fizz Unit	**1**	**1**	**1**	**3**	**2**
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**30.2**	**25.5**	**16.8**	**17.5**	**17.1**
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	**180**	**70**	**40**	**189**	**198**
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**110**	**120**	**120**	<100	**100**
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**100**	**210**	**160**	**110**	**140**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	**0.05**	**0.05**	**0.24**	**0.03**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**1130**	**1840**	**660**	**1090**	**1760**
ED093S: Soluble Major Cations								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY127-9	BY127-10	BY127-11	BY127-12	BY127-13
				Client sampling date / time: 24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00
				ES1118644-021	ES1118644-022	ES1118644-023	ES1118644-024	ES1118644-025
ED093S: Soluble Major Cations - Continued								
Calcium	7440-70-2	10	mg/kg	<10	30	<10	10	20
Magnesium	7439-95-4	10	mg/kg	<10	40	<10	20	30
Sodium	7440-23-5	10	mg/kg	830	1310	730	880	1330
Potassium	7440-09-7	10	mg/kg	<10	10	10	10	20
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	8	<5	<5	10
Barium	7440-39-3	10	mg/kg	110	20	70	100	150
Beryllium	7440-41-7	1	mg/kg	<1	1	1	<1	1
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	120	108	23	28	16
Cobalt	7440-48-4	2	mg/kg	31	39	16	14	14
Copper	7440-50-8	5	mg/kg	26	61	65	21	43
Lead	7439-92-1	5	mg/kg	<5	10	16	8	13
Manganese	7439-96-5	5	mg/kg	493	2500	808	752	1160
Nickel	7440-02-0	2	mg/kg	79	66	40	23	31
Vanadium	7440-62-2	5	mg/kg	120	112	55	64	46
Zinc	7440-66-6	5	mg/kg	82	124	72	66	61
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.2	<0.1	1.7
EK085M: Sulfide as S2-								
^ Sulfide as S	----	0.01	%	<0.01	0.05	0.05	0.24	0.03
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.13	0.50	1.09	0.35	0.89
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	0.41	0.91	1.50	3.58	2.83
EP003TIC: Total inorganic Carbon (TIC) in Soil								
^ Total Inorganic Carbon	----	0.02	%	0.28	0.41	0.41	3.23	1.94

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY127-14	BY127-15	BY127-16	BY127-17	BY127-18
				Client sampling date / time: 24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00
				ES1118644-026	ES1118644-027	ES1118644-028	ES1118644-029	ES1118644-030
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.3**	**9.4**	**9.6**	**9.5**	**9.6**
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Absorption Ratio	----	0.01	-	**22.8**	**14.0**	**18.0**	**15.1**	**26.9**
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	**-67.2**	**-105**	**-105**	**-21.6**	**-5.8**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1160**	**653**	**782**	**657**	**643**
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**8.5**	**9.3**	**8.8**	**8.7**	**8.4**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011A: Net Acid Generation - Sequential								
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	**8.5**	**9.3**	**8.8**	**8.7**	**8.4**
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**68.1**	**105**	**106**	**23.4**	**7.6**
^ ANC as CaCO3	----	0.1	% CaCO3	**6.9**	**10.7**	**10.8**	**2.4**	**0.8**
Fizz Rating	----	0	Fizz Unit	**2**	**3**	**3**	**1**	**0**
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**19.2**	**9.2**	**14.3**	**10.8**	**13.6**
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	**98**	**132**	**126**	**37**	**133**
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**160**	<100	<100	**150**	<100
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**140**	**40**	**80**	**180**	**180**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.03**	**0.01**	**0.03**	**0.06**	**0.06**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**2130**	**890**	**1260**	**1000**	**990**
ED093S: Soluble Major Cations								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY127-14	BY127-15	BY127-16	BY127-17	BY127-18
				Client sampling date / time: 24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00	24-AUG-2011 15:00
				ES1118644-026	ES1118644-027	ES1118644-028	ES1118644-029	ES1118644-030
ED093S: Soluble Major Cations - Continued								
Calcium	7440-70-2	10	mg/kg	**20**	**10**	**10**	**20**	<10
Magnesium	7439-95-4	10	mg/kg	**20**	**20**	**10**	**30**	<10
Sodium	7440-23-5	10	mg/kg	**1590**	**620**	**870**	**650**	**450**
Potassium	7440-09-7	10	mg/kg	**20**	**10**	**10**	**10**	<10
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**5**	**6**	**7**	**9**	**5**
Barium	7440-39-3	10	mg/kg	**120**	**140**	**110**	**180**	**40**
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	**1**	**1**
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**6**	**24**	**13**	**14**	**3**
Cobalt	7440-48-4	2	mg/kg	**12**	**21**	**20**	**12**	**3**
Copper	7440-50-8	5	mg/kg	**38**	**17**	**30**	**45**	**48**
Lead	7439-92-1	5	mg/kg	**15**	**10**	**12**	**15**	**23**
Manganese	7439-96-5	5	mg/kg	**82**	**1050**	**1020**	**870**	**28**
Nickel	7440-02-0	2	mg/kg	**30**	**53**	**67**	**58**	**12**
Vanadium	7440-62-2	5	mg/kg	**14**	**67**	**40**	**32**	**8**
Zinc	7440-66-6	5	mg/kg	**78**	**56**	**60**	**70**	**91**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	**0.1**
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	**0.6**	**0.1**	**0.2**
EK085M: Sulfide as S2-								
^ Sulfide as S	----	0.01	%	**0.02**	**0.01**	**0.03**	**0.06**	**0.06**
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**0.67**	**0.44**	**0.84**	**1.32**	**2.08**
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	**1.78**	**2.65**	**3.22**	**2.94**	**2.24**
EP003TIC: Total inorganic Carbon (TIC) in Soil								
^ Total Inorganic Carbon	----	0.02	%	**1.11**	**2.21**	**2.38**	**1.62**	**0.16**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY127-19	----	----	----	----
				Client sampling date / time: 24-AUG-2011 15:00	----	----	----	----
				ES1118644-031	----	----	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.7**	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Absorption Ratio	----	0.01	-	**13.9**	----	----	----	----
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	**-35.5**	----	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**531**	----	----	----	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**8.6**	----	----	----	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	----	----	----	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	----	----	----	----
EA011A: Net Acid Generation - Sequential								
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	----	----	----	----
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	<0.1	----	----	----	----
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	**8.6**	----	----	----	----
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	----	----	----	----
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	----	----	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**36.4**	----	----	----	----
^ ANC as CaCO3	----	0.1	% CaCO3	**3.7**	----	----	----	----
Fizz Rating	----	0	Fizz Unit	**1**	----	----	----	----
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**10.0**	----	----	----	----
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	**152**	----	----	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**100**	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**160**	----	----	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.03**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**780**	----	----	----	----
ED093S: Soluble Major Cations								

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BY127-19	----	----	----	----
				Client sampling date / time	24-AUG-2011 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1118644-031	----	----	----	----
ED093S: Soluble Major Cations - Continued									
Calcium	7440-70-2	10	mg/kg		<10	----	----	----	----
Magnesium	7439-95-4	10	mg/kg		<10	----	----	----	----
Sodium	7440-23-5	10	mg/kg		**390**	----	----	----	----
Potassium	7440-09-7	10	mg/kg		<10	----	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		**7**	----	----	----	----
Barium	7440-39-3	10	mg/kg		**120**	----	----	----	----
Beryllium	7440-41-7	1	mg/kg		<1	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		**6**	----	----	----	----
Cobalt	7440-48-4	2	mg/kg		**11**	----	----	----	----
Copper	7440-50-8	5	mg/kg		**17**	----	----	----	----
Lead	7439-92-1	5	mg/kg		**10**	----	----	----	----
Manganese	7439-96-5	5	mg/kg		**698**	----	----	----	----
Nickel	7440-02-0	2	mg/kg		**18**	----	----	----	----
Vanadium	7440-62-2	5	mg/kg		**21**	----	----	----	----
Zinc	7440-66-6	5	mg/kg		**57**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N (Sol.)	----	0.1	mg/kg		**0.5**	----	----	----	----
EK085M: Sulfide as S2-									
^ Sulfide as S	----	0.01	%		**0.03**	----	----	----	----
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		**0.28**	----	----	----	----
EP003TC: Total Carbon (TC) in Soil									
Total Carbon	----	0.02	%		**2.04**	----	----	----	----
EP003TIC: Total inorganic Carbon (TIC) in Soil									
^ Total Inorganic Carbon	----	0.02	%		**1.76**	----	----	----	----

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY132-1	BY132-2	BY132-3	BY132-4	BY132-5
				Client sampling date / time: 05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00
				ES1118644-001	ES1118644-002	ES1118644-003	ES1118644-004	ES1118644-005
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**14**	**11**	**9**	**11**	**16**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**21**	**94**	**104**	**31**	**22**
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**38**	**9**	**16**	**30**	**40**
Magnesium	7439-95-4	1	mg/L	**3**	**18**	**26**	**19**	**23**
Sodium	7440-23-5	1	mg/L	**2370**	**2530**	**2510**	**2450**	**2460**
Potassium	7440-09-7	1	mg/L	<1	**2**	**3**	**4**	**6**
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	**0.3**	**0.2**	**0.2**	**0.4**	**0.8**
Boron	7440-42-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	**0.1**
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	**0.3**
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.02**	**0.01**	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID	BY132-6	BY132-7	BY132-8	BY132-9	BY132-10
				Client sampling date / time	05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00
					ES1118644-006	ES1118644-007	ES1118644-008	ES1118644-009	ES1118644-010
ED040C: Leachable Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**8**	**10**	**11**	**8**	**8**
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		**32**	**24**	**23**	**20**	**25**
ED093C: Leachable Major Cations									
Calcium	7440-70-2	1	mg/L		**19**	**22**	**36**	**34**	**19**
Magnesium	7439-95-4	1	mg/L		**13**	**20**	**23**	**24**	**20**
Sodium	7440-23-5	1	mg/L		**2540**	**2480**	**2500**	**2460**	**2500**
Potassium	7440-09-7	1	mg/L		**6**	**6**	**5**	**6**	**5**
EG005C: Leachable Metals by ICPAES									
Arsenic	7440-38-2	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L		**0.6**	**1.0**	**0.8**	**0.2**	**0.4**
Boron	7440-42-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L		<0.1	**0.1**	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	**0.2**
Nickel	7440-02-0	0.1	mg/L		**0.2**	**0.2**	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EG035C: Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N	14797-55-8	0.01	mg/L		**0.01**	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY132-11	BY132-12	BY127-1	BY127-2	BY127-3
				Client sampling date / time: 05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00
				ES1118644-011	ES1118644-012	ES1118644-013	ES1118644-014	ES1118644-015
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**11**	**6**	**2**	**7**	**6**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**22**	**18**	**20**	**41**	**132**
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**20**	**34**	**48**	**34**	**30**
Magnesium	7439-95-4	1	mg/L	**22**	**27**	**8**	**32**	**35**
Sodium	7440-23-5	1	mg/L	**2470**	**2490**	**2410**	**2380**	**2510**
Potassium	7440-09-7	1	mg/L	**4**	**6**	<1	<1	**1**
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	**0.6**	**0.3**	**0.4**	**0.5**	**0.1**
Boron	7440-42-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	**0.1**	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	**0.2**	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	**0.03**	<0.01	**0.01**

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY127-4	BY127-5	BY127-6	BY127-7	BY127-8
				Client sampling date / time: 05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00	05-OCT-2011 12:00
				ES1118644-016	ES1118644-017	ES1118644-018	ES1118644-019	ES1118644-020
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**8**	**9**	**9**	**6**	**4**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**157**	**138**	**134**	**104**	**37**
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**36**	**32**	**30**	**25**	**23**
Magnesium	7439-95-4	1	mg/L	**57**	**62**	**66**	**53**	**41**
Sodium	7440-23-5	1	mg/L	**2460**	**2470**	**2420**	**2410**	**2450**
Potassium	7440-09-7	1	mg/L	<1	<1	<1	**2**	**1**
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	**0.1**	**0.7**	**0.8**	**0.4**	**0.4**
Boron	7440-42-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY127-9	BY127-10	BY127-11	BY127-12	BY127-13
				Client sampling date / time: 06-OCT-2011 12:00	06-OCT-2011 12:00	06-OCT-2011 12:00	06-OCT-2011 12:00	06-OCT-2011 12:00
				ES1118644-021	ES1118644-022	ES1118644-023	ES1118644-024	ES1118644-025
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**10**	**8**	**8**	**5**	**5**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**38**	**65**	**25**	**42**	**56**
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**33**	**27**	**25**	**29**	**31**
Magnesium	7439-95-4	1	mg/L	**46**	**38**	**25**	**20**	**23**
Potassium	7440-09-7	1	mg/L	**1**	**2**	**4**	**3**	**4**
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	**0.4**	**0.2**	**0.2**	**0.2**	**0.3**
Boron	7440-42-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	**0.9**	**0.2**	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	**0.02**	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY127-14	BY127-15	BY127-16	BY127-17	BY127-18
				Client sampling date / time: 06-OCT-2011 12:00	06-OCT-2011 12:00	06-OCT-2011 12:00	06-OCT-2011 12:00	06-OCT-2011 12:00
				ES1118644-026	ES1118644-027	ES1118644-028	ES1118644-029	ES1118644-030
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**8**	**3**	**6**	**8**	**6**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**94**	**60**	**60**	**51**	**41**
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**30**	**30**	**30**	**28**	**20**
Magnesium	7439-95-4	1	mg/L	**29**	**20**	**25**	**21**	**22**
Potassium	7440-09-7	1	mg/L	**4**	**2**	**4**	**4**	**6**
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	**0.6**	**0.3**	**0.4**	**1.8**	**0.5**
Boron	7440-42-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	**0.2**	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	**0.1**
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY127-19	----	----	----	----
				Client sampling date / time: 06-OCT-2011 12:00	----	----	----	----
				ES1118644-031	----	----	----	----
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**7**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**39**	----	----	----	----
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**25**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**19**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**3**	----	----	----	----
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	----	----	----	----
Barium	7440-39-3	0.1	mg/L	**0.2**	----	----	----	----
Boron	7440-42-8	0.1	mg/L	<0.1	----	----	----	----
Cadmium	7440-43-9	0.05	mg/L	<0.05	----	----	----	----
Chromium	7440-47-3	0.1	mg/L	<0.1	----	----	----	----
Cobalt	7440-48-4	0.1	mg/L	<0.1	----	----	----	----
Copper	7440-50-8	0.1	mg/L	<0.1	----	----	----	----
Lead	7439-92-1	0.1	mg/L	<0.1	----	----	----	----
Manganese	7439-96-5	0.1	mg/L	<0.1	----	----	----	----
Nickel	7440-02-0	0.1	mg/L	**0.1**	----	----	----	----
Selenium	7782-49-2	0.05	mg/L	<0.05	----	----	----	----
Vanadium	7440-62-2	0.1	mg/L	<0.1	----	----	----	----
Zinc	7440-66-6	0.1	mg/L	<0.1	----	----	----	----
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EB1118698**	Page	: 1 of 14
Amendment	: **1**		
Client	: **BYERWEN COAL P/L**	Laboratory	: Environmental Division Brisbane
Contact	: JORDAN BACHMANN	Contact	: Customer Services
Address	: 40 CREEK STREET BRISBANE QLD 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: jbachmann@qcoal.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3002 2900	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3002 2999	Facsimile	: +61 7 3243 7218
Project	: BYERWEN	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 13-SEP-2011
Sampler	: Dave Morwood	Issue Date	: 21-OCT-2011
Site	: ----		
		No. of samples received	: 34
Quote number	: BN/135/11 V7	No. of samples analysed	: 20

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
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Myles.Clark	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils

General Comments

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

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

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

- **ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.**
- **EG005T (Total Metals) Sample EB1118517 - 025 & 035 show poor duplicate results due to sample heterogeneity. Confirmed by visual inspection.**
- **EG005T (Total Metals) Sample EB1118517 - 026 shows poor matrix spike recovery due to sample heterogeneity. Confirmed by visual inspection.**
- **EG005T (Total Metals) Sample EB1118698 - 022 (BY054-3) & 032 (BY064-6) show poor duplicate results due to sample heterogeneity. Confirmed by visual inspection.**
- **TCLP conducted at pH 7 as per client request. Sodium Hydroxide used to buffer pH to required level.**
- **This report has been amended and re-released to allow additional pertinent comments to be added to the report. All analysis results are as per the previous report.**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY067 -1	BY067-2	BY067-3	BY067-4	BY067-5
				Client sampling date / time: 09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00
				EB1118698-015	EB1118698-016	EB1118698-017	EB1118698-018	EB1118698-019
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.3	8.8	9.4	9.4	9.5
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Absorption Ratio	----	0.01	-	16.1	34.4	17.5	20.1	32.4
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	-6.8	-22.9	-81.4	-64.5	-33.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	730	691	466	400	387
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.1	9.2	10.0	9.9	9.0
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011A: Net Acid Generation - Sequential								
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	7.1	9.2	10.0	9.9	9.0
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	6.8	22.9	81.4	66.3	35.6
^ ANC as CaCO3	----	0.1	% CaCO3	0.7	2.3	8.3	6.8	3.6
Fizz Rating	----	0	Fizz Unit	0	1	2	2	2
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	15.9	13.0	4.6	2.5	3.7
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	166	339	287	363
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	80	120	90	150	100
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	170	160	130	130	100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	0.06	0.07
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	1280	830	320	250	190
ED093S: Soluble Major Cations								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BY067 -1	BY067-2	BY067-3	BY067-4	BY067-5
				Client sampling date / time	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00
					EB1118698-015	EB1118698-016	EB1118698-017	EB1118698-018	EB1118698-019
ED093S: Soluble Major Cations - Continued									
Calcium	7440-70-2	10	mg/kg		<10	<10	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg		<10	<10	<10	<10	<10
Sodium	7440-23-5	10	mg/kg		**840**	**860**	**510**	**430**	**430**
Potassium	7440-09-7	10	mg/kg		<10	<10	**30**	**30**	**20**
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	**5**	**7**
Barium	7440-39-3	10	mg/kg		**50**	**100**	**80**	**60**	**60**
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		**103**	**118**	**17**	**11**	**6**
Cobalt	7440-48-4	2	mg/kg		**40**	**28**	**17**	**15**	**19**
Copper	7440-50-8	5	mg/kg		**19**	**38**	**17**	**20**	**26**
Lead	7439-92-1	5	mg/kg		<5	<5	**7**	**9**	**20**
Manganese	7439-96-5	5	mg/kg		**280**	**486**	**893**	**595**	**672**
Nickel	7440-02-0	2	mg/kg		**107**	**125**	**39**	**39**	**27**
Vanadium	7440-62-2	5	mg/kg		**79**	**72**	**43**	**20**	**11**
Zinc	7440-66-6	5	mg/kg		**51**	**84**	**60**	**52**	**67**
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	----	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N (Sol.)	----	0.1	mg/kg		**0.3**	**0.3**	**0.4**	**0.2**	**0.3**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg		**0.3**	**0.3**	**0.4**	**0.2**	**0.3**
EK085M: Sulfide as S2-									
^ Sulfide as S	----	0.01	%		<0.01	<0.01	<0.01	**0.06**	**0.07**
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		**0.06**	**0.04**	**0.43**	**1.15**	**3.45**
EP003TC: Total Carbon (TC) in Soil									
Total Carbon	----	0.02	%		**0.06**	**0.06**	**2.49**	**2.57**	**4.48**
EP003TIC: Total inorganic Carbon (TIC) in Soil									
^ Total Inorganic Carbon	----	0.02	%		<0.02	**0.02**	**2.06**	**1.42**	**1.03**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY054-1	BY054-2	BY054-3	BY054-4	BY054-5
				Client sampling date / time: 09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00
				EB1118698-020	EB1118698-021	EB1118698-022	EB1118698-023	EB1118698-024
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.4**	**7.7**	**8.0**	**9.9**	**9.8**
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Absorption Ratio	----	0.01	-	**24.0**	**19.0**	**43.6**	**23.5**	**24.0**
EA009: Nett Acid Production Potential								
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	**-8.6**	**-3.0**	**-1.3**	**-126**	**-85.6**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1760**	**3130**	**557**	**528**	**454**
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**9.0**	**6.4**	**7.1**	**10.3**	**9.3**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	**0.9**	<0.1	<0.1	<0.1
EA011A: Net Acid Generation - Sequential								
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	<0.1	**0.9**	<0.1	<0.1	<0.1
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	**9.0**	**6.4**	**7.1**	**10.3**	**9.3**
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	**0.9**	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**9.2**	**3.6**	**2.2**	**127**	**86.8**
^ ANC as CaCO3	----	0.1	% CaCO3	**0.9**	**0.4**	**0.2**	**12.9**	**8.8**
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**3**	**2**
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**9.2**	**15.0**	**7.6**	**2.7**	**4.1**
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	<1	<1	**440**	**477**
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**340**	**490**	**160**	**140**	**150**
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**420**	**560**	**260**	**130**	**160**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.02**	**0.02**	**0.03**	**0.03**	**0.04**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**2670**	**5090**	**2480**	**440**	**260**
ED093S: Soluble Major Cations								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY054-1	BY054-2	BY054-3	BY054-4	BY054-5
				Client sampling date / time: 09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00
				EB1118698-020	EB1118698-021	EB1118698-022	EB1118698-023	EB1118698-024
ED093S: Soluble Major Cations - Continued								
Calcium	7440-70-2	10	mg/kg	**50**	**120**	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg	**50**	**220**	**20**	<10	<10
Sodium	7440-23-5	10	mg/kg	**2090**	**3830**	**1320**	**580**	**520**
Potassium	7440-09-7	10	mg/kg	<10	<10	**20**	**20**	**20**
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	**8**
Barium	7440-39-3	10	mg/kg	**50**	**20**	**80**	**60**	**50**
Beryllium	7440-41-7	1	mg/kg	<1	<1	**2**	<1	<1
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**98**	**36**	**23**	**18**	**8**
Cobalt	7440-48-4	2	mg/kg	**18**	<2	**62**	**16**	**14**
Copper	7440-50-8	5	mg/kg	**30**	<5	**49**	**16**	**29**
Lead	7439-92-1	5	mg/kg	<5	<5	**7**	**7**	**12**
Manganese	7439-96-5	5	mg/kg	**433**	**22**	**248**	**700**	**694**
Nickel	7440-02-0	2	mg/kg	**43**	**5**	**97**	**34**	**36**
Vanadium	7440-62-2	5	mg/kg	**114**	**51**	**56**	**49**	**23**
Zinc	7440-66-6	5	mg/kg	**24**	<5	**84**	**61**	**74**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	**0.9**	**0.4**	**0.3**	**0.2**	**0.2**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	**0.9**	**0.4**	**0.3**	**0.2**	**0.2**
EK085M: Sulfide as S2-								
^ Sulfide as S	----	0.01	%	<0.01	<0.01	**0.02**	**0.02**	**0.03**
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**0.18**	**0.02**	**0.05**	**0.21**	**0.87**
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	**0.24**	**0.03**	**0.06**	**2.50**	**2.74**
EP003TIC: Total inorganic Carbon (TIC) in Soil								
^ Total Inorganic Carbon	----	0.02	%	**0.06**	<0.02	<0.02	**2.29**	**1.87**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BY054-6	BY054-7	BY064-1	BY064-2	BY064-3
				Client sampling date / time	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00
					EB1118698-025	EB1118698-026	EB1118698-027	EB1118698-028	EB1118698-029
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.6**	**9.7**	**5.8**	**6.8**	**8.6**
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Absorption Ratio	----	0.01	-		**20.4**	**12.5**	**7.71**	**9.88**	**6.89**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-38.9**	**-93.7**	**-2.2**	**-4.4**	**-29.2**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**389**	**293**	**271**	**291**	**63**
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit		**9.0**	**8.6**	**6.5**	**8.2**	**8.8**
NAG (pH 4.5)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t		<0.1	<0.1	**0.3**	<0.1	<0.1
EA011A: Net Acid Generation - Sequential									
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t		<0.1	<0.1	**0.3**	<0.1	<0.1
EA011S: pH OX (Stage 1)									
pH OX (Stage 1)	----	0.1	pH Unit		**9.0**	**8.8**	**6.5**	**8.2**	**8.8**
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t		<0.1	<0.1	**0.3**	<0.1	<0.1
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**39.8**	**105**	**2.8**	**4.4**	**29.2**
^ ANC as CaCO3	----	0.1	% CaCO3		**4.0**	**10.8**	**0.3**	**0.4**	**3.0**
Fizz Rating	----	0	Fizz Unit		**2**	**3**	**0**	**0**	**1**
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1.0	%		**4.1**	**2.7**	**9.6**	**14.1**	**15.3**
ED037: Alkalinity									
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		**371**	**334**	<1	<1	**11**
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		**200**	**220**	**210**	**30**	**40**
ED040T : Total Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	100	mg/kg		**120**	**110**	**360**	**100**	<100
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.03**	**0.37**	**0.02**	<0.01	<0.01
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		**190**	**110**	**290**	**480**	**40**
ED093S: Soluble Major Cations									

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BY054-6	BY054-7	BY064-1	BY064-2	BY064-3
				Client sampling date / time	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00
					EB1118698-025	EB1118698-026	EB1118698-027	EB1118698-028	EB1118698-029
ED093S: Soluble Major Cations - Continued									
Calcium	7440-70-2	10	mg/kg		<10	<10	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg		<10	<10	<10	<10	<10
Sodium	7440-23-5	10	mg/kg		**420**	**330**	**280**	**340**	**80**
Potassium	7440-09-7	10	mg/kg		**30**	**30**	**10**	<10	<10
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		**9**	**7**	<5	<5	<5
Barium	7440-39-3	10	mg/kg		**30**	**50**	**60**	**130**	**360**
Beryllium	7440-41-7	1	mg/kg		<1	<1	<1	<1	<1
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		**6**	**11**	**105**	**90**	**132**
Cobalt	7440-48-4	2	mg/kg		**18**	**15**	**6**	**52**	**146**
Copper	7440-50-8	5	mg/kg		**25**	**63**	**12**	**35**	**75**
Lead	7439-92-1	5	mg/kg		**37**	<5	<5	<5	<5
Manganese	7439-96-5	5	mg/kg		**1490**	**1120**	**114**	**1290**	**2550**
Nickel	7440-02-0	2	mg/kg		**46**	**39**	**22**	**57**	**394**
Vanadium	7440-62-2	5	mg/kg		**23**	**38**	**105**	**93**	**69**
Zinc	7440-66-6	5	mg/kg		**105**	**36**	**8**	**18**	**181**
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	----	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N (Sol.)	----	0.1	mg/kg		**0.2**	**0.2**	**3.5**	**0.4**	**0.9**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg		**0.2**	**0.2**	**3.5**	**0.4**	**0.9**
EK085M: Sulfide as S2-									
^ Sulfide as S	----	0.01	%		**0.03**	**0.37**	<0.01	<0.01	<0.01
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		**0.50**	**0.19**	**0.03**	<0.02	<0.02
EP003TC: Total Carbon (TC) in Soil									
Total Carbon	----	0.02	%		**2.95**	**2.26**	**0.04**	**0.02**	<0.02
EP003TIC: Total inorganic Carbon (TIC) in Soil									
^ Total Inorganic Carbon	----	0.02	%		**2.45**	**2.07**	<0.02	**0.02**	<0.02

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BY064-4	BY064-5	BY064-6	BY064-7	BY064-8
				Client sampling date / time	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00
					EB1118698-030	EB1118698-031	EB1118698-032	EB1118698-033	EB1118698-034
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.1**	**9.0**	**9.4**	**9.6**	**9.6**
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Absorption Ratio	----	0.01	-		**14.2**	**19.9**	**19.7**	**17.1**	**19.7**
EA009: Nett Acid Production Potential									
^ Net Acid Production Potential	----	0.5	kg H2SO4/t		**-110**	**-35.3**	**-9.3**	**-92.5**	**-53.2**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**367**	**344**	**321**	**337**	**306**
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit		**9.9**	**9.1**	**8.2**	**9.1**	**8.9**
NAG (pH 4.5)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	<0.1	<0.1
EA011A: Net Acid Generation - Sequential									
^ NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	<0.1	<0.1
^ NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	<0.1	<0.1
EA011S: pH OX (Stage 1)									
pH OX (Stage 1)	----	0.1	pH Unit		**9.9**	**9.1**	**8.2**	**9.1**	**8.9**
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t		<0.1	<0.1	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**110**	**36.2**	**9.6**	**94.0**	**55.4**
^ ANC as CaCO3	----	0.1	% CaCO3		**11.2**	**3.7**	**1.0**	**9.6**	**5.6**
Fizz Rating	----	0	Fizz Unit		**3**	**2**	**0**	**2**	**2**
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1.0	%		**12.2**	**7.0**	**14.3**	**7.5**	**5.5**
ED037: Alkalinity									
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		**301**	**245**	**340**	**378**	**370**
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		**40**	**160**	**100**	**170**	**190**
ED040T : Total Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	100	mg/kg		<100	**160**	**110**	**180**	**150**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		<0.01	**0.03**	**0.01**	**0.05**	**0.07**
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		**40**	**40**	**130**	**40**	**60**
ED093S: Soluble Major Cations									

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY064-4	BY064-5	BY064-6	BY064-7	BY064-8
				Client sampling date / time: 09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00
				EB1118698-030	EB1118698-031	EB1118698-032	EB1118698-033	EB1118698-034
ED093S: Soluble Major Cations - Continued								
Calcium	7440-70-2	10	mg/kg	<10	<10	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg	<10	<10	<10	<10	<10
Sodium	7440-23-5	10	mg/kg	510	450	420	390	360
Potassium	7440-09-7	10	mg/kg	<10	<10	20	30	30
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	7	6
Barium	7440-39-3	10	mg/kg	30	20	20	90	60
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	74	62	26	8	6
Cobalt	7440-48-4	2	mg/kg	37	24	13	11	12
Copper	7440-50-8	5	mg/kg	54	34	24	27	35
Lead	7439-92-1	5	mg/kg	<5	<5	11	12	18
Manganese	7439-96-5	5	mg/kg	1200	594	141	1060	759
Nickel	7440-02-0	2	mg/kg	159	105	45	27	32
Vanadium	7440-62-2	5	mg/kg	51	41	34	23	19
Zinc	7440-66-6	5	mg/kg	76	51	45	59	78
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	0.4	0.3	0.9	0.4	0.4
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.4	0.3	1.0	0.4	0.4
EK085M: Sulfide as S2-								
^ Sulfide as S	----	0.01	%	<0.01	0.02	<0.01	0.04	0.06
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.05	<0.02	0.11	1.00	0.87
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	0.90	0.05	0.18	3.10	2.32
EP003TIC: Total inorganic Carbon (TIC) in Soil								
^ Total Inorganic Carbon	----	0.02	%	0.85	0.05	0.07	2.10	1.45

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY067 -1	BY067-2	BY067-3	BY067-4	BY067-5
Client sampling date / time				04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00
				EB1118698-015	EB1118698-016	EB1118698-017	EB1118698-018	EB1118698-019
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**2**	**3**	**3**	**5**	**3**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**34**	**21**	**14**	**15**	**12**
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**7**	**17**	**23**	**21**	**19**
Magnesium	7439-95-4	1	mg/L	**14**	**29**	**17**	**16**	**14**
Sodium	7440-23-5	1	mg/L	**1620**	**1550**	**1530**	**1630**	**1350**
Potassium	7440-09-7	1	mg/L	<1	**2**	**3**	**4**	**4**
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	**0.1**	**0.2**	**0.1**	**0.3**	**0.4**
Boron	7440-42-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY054-1	BY054-2	BY054-3	BY054-4	BY054-5
				Client sampling date / time: 04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00
				EB1118698-020	EB1118698-021	EB1118698-022	EB1118698-023	EB1118698-024
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**12**	**22**	**7**	**4**	**5**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**89**	**206**	**77**	**17**	**12**
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**21**	**11**	**8**	**17**	**18**
Magnesium	7439-95-4	1	mg/L	**22**	**17**	**13**	**14**	**14**
Sodium	7440-23-5	1	mg/L	**1520**	**1750**	**1360**	**1490**	**1210**
Potassium	7440-09-7	1	mg/L	**2**	**3**	**3**	**2**	**3**
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	**2.9**	**2.8**	**3.3**	**0.2**	**0.2**
Boron	7440-42-8	0.1	mg/L	**1.4**	**1.5**	**1.5**	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	**0.5**	**1.2**	**1.6**	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.04**	**0.03**	**0.02**	**0.02**	**0.02**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.04**	**0.03**	**0.02**	**0.02**	**0.02**

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY054-6	BY054-7	BY064-1	BY064-2	BY064-3
				Client sampling date / time: 04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00
				EB1118698-025	EB1118698-026	EB1118698-027	EB1118698-028	EB1118698-029
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**6**	**4**	**10**	**2**	**2**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**12**	**10**	**12**	**11**	**8**
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**23**	**16**	**4**	**4**	**37**
Magnesium	7439-95-4	1	mg/L	**17**	**12**	**12**	**12**	**68**
Sodium	7440-23-5	1	mg/L	**1660**	**1470**	**1520**	**911**	**1580**
Potassium	7440-09-7	1	mg/L	**7**	**5**	**3**	<1	**5**
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	**0.2**	**0.2**	**0.5**	**0.2**	**0.2**
Boron	7440-42-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.02**	**0.02**	**0.81**	**0.02**	**0.05**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.02**	**0.02**	**0.81**	**0.02**	**0.05**

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: BY064-4	BY064-5	BY064-6	BY064-7	BY064-8
				Client sampling date / time: 04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00	04-OCT-2011 14:00
				EB1118698-030	EB1118698-031	EB1118698-032	EB1118698-033	EB1118698-034
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**2**	**5**	**2**	**7**	**6**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**3**	**8**	**6**	**8**	**6**
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**23**	**58**	**33**	**45**	**23**
Magnesium	7439-95-4	1	mg/L	**18**	**11**	**7**	**12**	**10**
Sodium	7440-23-5	1	mg/L	**862**	**1760**	**1050**	**1690**	**1300**
Potassium	7440-09-7	1	mg/L	**3**	**4**	**6**	**7**	**6**
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	**0.2**	**0.1**	**3.0**	**0.2**	**0.4**
Boron	7440-42-8	0.1	mg/L	<0.1	<0.1	**1.2**	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	**0.1**
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	**0.6**	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.34**	**0.02**	**0.02**	**0.02**	**0.02**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.34**	**0.02**	**0.02**	**0.02**	**0.02**

ALS Group
Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1120637**	Page	: 1 of 9
Amendment	: **2**		
Client	: **BYERWEN COAL P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MS JORDAN BACHMANN	Contact	: Customer Services
Address	: LEVEL 15 40 CREEK STREET BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: jbachmann@qcoal.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: ----	Telephone	: +61 7 3243 7222
Facsimile	: ----	Facsimile	: +61 7 3243 7218
Project	: BYERWEN CORES	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 04-OCT-2011
Sampler	: ----	Issue Date	: 09-DEC-2011
Site	: ----		
		No. of samples received	: 6
Quote number	: BN/135/11 V7	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
WORLD RECOGNISED ACCREDITATION

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
Myles.Clark	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Myles.Clark	Acid Sulfate Soils Supervisor	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Stafford Minerals - AY

General Comments

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

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

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

- **ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.**
- **TCLP conducted at pH 7 as per client request. Acetic acid used to buffer pH to required level.**
- **This report has been amended and re-released to allow additional pertinent comments to be added to the report. All analysis results are as per the previous report.**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W07601	W07612	X09301	X09310	W12410
				Client sampling date / time: 20-SEP-2011 15:00	20-SEP-2011 15:00	20-SEP-2011 15:00	20-SEP-2011 15:00	20-SEP-2011 15:00
				EB1120637-001	EB1120637-002	EB1120637-003	EB1120637-004	EB1120637-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.9	9.2	9.1	9.3	8.3
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	1.5	8.6	10.2	6.2	17.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	470	244	355	367	218
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.7	3.2	3.1	3.1	2.8
NAG (pH 4.5)	----	0.1	kg H2SO4/t	3.2	16.7	22.5	22.0	52.4
NAG (pH 7.0)	----	0.1	kg H2SO4/t	9.4	36.5	45.1	41.2	96.8
EA011A: Net Acid Generation - Sequential								
NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	32.9	22.2	45.7	36.5
NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	3.8	83.3	64.7	93.5	86.7
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	5.1	3.0	3.0	2.8	2.8
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	13.7	17.4	22.2	22.2
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	2.4	26.7	33.6	36.3	39.6
EA011S: pH OX (Stage 2)								
pH OX (Stage 2)	----	0.1	pH Unit	5.1	3.7	3.2	2.6	2.7
NAG at pH 4.5 (Stage 2)	----	0.1	kg H2SO4/t	<0.1	17.0	4.5	21.6	13.7
NAG at pH 7.0 (Stage 2)	----	0.1	kg H2SO4/t	1.4	28.9	10.7	35.6	25.2
EA011S: pH OX (Stage 3)								
pH OX (Stage 3)	----	0.1	pH Unit	----	3.4	4.0	3.4	3.9
NAG at pH 4.5 (Stage 3)	----	0.1	kg H2SO4/t	----	2.0	0.3	1.9	0.6
NAG at pH 7.0 (Stage 3)	----	0.1	kg H2SO4/t	----	8.5	5.2	9.1	6.3
EA011S: pH OX (Stage 4)								
pH OX (Stage 4)	----	0.1	pH Unit	----	4.2	4.4	4.5	4.6
NAG at pH 4.5 (Stage 4)	----	0.1	kg H2SO4/t	----	0.2	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 4)	----	0.1	kg H2SO4/t	----	10.1	8.3	6.5	8.5
EA011S: pH OX (Stage 5)								
pH OX (Stage 5)	----	0.1	pH Unit	----	4.5	4.6	4.6	4.8
NAG at pH 4.5 (Stage 5)	----	0.1	kg H2SO4/t	----	<0.1	<0.1	<0.1	<0.1
NAG at pH 7.0 (Stage 5)	----	0.1	kg H2SO4/t	----	9.1	6.9	6.0	7.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	1.6	3.6	2.9	3.6	3.0
ANC as CaCO3	----	0.1	% CaCO3	0.2	0.4	0.3	0.4	0.3

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W07601	W07612	X09301	X09310	W12410
				Client sampling date / time: 20-SEP-2011 15:00	20-SEP-2011 15:00	20-SEP-2011 15:00	20-SEP-2011 15:00	20-SEP-2011 15:00
				EB1120637-001	EB1120637-002	EB1120637-003	EB1120637-004	EB1120637-005
EA013: Acid Neutralising Capacity - Continued								
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	14	16	38	<1
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	320	440	180	210	250
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	240	40	110	50	220
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.10	0.40	0.43	0.32	0.67
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	550	240	390	440	120
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg	<10	<10	<10	<10	<10
Sodium	7440-23-5	10	mg/kg	450	250	350	370	230
Potassium	7440-09-7	10	mg/kg	<10	<10	<10	<10	<10
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	10	<5	<5	54
Barium	7440-39-3	10	mg/kg	30	280	<10	150	<10
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	<2	<2	<2	<2	<2
Cobalt	7440-48-4	2	mg/kg	4	<2	7	<2	11
Copper	7440-50-8	5	mg/kg	27	28	29	32	39
Lead	7439-92-1	5	mg/kg	13	11	9	13	12
Manganese	7439-96-5	5	mg/kg	<5	<5	<5	<5	<5
Nickel	7440-02-0	2	mg/kg	48	7	49	<2	10
Vanadium	7440-62-2	5	mg/kg	9	<5	10	<5	<5
Zinc	7440-66-6	5	mg/kg	28	42	26	66	107
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N (Sol.)	----	0.1	mg/kg	0.3	0.2	0.2	0.2	0.1
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	0.09	0.38	0.42	0.31	0.66

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W07601	W07612	X09301	X09310	W12410
				Client sampling date / time: 20-SEP-2011 15:00	20-SEP-2011 15:00	20-SEP-2011 15:00	20-SEP-2011 15:00	20-SEP-2011 15:00
				EB1120637-001	EB1120637-002	EB1120637-003	EB1120637-004	EB1120637-005
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**8.50**	**23.8**	**22.3**	**24.1**	**41.3**
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	**8.51**	**24.1**	**23.5**	**24.2**	**42.0**
EP003TIC: Total inorganic Carbon (TIC) in Soil								
Total Inorganic Carbon	----	0.02	%	<0.02	**0.30**	**1.20**	**0.10**	**0.70**

Analytical Results

Sub-Matrix: SOIL			Client sample ID	W12401	----	----	----	----
			Client sampling date / time	20-SEP-2011 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1120637-006	----	----	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.2**	----	----	----	----
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-2.2**	----	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**270**	----	----	----	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**6.3**	----	----	----	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	----	----	----	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**0.4**	----	----	----	----
EA011A: Net Acid Generation - Sequential								
NAG at pH 4.5 (total)	----	0.1	kg H2SO4/t	<0.1	----	----	----	----
NAG at pH 7.0 (total)	----	0.1	kg H2SO4/t	**2.0**	----	----	----	----
EA011S: pH OX (Stage 1)								
pH OX (Stage 1)	----	0.1	pH Unit	**6.1**	----	----	----	----
NAG at pH 4.5 (Stage 1)	----	0.1	kg H2SO4/t	<0.1	----	----	----	----
NAG at pH 7.0 (Stage 1)	----	0.1	kg H2SO4/t	**1.1**	----	----	----	----
EA011S: pH OX (Stage 2)								
pH OX (Stage 2)	----	0.1	pH Unit	**5.6**	----	----	----	----
NAG at pH 4.5 (Stage 2)	----	0.1	kg H2SO4/t	<0.1	----	----	----	----
NAG at pH 7.0 (Stage 2)	----	0.1	kg H2SO4/t	**0.9**	----	----	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**2.8**	----	----	----	----
ANC as CaCO3	----	0.1	% CaCO3	**0.3**	----	----	----	----
Fizz Rating	----	0	Fizz Unit	**0**	----	----	----	----
ED037: Alkalinity								
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	----	----	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**10**	----	----	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.02**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**370**	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W12401	----	----	----	----
				Client sampling date / time: 20-SEP-2011 15:00	----	----	----	----
				EB1120637-006	**----**	**----**	**----**	**----**
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	----	----	----	----
Magnesium	7439-95-4	10	mg/kg	<10	----	----	----	----
Sodium	7440-23-5	10	mg/kg	**270**	----	----	----	----
Potassium	7440-09-7	10	mg/kg	<10	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Barium	7440-39-3	10	mg/kg	<10	----	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**3**	----	----	----	----
Cobalt	7440-48-4	2	mg/kg	<2	----	----	----	----
Copper	7440-50-8	5	mg/kg	**6**	----	----	----	----
Lead	7439-92-1	5	mg/kg	<5	----	----	----	----
Manganese	7439-96-5	5	mg/kg	<5	----	----	----	----
Nickel	7440-02-0	2	mg/kg	<2	----	----	----	----
Vanadium	7440-62-2	5	mg/kg	**17**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	<5	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N (Sol.)	----	0.1	mg/kg	**0.1**	----	----	----	----
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	**0.02**	----	----	----	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**49.1**	----	----	----	----
EP003TC: Total Carbon (TC) in Soil								
Total Carbon	----	0.02	%	**50.8**	----	----	----	----
EP003TIC: Total inorganic Carbon (TIC) in Soil								
Total Inorganic Carbon	----	0.02	%	**1.70**	----	----	----	----

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: W07601	W07612	X09301	X09310	W12410
				Client sampling date / time: 06-OCT-2011 15:00	06-OCT-2011 15:00	06-OCT-2011 15:00	06-OCT-2011 15:00	06-OCT-2011 15:00
				EB1120637-001	EB1120637-002	EB1120637-003	EB1120637-004	EB1120637-005
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.2	2.1	1.7	2.5	3.6
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	13	6	7	4	11
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	32	17	16	22	15
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	14	15	13	14	9
Magnesium	7439-95-4	1	mg/L	18	18	17	18	10
Sodium	7440-23-5	1	mg/L	<1	<1	<1	<1	<1
Potassium	7440-09-7	1	mg/L	5	8	5	7	4
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	7440-39-3	0.1	mg/L	2.2	4.0	1.9	2.6	1.3
Boron	7440-42-8	0.1	mg/L	1.3	1.2	1.1	1.4	0.7
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	7440-48-4	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	0.3	<0.1	0.2	<0.1	<0.1
Selenium	7782-49-2	0.05	mg/L	0.08	<0.05	<0.05	<0.05	<0.05
Vanadium	7440-62-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	1.5	1.3	1.3	1.4	1.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.04	0.04	0.04	0.07	0.05
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.04	0.04	0.04	0.07	0.05

Analytical Results

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	LOR	Unit	Client sample ID: W12401	----	----	----	----
				Client sampling date / time: 06-OCT-2011 15:00	----	----	----	----
				EB1120637-006	----	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**1.4**	----	----	----	----
ED040C: Leachable Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**1**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**16**	----	----	----	----
ED093C: Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	**7**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**4**	----	----	----	----
Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
Potassium	7440-09-7	1	mg/L	**3**	----	----	----	----
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	----	----	----	----
Barium	7440-39-3	0.1	mg/L	**1.5**	----	----	----	----
Boron	7440-42-8	0.1	mg/L	**1.1**	----	----	----	----
Cadmium	7440-43-9	0.05	mg/L	<0.05	----	----	----	----
Chromium	7440-47-3	0.1	mg/L	<0.1	----	----	----	----
Cobalt	7440-48-4	0.1	mg/L	<0.1	----	----	----	----
Copper	7440-50-8	0.1	mg/L	<0.1	----	----	----	----
Lead	7439-92-1	0.1	mg/L	<0.1	----	----	----	----
Manganese	7439-96-5	0.1	mg/L	<0.1	----	----	----	----
Nickel	7440-02-0	0.1	mg/L	<0.1	----	----	----	----
Selenium	7782-49-2	0.05	mg/L	<0.05	----	----	----	----
Vanadium	7440-62-2	0.1	mg/L	<0.1	----	----	----	----
Zinc	7440-66-6	0.1	mg/L	**1.2**	----	----	----	----
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.05**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.05**	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EB1122664**	Page	: 1 of 4
Client	: **Q COAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR JORDAN BACHMANN	Contact	: Customer Services
Address	: 2/262 Adelaide St BRISBANE QLD 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: jbachmann@qcoal.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3229 2202	Telephone	: +61 7 3243 7222
Facsimile	: ----	Facsimile	: +61 7 3243 7218
Project	: BYERWEN	Quote number	: BN/135/11 V4
Order number	: ----		
		Date Samples Received	: 28-OCT-2011
No. of samples received	: 5		
No. of samples analysed	: 5	Issue Date	: 04-NOV-2011

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 825/14610

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
Myles.Clark	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Stafford Minerals - AY

General Comments

The analytical procedures used by the Food and Pharmaceutical Division have been developed from established internationally recognized procedures such as those published by the BP, USP, FCC and AOAC. In house developed procedures are employed in the absence of documented standards or by client request.

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.

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

Analytical Results

Reporting Category: **SOIL**	Client sample ID :	X16001	W07810	W16009
	Client sampling date / time :	07-OCT-2011 15:00	07-OCT-2011 15:00	07-OCT-2011 15:00
Compound	*Unit*	**EB1122664-001**	**EB1122664-002**	**EB1122664-003**
EA002 : pH (Soils)				
pH Value	pH Unit	**6.5**	**9.2**	**9.7**
EA009: Nett Acid Production Potential				
Net Acid Production Potential	kg H2SO4/t	-17.0	4.8	<0.5
EA010: Conductivity				
Electrical Conductivity @ 25°C	µS/cm	**2390**	**248**	**278**
EA013: Acid Neutralising Capacity				
ANC as H2SO4	kg H2SO4 equiv./t	**21.0**	**5.0**	**4.9**
ANC as CaCO3	% CaCO3	**2.1**	**0.5**	**0.5**
Fizz Rating	Fizz Unit	**1**	**0**	**0**
EA026 : Chromium Reducible Sulfur				
Chromium Reducible Sulphur	%	**0.033**	**0.242**	**0.075**
ED042T: Total Sulfur by LECO				
Sulfur - Total as S (LECO)	%	**0.13**	**0.32**	**0.17**

Analytical Results

Reporting Category: **SOIL**

	Client sample ID :	W11418	W07809	
	Client sampling date / time :	07-OCT-2011 15:00	07-OCT-2011 15:00	
Compound	*Unit*	**EB1122664-004**	**EB1122664-005**	
EA002 : pH (Soils)				
pH Value	pH Unit	**9.5**	**9.1**	
EA009: Nett Acid Production Potential				
Net Acid Production Potential	kg H2SO4/t	<0.5	10.3	
EA010: Conductivity				
Electrical Conductivity @ 25°C	µS/cm	**416**	**296**	
EA013: Acid Neutralising Capacity				
ANC as H2SO4	kg H2SO4 equiv./t	**6.0**	**5.0**	
ANC as CaCO3	% CaCO3	**0.6**	**0.5**	
Fizz Rating	Fizz Unit	**0**	**0**	
EA026 : Chromium Reducible Sulfur				
Chromium Reducible Sulphur	%	**0.058**	**0.379**	
ED042T: Total Sulfur by LECO				
Sulfur - Total as S (LECO)	%	**0.19**	**0.50**	

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1125857**	Page	: 1 of 34
Client	: **BYERWEN COAL P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MS JORDAN BACHMANN	Contact	: Customer Services
Address	: LEVEL 15 40 CREEK STREET BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: jbachmann@qcoal.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: ----	Telephone	: +61 7 3243 7222
Facsimile	: ----	Facsimile	: +61 7 3243 7218
Project	: BYERWEN	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 28-NOV-2011
Sampler	: JORDAN BACHMANN	Issue Date	: 20-DEC-2011
Site	: ----		
		No. of samples received	: 189
Quote number	: BN/135/11 V7	No. of samples analysed	: 156

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*
Myles.Clark	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Stafford Minerals - AY

General Comments

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

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

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

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

Analytical Results

Sub-Matrix: SOIL			Client sample ID	BY116-1	BY116-2	BY116-3	BY116-4	BY116-5
			Client sampling date / time	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
Compound	CAS Number	LOR	Unit	EB1125857-001	EB1125857-002	EB1125857-003	EB1125857-004	EB1125857-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.4	8.2	7.8	7.7	9.2
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-19.8	-16.2	-7.6	-6.2	-133
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	2410	1010	1170	1280	630
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	19.8	16.2	7.6	8.6	134
ANC as CaCO3	----	0.1	% CaCO3	2.0	1.6	0.8	0.9	13.7
Fizz Rating	----	0	Fizz Unit	1	1	0	0	3
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	0.08	0.03

Analytical Results

Sub-Matrix: SOIL			Client sample ID	BY116-6	BY116-7	BY116-8	BY116-9	BY116-10
			Client sampling date / time	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
Compound	CAS Number	LOR	Unit	EB1125857-006	EB1125857-007	EB1125857-008	EB1125857-009	EB1125857-010
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.4	9.8	9.8	9.7	9.9
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-77.2	-55.9	-28.0	-29.2	-35.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	664	348	490	295	306
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	77.8	56.5	29.8	31.0	36.3
ANC as CaCO3	----	0.1	% CaCO3	7.9	5.8	3.0	3.2	3.7
Fizz Rating	----	0	Fizz Unit	2	2	1	1	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.02	0.02	0.06	0.06	0.04

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY107-1	BY107-2	BY107-3	BY107-4	BY107-5
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1125857-011	EB1125857-012	EB1125857-013	EB1125857-014	EB1125857-015
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.8**	**8.2**	**8.9**	**9.4**	**9.3**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-12.4**	**-8.0**	**-36.9**	**-165**	**-27.3**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1280**	**2110**	**906**	**648**	**487**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**12.4**	**8.3**	**37.2**	**167**	**31.6**
ANC as CaCO3	----	0.1	% CaCO3	**1.3**	**0.8**	**3.8**	**17.0**	**3.2**
Fizz Rating	----	0	Fizz Unit	**1**	**0**	**1**	**3**	**1**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	**0.01**	**0.01**	**0.06**	**0.14**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY107-6	BY107-7	BY107-8	BY107-9	BY107-10
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1125857-016	EB1125857-017	EB1125857-018	EB1125857-019	EB1125857-020
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.7**	**9.8**	**9.6**	**9.5**	**9.4**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-123**	**-126**	**-50.5**	**-11.8**	**-128**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**581**	**473**	**566**	**766**	**656**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**125**	**127**	**52.3**	**13.3**	**128**
ANC as CaCO3	----	0.1	% CaCO3	**12.8**	**13.0**	**5.3**	**1.4**	**13.0**
Fizz Rating	----	0	Fizz Unit	**3**	**2**	**2**	**1**	**3**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.07**	**0.03**	**0.06**	**0.05**	**0.01**

Analytical Results

Sub-Matrix: SOIL			Client sample ID	BY107-11	BY107-12	BY107-13	BY107-14	BY093-1
			Client sampling date / time	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
Compound	CAS Number	LOR	Unit	EB1125857-021	EB1125857-022	EB1125857-023	EB1125857-024	EB1125857-038
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.4	9.5	9.6	9.9	8.4
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-34.6	-76.0	-65.2	-49.5	-9.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	465	542	581	595	1940
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	35.8	77.2	67.4	51.0	9.9
ANC as CaCO3	----	0.1	% CaCO3	3.6	7.9	6.9	5.2	1.0
Fizz Rating	----	0	Fizz Unit	1	2	2	2	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.04	0.04	0.07	0.05	0.01

Analytical Results

Sub-Matrix: SOIL			Client sample ID	BY093-2	BY093-3	BY093-4	BY093-5	BY093-6
			Client sampling date / time	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
Compound	CAS Number	LOR	Unit	EB1125857-039	EB1125857-040	EB1125857-041	EB1125857-042	EB1125857-043
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.4	8.0	9.2	9.2	9.4
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-17.9	-2.1	-36.6	-1.2	-76.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	2130	1650	840	915	838
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	18.2	2.1	37.2	4.9	77.8
ANC as CaCO3	----	0.1	% CaCO3	1.8	0.2	3.8	0.5	7.9
Fizz Rating	----	0	Fizz Unit	1	0	1	0	2
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.01	<0.01	0.02	0.12	0.04

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY093-7 Client sampling date / time: 31-AUG-2011 15:00 EB1125857-044	BY093-8 31-AUG-2011 15:00 EB1125857-045	BY093-9 31-AUG-2011 15:00 EB1125857-046	BY096-1 09-SEP-2011 15:00 EB1125857-067	BY096-2 09-SEP-2011 15:00 EB1125857-068
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.8**	**10.0**	**9.7**	**8.5**	**8.2**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-39.5**	**-59.0**	**-14.0**	**-15.5**	**-7.6**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**482**	**405**	**313**	**116**	**2120**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**40.7**	**59.6**	**16.5**	**15.5**	**7.6**
ANC as CaCO3	----	0.1	% CaCO3	**4.2**	**6.1**	**1.7**	**1.6**	**0.8**
Fizz Rating	----	0	Fizz Unit	**2**	**2**	**1**	**1**	**0**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.04**	**0.02**	**0.08**	<0.01	<0.01

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BY096-3	BY096-4	BY096-5	BY096-6	BY096-7
				Client sampling date / time	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00
Compound	CAS Number	LOR	Unit		EB1125857-069	EB1125857-070	EB1125857-071	EB1125857-072	EB1125857-073
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		7.6	7.6	7.6	7.6	8.0
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-4.8	-4.3	-2.1	-3.0	-10.1
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		3310	3160	3150	3300	2650
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		4.8	4.9	2.7	3.3	10.1
ANC as CaCO3	----	0.1	% CaCO3		0.5	0.5	0.3	0.3	1.0
Fizz Rating	----	0	Fizz Unit		0	0	0	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		<0.01	0.02	0.02	0.01	<0.01

Analytical Results

Sub-Matrix: SOIL			Client sample ID	BY096-8	BY096-9	BY096-10	BY096-11	BY096-12
			Client sampling date / time	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00	09-SEP-2011 15:00
Compound	CAS Number	LOR	Unit	EB1125857-074	EB1125857-075	EB1125857-076	EB1125857-077	EB1125857-078
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.5	9.5	9.5	9.2	9.6
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-22.3	-85.1	-2.4	-4.5	-7.0
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	989	742	539	985	1180
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	22.3	86.3	5.2	7.6	16.2
ANC as CaCO3	----	0.1	% CaCO3	2.3	8.8	0.5	0.8	1.6
Fizz Rating	----	0	Fizz Unit	1	2	0	0	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.04	0.09	0.10	0.30

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY096-13	BY096-14	BY031-1	BY031-2	BY031-3
				Client sampling date / time: 09-SEP-2011 15:00	09-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
				EB1125857-079	EB1125857-080	EB1125857-081	EB1125857-082	EB1125857-083
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.8**	**9.8**	**8.0**	**7.4**	**3.3**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-17.1**	**-21.9**	**-2.7**	**-5.2**	**213**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**539**	**460**	**284**	**240**	**2780**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**18.6**	**24.7**	**2.7**	**5.8**	**3.1**
ANC as CaCO3	----	0.1	% CaCO3	**1.9**	**2.5**	**0.3**	**0.6**	**0.3**
Fizz Rating	----	0	Fizz Unit	**1**	**1**	**0**	**0**	**0**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.05**	**0.09**	<0.01	**0.02**	**7.07**

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BY031-4	BY031-5	BY031-6	BY031-7	BY031-8
				Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
Compound	CAS Number	LOR	Unit		EB1125857-084	EB1125857-085	EB1125857-086	EB1125857-087	EB1125857-088
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.0	7.8	7.9	9.3	8.3
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-13.0	2.0	-3.8	-135	-3.3
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		156	349	79	117	369
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		13.6	12.4	5.6	139	19.8
ANC as CaCO3	----	0.1	% CaCO3		1.4	1.3	0.6	14.2	2.0
Fizz Rating	----	0	Fizz Unit		1	1	0	3	1
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.02	0.47	0.06	0.14	0.54

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY031-9	BY031-10	BY031-11	BY082-1	BY082-2
				Client sampling date / time: 19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
				EB1125857-089	EB1125857-090	EB1125857-091	EB1125857-092	EB1125857-093
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.2**	**9.6**	**9.6**	**7.7**	**7.5**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-9.8**	**-29.9**	**-8.4**	**-2.1**	**-1.7**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**205**	**161**	**164**	**3200**	**3430**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**19.0**	**33.0**	**21.9**	**2.7**	**2.3**
ANC as CaCO3	----	0.1	% CaCO3	**1.9**	**3.4**	**2.2**	**0.3**	**0.2**
Fizz Rating	----	0	Fizz Unit	**1**	**1**	**1**	**0**	**0**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.30**	**0.10**	**0.44**	**0.02**	**0.02**

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BY082-3	BY082-4	BY082-5	BY082-6	BY082-7
				Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
Compound	CAS Number	LOR	Unit		EB1125857-094	EB1125857-095	EB1125857-096	EB1125857-097	EB1125857-098
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**7.4**	**7.6**	**7.9**	**9.1**	**9.2**
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		**-4.9**	**-20.5**	**-17.6**	**-20.4**	**-95.0**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**3770**	**1990**	**910**	**591**	**717**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**5.2**	**20.8**	**17.6**	**20.4**	**99.0**
ANC as CaCO3	----	0.1	% CaCO3		**0.5**	**2.1**	**1.8**	**2.1**	**10.1**
Fizz Rating	----	0	Fizz Unit		**0**	**1**	**1**	**1**	**2**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.01**	**0.01**	<0.01	<0.01	**0.13**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY082-8	BY082-9	BY082-10	BY082-11	BY082-12
				Client sampling date / time: 19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
				EB1125857-099	EB1125857-100	EB1125857-101	EB1125857-102	EB1125857-103
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.0**	**9.8**	**9.2**	**9.6**	**9.7**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-8.1**	**-151**	**21.4**	**-34.1**	**-41.6**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**980**	**374**	**373**	**656**	**408**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**9.0**	**152**	**5.2**	**37.2**	**42.5**
ANC as CaCO3	----	0.1	% CaCO3	**0.9**	**15.5**	**0.5**	**3.8**	**4.3**
Fizz Rating	----	0	Fizz Unit	**0**	**3**	**0**	**1**	**2**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.03**	**0.02**	**0.87**	**0.10**	**0.03**

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BY082-13	BY056-1	BY056-2	BY056-3	BY056-4
				Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
Compound	CAS Number	LOR	Unit		EB1125857-104	EB1125857-105	EB1125857-106	EB1125857-107	EB1125857-108
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		9.7	8.6	8.2	7.8	7.9
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-30.2	-5.2	-3.0	-2.1	-7.9
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		351	797	1590	2860	2800
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		34.5	5.2	3.6	2.7	8.5
ANC as CaCO3	----	0.1	% CaCO3		3.5	0.5	0.4	0.3	0.9
Fizz Rating	----	0	Fizz Unit		1	0	0	0	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.14	<0.01	0.02	0.02	0.02

Analytical Results

Sub-Matrix: SOIL			Client sample ID	BY056-5	BY056-6	BY056-7	BY056-8	BY056-9
			Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
Compound	CAS Number	LOR	Unit	EB1125857-109	EB1125857-110	EB1125857-111	EB1125857-112	EB1125857-113
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.0	8.8	9.4	9.5	9.5
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-3.3	-24.5	-55.3	-54.1	-24.7
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	2080	1140	769	511	490
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.9	24.8	55.9	54.7	26.2
ANC as CaCO3	----	0.1	% CaCO3	0.4	2.5	5.7	5.6	2.7
Fizz Rating	----	0	Fizz Unit	0	1	2	2	1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.02	0.01	0.02	0.02	0.05

Analytical Results

Sub-Matrix: SOIL			Client sample ID	BY056-10	BY056-11	BY056-12	BY056-13	BY056-14
			Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
Compound	CAS Number	LOR	Unit	EB1125857-114	EB1125857-115	EB1125857-116	EB1125857-117	EB1125857-118
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.9	9.8	9.7	9.6	9.6
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	2.7	-73.8	-70.8	-14.3	-56.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	288	359	297	466	347
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.8	74.7	71.7	20.7	65.6
ANC as CaCO3	----	0.1	% CaCO3	0.3	7.6	7.3	2.1	6.7
Fizz Rating	----	0	Fizz Unit	0	2	2	1	2
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.18	0.03	0.03	0.21	0.31

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY056-15	BY056-16	BY056-17	BY056-18	BY059-1
				Client sampling date / time: 19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
				EB1125857-119	EB1125857-120	EB1125857-121	EB1125857-122	EB1125857-123
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.6**	**9.8**	**9.7**	**9.7**	**8.7**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-163**	**-163**	**-24.5**	**-27.4**	**-18.0**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**430**	**405**	**353**	**298**	**1570**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**166**	**164**	**25.7**	**29.8**	**18.6**
ANC as CaCO3	----	0.1	% CaCO3	**17.0**	**16.7**	**2.6**	**3.0**	**1.9**
Fizz Rating	----	0	Fizz Unit	**3**	**3**	**1**	**1**	**1**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.10**	**0.04**	**0.04**	**0.08**	**0.02**

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BY059-2	BY059-3	BY059-4	BY059-5	BY059-6
				Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
Compound	CAS Number	LOR	Unit		EB1125857-124	EB1125857-125	EB1125857-126	EB1125857-127	EB1125857-128
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.5	8.4	8.5	8.8	9.6
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-8.6	-1.8	<0.5	-19.2	-51.7
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		1440	1880	1080	1230	384
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		9.5	2.7	3.3	19.5	52.3
ANC as CaCO3	----	0.1	% CaCO3		1.0	0.3	0.3	2.0	5.3
Fizz Rating	----	0	Fizz Unit		0	0	0	1	2
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.03	0.12	0.01	0.02

Analytical Results

Sub-Matrix: SOIL			Client sample ID	BY059-7	BY059-8	BY059-9	BY059-10	BY059-11
			Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
Compound	CAS Number	LOR	Unit	EB1125857-129	EB1125857-130	EB1125857-131	EB1125857-132	EB1125857-133
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.2	9.2	9.6	9.7	9.9
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-18.0	-3.3	-70.8	-12.3	-131
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	1270	557	417	440	311
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	25.7	7.6	72.3	32.2	138
ANC as CaCO3	----	0.1	% CaCO3	2.6	0.8	7.4	3.3	14.0
Fizz Rating	----	0	Fizz Unit	1	0	2	1	3
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.25	0.14	0.05	0.65	0.23

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BY059-12	BY059-13	BY059-14	BY059-15	BY047-1
				Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
Compound	CAS Number	LOR	Unit		EB1125857-134	EB1125857-135	EB1125857-136	EB1125857-137	EB1125857-138
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		9.6	9.2	9.8	9.8	9.0
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-29.8	-14.0	-35.3	-32.0	-21.1
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		804	564	506	427	922
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		37.2	17.4	36.5	33.8	21.1
ANC as CaCO3	----	0.1	% CaCO3		3.8	1.8	3.7	3.4	2.1
Fizz Rating	----	0	Fizz Unit		1	1	2	1	1
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.24	0.11	0.04	0.06	<0.01

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BY047-2	BY047-3	BY047-4	BY047-5	BY047-6
				Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
Compound	CAS Number	LOR	Unit		EB1125857-139	EB1125857-140	EB1125857-141	EB1125857-142	EB1125857-143
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.5	9.7	9.4	9.7	9.6
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-21.7	-59.6	-10.8	-126	-128
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		925	808	732	370	292
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		21.7	59.6	10.8	126	128
ANC as CaCO3	----	0.1	% CaCO3		2.2	6.1	1.1	12.9	13.0
Fizz Rating	----	0	Fizz Unit		1	2	1	2	3
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		<0.01	<0.01	<0.01	<0.01	0.01

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY047-7	BY047-8	BY047-9	BY047-10	BY047-11
				Client sampling date / time: 19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
				EB1125857-144	EB1125857-145	EB1125857-146	EB1125857-147	EB1125857-148
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.6**	**9.8**	**9.8**	**9.9**	**9.8**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-138**	**-126**	**-35.7**	**-133**	**-62.2**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**331**	**275**	**316**	**318**	**346**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**138**	**127**	**37.2**	**134**	**64.4**
ANC as CaCO3	----	0.1	% CaCO3	**14.0**	**13.0**	**3.8**	**13.7**	**6.6**
Fizz Rating	----	0	Fizz Unit	**3**	**3**	**1**	**3**	**2**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.01**	**0.02**	**0.05**	**0.04**	**0.07**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BY047-12	BY047-13	BY047-14	BY047-15	BY047-16
				Client sampling date / time: 19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
				EB1125857-149	EB1125857-150	EB1125857-151	EB1125857-152	EB1125857-153
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.8**	**9.9**	**9.9**	**10.0**	**10.0**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-36.2**	**-37.9**	**-23.5**	**-126**	**-64.7**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**327**	**294**	**293**	**263**	**264**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**37.4**	**40.7**	**26.6**	**128**	**65.6**
ANC as CaCO3	----	0.1	% CaCO3	**3.8**	**4.2**	**2.7**	**13.1**	**6.7**
Fizz Rating	----	0	Fizz Unit	**1**	**2**	**1**	**3**	**2**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.04**	**0.09**	**0.10**	**0.05**	**0.03**

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BY047-17	BYGW002-1	BYGW002-2	BYGW002-3	BYGW002-4
				Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
Compound	CAS Number	LOR	Unit		EB1125857-154	EB1125857-155	EB1125857-156	EB1125857-157	EB1125857-158
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		9.4	8.7	9.4	6.9	8.0
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-21.6	-1.2	-184	-18.6	12.3
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		221	1140	1380	824	365
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		37.2	2.7	188	22.3	7.9
ANC as CaCO3	----	0.1	% CaCO3		3.8	0.3	19.2	2.3	0.8
Fizz Rating	----	0	Fizz Unit		1	0	3	1	0
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.51	0.05	0.14	0.12	0.66

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BYGW002-5	BYGW002-6	BYGW002-7	BYGW003-1	BYGW003-2
				Client sampling date / time: 19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
				EB1125857-159	EB1125857-160	EB1125857-161	EB1125857-162	EB1125857-163
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.5**	**9.5**	**9.5**	**8.7**	**8.7**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-45.2**	**-22.0**	**-27.4**	**-88.4**	**-30.1**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**426**	**486**	**560**	**748**	**556**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**48.0**	**27.5**	**29.8**	**88.7**	**30.4**
ANC as CaCO3	----	0.1	% CaCO3	**4.9**	**2.8**	**3.0**	**9.0**	**3.1**
Fizz Rating	----	0	Fizz Unit	**2**	**1**	**1**	**2**	**1**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.09**	**0.18**	**0.08**	**0.01**	**0.01**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BYGW003-3	BYGW003-4	BYGW003-5	BYGW003-6	BYGW003-7
				Client sampling date / time: 19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
				EB1125857-164	EB1125857-165	EB1125857-166	EB1125857-167	EB1125857-168
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.3**	**9.2**	**9.2**	**8.9**	**8.7**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-55.9**	**-82.0**	**-36.2**	**-15.9**	**-20.6**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**418**	**433**	**228**	**368**	**352**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**55.9**	**82.0**	**37.1**	**18.7**	**27.9**
ANC as CaCO3	----	0.1	% CaCO3	**5.7**	**8.4**	**3.8**	**1.9**	**2.8**
Fizz Rating	----	0	Fizz Unit	**2**	**2**	**2**	**1**	**1**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	**0.03**	**0.09**	**0.24**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BYGW004-1	BYGW004-2	BYGW004-3	BYGW004-4	BYGW004-5
				Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
					EB1125857-169	EB1125857-170	EB1125857-171	EB1125857-172	EB1125857-173
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**8.6**	**8.2**	**8.2**	**8.6**	**8.4**
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		**-25.6**	**-22.6**	**-29.8**	**-31.0**	**-32.2**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**818**	**1020**	**544**	**607**	**640**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**26.2**	**23.2**	**29.8**	**31.0**	**32.8**
ANC as CaCO3	----	0.1	% CaCO3		**2.7**	**2.4**	**3.0**	**3.2**	**3.3**
Fizz Rating	----	0	Fizz Unit		**1**	**1**	**1**	**1**	**2**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.02**	**0.02**	<0.01	<0.01	**0.02**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BYGW004-6	BYGW004-7	BYGW004-8	BYGW004-9	BYGW004-10
				Client sampling date / time: 19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
				EB1125857-174	EB1125857-175	EB1125857-176	EB1125857-177	EB1125857-178
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.3**	**8.6**	**9.1**	**8.9**	**8.9**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-19.0**	**-7.2**	**-53.1**	**-71.4**	**-76.0**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**576**	**559**	**507**	**978**	**786**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**23.6**	**12.4**	**57.7**	**73.5**	**77.8**
ANC as CaCO3	----	0.1	% CaCO3	**2.4**	**1.3**	**5.9**	**7.5**	**7.9**
Fizz Rating	----	0	Fizz Unit	**1**	**1**	**2**	**2**	**2**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.15**	**0.17**	**0.15**	**0.07**	**0.06**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BYGW004-11	BYG009-1	BYG009-2	BYG009-3	BYG009-4
				Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
					EB1125857-179	EB1125857-180	EB1125857-181	EB1125857-182	EB1125857-183
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**8.9**	**6.3**	**6.2**	**6.0**	**6.3**
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		**-82.0**	**-2.0**	**-2.4**	**-2.4**	**-2.1**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**914**	**73**	**58**	**93**	**31**
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		**82.6**	**2.3**	**2.7**	**2.7**	**2.1**
ANC as CaCO3	----	0.1	% CaCO3		**8.4**	**0.2**	**0.3**	**0.3**	**0.2**
Fizz Rating	----	0	Fizz Unit		**2**	**0**	**0**	**0**	**0**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		**0.02**	**0.01**	**0.01**	**0.01**	<0.01

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BYG009-5	BYG009-6	BYG009-7	BYG009-8	BYG009-9
				Client sampling date / time	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00	19-SEP-2011 15:00
Compound	CAS Number	LOR	Unit		EB1125857-184	EB1125857-185	EB1125857-186	EB1125857-187	EB1125857-188
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		6.0	5.9	5.8	7.3	7.5
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-2.7	-1.6	-3.9	-9.2	-13.4
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		72	87	195	222	193
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		3.0	1.6	7.9	12.0	14.9
ANC as CaCO3	----	0.1	% CaCO3		0.3	0.2	0.8	1.2	1.5
Fizz Rating	----	0	Fizz Unit		0	0	1	1	1
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.01	<0.01	0.13	0.09	0.05

Analytical Results

Sub-Matrix: SOIL			Client sample ID	BYG009-10	----	----	----	----
			Client sampling date / time	19-SEP-2011 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1125857-189	----	----	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**7.8**	----	----	----	----
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-62.9**	----	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**165**	----	----	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**64.4**	----	----	----	----
ANC as CaCO3	----	0.1	% CaCO3	**6.6**	----	----	----	----
Fizz Rating	----	0	Fizz Unit	**2**	----	----	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.05**	----	----	----	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1203143**	Page	: 1 of 7
Client	: **BYERWEN COAL P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MS JORDAN BACHMANN	Contact	: Customer Services
Address	: LEVEL 15 40 CREEK STREET BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: jbachmann@qcoal.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: ----	Telephone	: +61 7 3243 7222
Facsimile	: ----	Facsimile	: +61 7 3243 7218
Project	: BYERWEN	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 02-FEB-2012
Sampler	: ROSS MCWATTERS	Issue Date	: 14-FEB-2012
Site	: ----		
		No. of samples received	: 23
Quote number	: BN/135/11 V7	No. of samples analysed	: 23

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

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

General Comments

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

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

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

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

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

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

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

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: E11401	E11402	E11403	E11404	E11405
				Client sampling date / time: 28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00
				EB1203143-001	EB1203143-002	EB1203143-003	EB1203143-004	EB1203143-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.3**	**9.3**	**9.2**	**9.2**	**8.8**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-16.4**	**-18.6**	**-22.4**	**-25.8**	**-9.9**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**639**	**563**	**634**	**602**	**367**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**18.2**	**20.1**	**24.2**	**27.3**	**11.4**
ANC as CaCO3	----	0.1	% CaCO3	**1.9**	**2.0**	**2.5**	**2.8**	**1.2**
Fizz Rating	----	0	Fizz Unit	**1**	**1**	**1**	**1**	**1**
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	**0.041**	**0.029**	**0.044**	**0.035**	**0.022**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.06**	**0.05**	**0.06**	**0.05**	**0.05**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: E11406	E09301	E09302	E16001	E16002
				Client sampling date / time: 28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00
				EB1203143-006	EB1203143-007	EB1203143-008	EB1203143-009	EB1203143-010
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.9**	**9.3**	**9.0**	**8.3**	**8.9**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-6.2**	**-142**	**-5.3**	**-45.5**	**-3.3**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**503**	**609**	**345**	**1040**	**976**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**9.0**	**143**	**6.5**	**74.0**	**7.0**
ANC as CaCO3	----	0.1	% CaCO3	**0.9**	**14.6**	**0.7**	**7.5**	**0.7**
Fizz Rating	----	0	Fizz Unit	**0**	**3**	**0**	**2**	**0**
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	**0.042**	**0.013**	**0.030**	**0.889**	**0.099**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.09**	**0.02**	**0.04**	**0.93**	**0.12**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: E16003	E16004	E16005	E16006	E08301
				Client sampling date / time: 28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00
				EB1203143-011	EB1203143-012	EB1203143-013	EB1203143-014	EB1203143-015
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.3**	**8.9**	**8.4**	**6.8**	**8.2**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-7.5**	**-2.7**	**-46.3**	**-2.1**	**-2.6**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**415**	**347**	**636**	**1950**	**380**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**8.4**	**5.5**	**48.1**	**6.4**	**4.4**
ANC as CaCO3	----	0.1	% CaCO3	**0.8**	**0.6**	**4.9**	**0.6**	**0.4**
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**2**	**0**	**0**
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	**0.024**	**0.013**	**0.057**	**0.103**	**0.038**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.03**	**0.09**	**0.06**	**0.14**	**0.06**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: E08302	E09701	E09702	E11101	E11102
				Client sampling date / time: 28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00
				EB1203143-016	EB1203143-017	EB1203143-018	EB1203143-019	EB1203143-020
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.1**	**8.6**	**9.0**	**9.2**	**9.4**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**-4.4**	**-2.3**	**-3.6**	**-26.1**	**-38.9**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**284**	**380**	**340**	**550**	**540**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**5.6**	**5.4**	**5.4**	**27.3**	**40.1**
ANC as CaCO3	----	0.1	% CaCO3	**0.6**	**0.5**	**0.5**	**2.8**	**4.1**
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**1**	**2**
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	**0.031**	**0.081**	**0.047**	**0.032**	**0.048**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.04**	**0.10**	**0.06**	**0.04**	**0.04**

Analytical Results

Sub-Matrix: SOIL			Client sample ID	E11103	E11104	E11105	----	----
			Client sampling date / time	28-OCT-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1203143-021	EB1203143-022	EB1203143-023	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.3	8.5	9.2	----	----
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-13.1	-4.7	-4.9	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	499	512	270	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	14.3	5.6	5.8	----	----
ANC as CaCO3	----	0.1	% CaCO3	1.5	0.6	0.6	----	----
Fizz Rating	----	0	Fizz Unit	1	0	0	----	----
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.030	0.018	0.020	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.04	0.03	0.03	----	----

ALS Group
Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1207808**	Page	: 1 of 15
Client	: **BYERWEN COAL P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MS JORDAN BACHMANN	Contact	: Customer Services
Address	: LEVEL 15 40 CREEK STREET BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: jbachmann@qcoal.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: ----	Telephone	: +61 7 3243 7222
Facsimile	: ----	Facsimile	: +61 7 3243 7218
Project	: Byerwen	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 19-MAR-2012
Sampler	: JB / JW	Issue Date	: 29-MAR-2012
Site	: ----		
		No. of samples received	: 42
Quote number	: BN/201/12	No. of samples analysed	: 35

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
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics
SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics

General Comments

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

- **Alkalinity (ED037): Insufficient volume was provided to perform analysis on samples 18,19,20,21,22,23,24,25,26,27,28.**

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID	BY096-12	BY031-3	BY031-5	BY031-8	BY031-9
				Client sampling date / time	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
					EB1207808-001	EB1207808-002	EB1207808-003	EB1207808-005	EB1207808-006
EA026 : Chromium Reducible Sulfur									
Chromium Reducible Sulphur	----	0.005	%		**0.270**	**6.33**	**0.412**	**0.472**	**0.201**

Analytical Results

Sub-Matrix: PULP				Client sample ID	BY031-11	BY056-14	BY059-4	BY059-7	BYGW003-7
				Client sampling date / time	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
Compound	CAS Number	LOR	Unit		EB1207808-007	EB1207808-008	EB1207808-009	EB1207808-010	EB1207808-011
EA026 : Chromium Reducible Sulfur									
Chromium Reducible Sulphur	----	0.005	%		**0.359**	**0.248**	<0.005	**0.216**	**0.215**

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: BYGW004-7	BYG009-7	BY082-7	BY082-10	BY082-13
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1207808-012	EB1207808-013	EB1207808-014	EB1207808-015	EB1207808-016
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	----	----	**8.6**	**8.5**	**9.6**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	**753**	**505**	**455**
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	**0.100**	**0.125**	**0.119**	**0.697**	**0.117**
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	----	**53.8**	**7.0**	**12.3**
Exchangeable Magnesium	----	0.1	meq/100g	----	----	**20.1**	**13.4**	**7.6**
Exchangeable Potassium	----	0.1	meq/100g	----	----	**0.3**	**1.2**	**1.1**
Exchangeable Sodium	----	0.1	meq/100g	----	----	**12.3**	**7.8**	**7.5**
Cation Exchange Capacity	----	0.1	meq/100g	----	----	**86.5**	**29.3**	**28.6**
Exchangeable Aluminium	----	0.1	meq/100g	----	----	<0.2	<0.2	<0.2
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	----	----	**790**	**135**	**634**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	----	----	**665**	**135**	**426**
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	----	----	**125**	<1	**208**
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	----	----	**430**	**470**	**140**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	----	----	**400**	**300**	**220**
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	----	----	**20**	<10	<10
Magnesium	7439-95-4	10	mg/kg	----	----	**20**	<10	<10
Sodium	7440-23-5	10	mg/kg	----	----	**720**	**450**	**430**
Potassium	7440-09-7	10	mg/kg	----	----	<10	**20**	**10**
ED093T: Total Major Cations								
Sodium	7440-23-5	10	mg/kg	----	----	**3400**	**990**	**980**
Potassium	7440-09-7	10	mg/kg	----	----	**260**	**1360**	**1100**
Calcium	7440-70-2	10	mg/kg	----	----	**37400**	**1270**	**8880**
Magnesium	7439-95-4	10	mg/kg	----	----	**21500**	**1450**	**4440**
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	----	----	<1	<1	<1
Antimony	7440-36-0	0.1	mg/kg	----	----	<0.1	<0.1	<0.1
Arsenic	7440-38-2	0.1	mg/kg	----	----	<0.1	**0.1**	**0.2**
Boron	7440-42-8	1	mg/kg	----	----	<1	<1	<1
Cadmium	7440-43-9	0.1	mg/kg	----	----	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: BYGW004-7 Client sampling date / time: 31-AUG-2011 15:00 EB1207808-012	Client sample ID: BYG009-7 Client sampling date / time: 31-AUG-2011 15:00 EB1207808-013	Client sample ID: BY082-7 Client sampling date / time: 31-AUG-2011 15:00 EB1207808-014	Client sample ID: BY082-10 Client sampling date / time: 31-AUG-2011 15:00 EB1207808-015	Client sample ID: BY082-13 Client sampling date / time: 31-AUG-2011 15:00 EB1207808-016
EG005S : Soluble Metals by ICPAES - Continued								
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	<1	<1
Lead	7439-92-1	0.1	mg/kg	----	----	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/kg	----	----	<0.1	<0.1	<0.1
Molybdenum	7439-98-7	0.1	mg/kg	----	----	**0.1**	<0.1	**0.2**
Nickel	7440-02-0	0.1	mg/kg	----	----	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.1	mg/kg	----	----	<0.1	**0.3**	**0.2**
Vanadium	7440-62-2	0.1	mg/kg	----	----	**0.9**	**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	----	----	**14000**	**4000**	**3290**
Antimony	7440-36-0	5	mg/kg	----	----	<5	<5	<5
Boron	7440-42-8	50	mg/kg	----	----	<50	<50	<50
Cobalt	7440-48-4	2	mg/kg	----	----	**23**	**10**	**8**
Iron	7439-89-6	50	mg/kg	----	----	**39400**	**10800**	**18100**
Manganese	7439-96-5	5	mg/kg	----	----	**1130**	**79**	**375**
Molybdenum	7439-98-7	2	mg/kg	----	----	**2**	<2	<2
Selenium	7782-49-2	5	mg/kg	----	----	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	----	----	**70**	**18**	**10**
Arsenic	7440-38-2	5	mg/kg	----	----	<5	**212**	**8**
Cadmium	7440-43-9	1	mg/kg	----	----	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	----	----	**112**	**6**	**8**
Copper	7440-50-8	5	mg/kg	----	----	**32**	**32**	**19**
Lead	7439-92-1	5	mg/kg	----	----	<5	**17**	**16**
Nickel	7440-02-0	2	mg/kg	----	----	**79**	**29**	**10**
Zinc	7440-66-6	5	mg/kg	----	----	**66**	**66**	**60**
EG035S: Soluble Mercury by FIMS								
Mercury	7439-97-6	0.0005	mg/kg	----	----	<0.0005	<0.0005	<0.0005
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	<0.1	**0.2**	<0.1

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: BY056-13	BY047-17	BYGW002-4	BY082-8	BY082-9
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1207808-017	EB1207808-018	EB1207808-019	EB1207808-020	EB1207808-021
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.3**	**8.5**	**8.6**	**8.6**	**9.5**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**468**	**386**	**569**	**941**	**440**
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	**0.201**	**0.284**	**0.170**	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**11.9**	----	----	**18.4**	**40.1**
Exchangeable Magnesium	----	0.1	meq/100g	**13.7**	----	----	**25.4**	**10.6**
Exchangeable Potassium	----	0.1	meq/100g	**0.7**	----	----	**1.8**	**0.8**
Exchangeable Sodium	----	0.1	meq/100g	**9.0**	----	----	**15.2**	**6.0**
Cation Exchange Capacity	----	0.1	meq/100g	**35.5**	----	----	**60.8**	**57.6**
Exchangeable Aluminium	----	0.1	meq/100g	<0.2	----	----	<0.2	<0.2
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	**593**	**416**	**481**	**624**	**611**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	**385**	**416**	**481**	**624**	**507**
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	**208**	<1	<1	<1	**104**
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**100**	**630**	**780**	**150**	**110**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**280**	**20**	**150**	**1170**	**210**
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	**60**	<10	**10**	<10
Magnesium	7439-95-4	10	mg/kg	<10	**20**	<10	**10**	<10
Sodium	7440-23-5	10	mg/kg	**480**	**320**	**560**	**870**	**430**
Potassium	7440-09-7	10	mg/kg	**10**	**20**	**30**	**40**	**20**
ED093T: Total Major Cations								
Sodium	7440-23-5	10	mg/kg	**1260**	**550**	**1160**	**1950**	**970**
Potassium	7440-09-7	10	mg/kg	**1340**	**1070**	**1530**	**1470**	**780**
Calcium	7440-70-2	10	mg/kg	**8150**	**12800**	**3390**	**2860**	**42000**
Magnesium	7439-95-4	10	mg/kg	**7440**	**2090**	**1630**	**2930**	**13500**
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	<1	<1	<1	<1	<1
Antimony	7440-36-0	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	7440-38-2	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	7440-42-8	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: BY056-13	BY047-17	BYGW002-4	BY082-8	BY082-9
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1207808-017	EB1207808-018	EB1207808-019	EB1207808-020	EB1207808-021
EG005S : Soluble Metals by ICPAES - Continued								
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
Manganese	7439-96-5	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	7439-98-7	0.1	mg/kg	<0.1	**0.2**	**0.2**	**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	**0.2**	**0.2**	**0.1**	**0.1**
Vanadium	7440-62-2	0.1	mg/kg	**0.2**	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**7240**	**8740**	**6520**	**6660**	**4530**
Antimony	7440-36-0	5	mg/kg	<5	<5	<5	<5	<5
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cobalt	7440-48-4	2	mg/kg	**25**	**6**	**10**	**5**	**17**
Iron	7439-89-6	50	mg/kg	**51400**	**12700**	**10900**	**5520**	**37900**
Manganese	7439-96-5	5	mg/kg	**972**	**261**	**354**	**72**	**1000**
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	<2
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	**77**	**26**	**20**	**14**	**46**
Arsenic	7440-38-2	5	mg/kg	<5	<5	**9**	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**10**	**9**	**6**	**16**	**21**
Copper	7440-50-8	5	mg/kg	**67**	**23**	**139**	**26**	**15**
Lead	7439-92-1	5	mg/kg	<5	**11**	**14**	**16**	**10**
Nickel	7440-02-0	2	mg/kg	**24**	**10**	**6**	**23**	**33**
Zinc	7440-66-6	5	mg/kg	**78**	**26**	**78**	**40**	**64**
EG035S: Soluble Mercury by FIMS								
Mercury	7439-97-6	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.2**	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: BY082-2	E11102	W07809	W16009	E16001
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1207808-022	EB1207808-023	EB1207808-024	EB1207808-025	EB1207808-026
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.5	9.3	8.2	9.0	8.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	3070	486	308	230	1070
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	6.6	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	22.0	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	0.4	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	20.9	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	49.9	----	----	----	----
Exchangeable Aluminium	----	0.1	meq/100g	<0.2	----	----	----	----
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	169	489	333	187	312
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	169	385	333	187	312
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	104	<1	<1	<1
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	230	40	210	60	1970
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	4880	440	210	180	330
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	250	<10	<10	<10	240
Magnesium	7439-95-4	10	mg/kg	590	<10	<10	<10	110
Sodium	7440-23-5	10	mg/kg	2160	460	300	230	660
Potassium	7440-09-7	10	mg/kg	30	<10	10	10	140
ED093T: Total Major Cations								
Sodium	7440-23-5	10	mg/kg	2500	1990	730	950	890
Potassium	7440-09-7	10	mg/kg	140	960	1260	1950	2400
Calcium	7440-70-2	10	mg/kg	800	9530	510	590	22500
Magnesium	7439-95-4	10	mg/kg	1710	7190	710	1050	3100
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	<1	<1	<1	1	<1
Antimony	7440-36-0	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	7440-38-2	0.1	mg/kg	<0.1	<0.1	<0.1	0.4	<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

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: BY082-2	E11102	W07809	W16009	E16001
				Client sampling date / time: 31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00	31-AUG-2011 15:00
				EB1207808-022	EB1207808-023	EB1207808-024	EB1207808-025	EB1207808-026
EG005S : Soluble Metals by ICPAES - Continued								
Copper	7440-50-8	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Iron	7439-89-6	1	mg/kg	<1	<1	<1	<1	<1
Lead	7439-92-1	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/kg	**0.1**	<0.1	<0.1	**0.1**	<0.1
Molybdenum	7439-98-7	0.1	mg/kg	<0.1	**0.3**	**0.4**	**0.2**	<0.1
Nickel	7440-02-0	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	7782-49-2	0.1	mg/kg	**0.1**	<0.1	**0.1**	**0.1**	**0.1**
Vanadium	7440-62-2	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**13800**	**5080**	**3260**	**3980**	**7160**
Antimony	7440-36-0	5	mg/kg	<5	<5	<5	<5	<5
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cobalt	7440-48-4	2	mg/kg	**13**	**2**	**10**	**4**	**11**
Iron	7439-89-6	50	mg/kg	**108000**	**7570**	**3430**	**880**	**29300**
Manganese	7439-96-5	5	mg/kg	**380**	**102**	<5	<5	**707**
Molybdenum	7439-98-7	2	mg/kg	<2	<2	**2**	<2	<2
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	**267**	**6**	**8**	**6**	**33**
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	**7**
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**270**	<2	**3**	**3**	**17**
Copper	7440-50-8	5	mg/kg	**39**	**6**	**37**	**36**	**39**
Lead	7439-92-1	5	mg/kg	**5**	**35**	**14**	**19**	**16**
Nickel	7440-02-0	2	mg/kg	**132**	<2	**14**	**6**	**58**
Zinc	7440-66-6	5	mg/kg	**53**	**61**	**110**	**51**	**23**
EG035S: Soluble Mercury by FIMS								
Mercury	7439-97-6	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	**0.2**

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: W07810 Client sampling date / time: 31-AUG-2011 15:00 EB1207808-027	E16003 31-AUG-2011 15:00 EB1207808-028	BY059-10 31-AUG-2011 15:00 EB1207808-029	BY059-11 31-AUG-2011 15:00 EB1207808-030	BY059-12 31-AUG-2011 15:00 EB1207808-031
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.5**	**9.3**	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**279**	**386**	----	----	----
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	----	----	**0.233**	**0.216**	**0.194**
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	**239**	**676**	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	**239**	**551**	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	**125**	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**260**	**60**	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**140**	**200**	----	----	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	----	----	----
Magnesium	7439-95-4	10	mg/kg	<10	<10	----	----	----
Sodium	7440-23-5	10	mg/kg	**270**	**380**	----	----	----
Potassium	7440-09-7	10	mg/kg	**10**	**30**	----	----	----
ED093T: Total Major Cations								
Sodium	7440-23-5	10	mg/kg	**740**	**970**	----	----	----
Potassium	7440-09-7	10	mg/kg	**1780**	**2570**	----	----	----
Calcium	7440-70-2	10	mg/kg	**560**	**1870**	----	----	----
Magnesium	7439-95-4	10	mg/kg	**930**	**1190**	----	----	----
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	**0.3**	----	----	----
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	----	----	----
Molybdenum	7439-98-7	0.1	mg/kg	**0.1**	<0.1	----	----	----

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: W07810 Client sampling date / time: 31-AUG-2011 15:00 EB1207808-027	Client sample ID: E16003 Client sampling date / time: 31-AUG-2011 15:00 EB1207808-028	Client sample ID: BY059-10 Client sampling date / time: 31-AUG-2011 15:00 EB1207808-029	Client sample ID: BY059-11 Client sampling date / time: 31-AUG-2011 15:00 EB1207808-030	Client sample ID: BY059-12 Client sampling date / time: 31-AUG-2011 15:00 EB1207808-031
EG005S : Soluble Metals by ICPAES - Continued								
Nickel	7440-02-0	0.1	mg/kg	<0.1	<0.1	----	----	----
Selenium	7782-49-2	0.1	mg/kg	**0.2**	<0.1	----	----	----
Vanadium	7440-62-2	0.1	mg/kg	<0.1	**0.6**	----	----	----
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	**3710**	**6570**	----	----	----
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	**9**	**6**	----	----	----
Iron	7439-89-6	50	mg/kg	**1600**	**820**	----	----	----
Manganese	7439-96-5	5	mg/kg	<5	**5**	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	<2	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	<5	----	----	----
Vanadium	7440-62-2	5	mg/kg	**10**	**13**	----	----	----
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	**5**	**5**	----	----	----
Copper	7440-50-8	5	mg/kg	**38**	**31**	----	----	----
Lead	7439-92-1	5	mg/kg	**20**	**16**	----	----	----
Nickel	7440-02-0	2	mg/kg	**22**	**17**	----	----	----
Zinc	7440-66-6	5	mg/kg	**91**	**140**	----	----	----
EG035S: Soluble Mercury by FIMS								
Mercury	7439-97-6	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.1**	<0.1	----	----	----

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID	GL-s C1 Composite	PR C2 Composite	P-f C3 Composite	P-r C4 Composite	----
				Client sampling date / time	31-AUG-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00	31-AUG-2011 15:00	----
					EB1207808-039	EB1207808-040	EB1207808-041	EB1207808-042	----
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**9.4**	**9.2**	**7.8**	**7.4**	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**634**	**551**	**1240**	**1240**	----
ED037: Alkalinity									
Total Alkalinity as CaCO3	----	1	mg/kg		**123**	**35**	**29**	**50**	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg		**81**	**23**	**29**	**50**	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		**42**	**12**	<1	<1	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		**380**	**80**	**1120**	**340**	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		**270**	**640**	**1330**	**1680**	----
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		<10	<10	**20**	**20**	----
Magnesium	7439-95-4	10	mg/kg		<10	<10	**20**	**30**	----
Sodium	7440-23-5	10	mg/kg		**640**	**550**	**1390**	**1450**	----
Potassium	7440-09-7	10	mg/kg		**20**	**20**	**50**	**60**	----
ED093T: Total Major Cations									
Sodium	7440-23-5	10	mg/kg		**2760**	**1650**	**2130**	**1780**	----
Potassium	7440-09-7	10	mg/kg		**2190**	**1370**	**1430**	**1400**	----
Calcium	7440-70-2	10	mg/kg		**14000**	**1070**	**1040**	**3900**	----
Magnesium	7439-95-4	10	mg/kg		**17800**	**3010**	**1920**	**3200**	----
EG005S : Soluble Metals by ICPAES									
Aluminium	7429-90-5	1	mg/kg		<1	<1	<1	<1	----
Antimony	7440-36-0	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
Arsenic	7440-38-2	0.1	mg/kg		<0.1	**1.5**	<0.1	<0.1	----
Boron	7440-42-8	1	mg/kg		<1	<1	<1	**2**	----
Cadmium	7440-43-9	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
Chromium	7440-47-3	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
Cobalt	7440-48-4	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
Copper	7440-50-8	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
Iron	7439-89-6	1	mg/kg		<1	<1	<1	<1	----
Lead	7439-92-1	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
Manganese	7439-96-5	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
Molybdenum	7439-98-7	0.1	mg/kg		<0.1	**0.2**	**0.2**	**0.4**	----
Nickel	7440-02-0	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----

Analytical Results

Sub-Matrix: **PULP**

Compound	CAS Number	LOR	Unit	Client sample ID: GL-s C1 Composite	PR C2 Composite	P-f C3 Composite	P-r C4 Composite	----
				Client sampling date / time: 31-AUG-2011 15:00	28-OCT-2011 15:00	28-OCT-2011 15:00	31-AUG-2011 15:00	----
				EB1207808-039	EB1207808-040	EB1207808-041	EB1207808-042	----
EG005S : Soluble Metals by ICPAES - Continued								
Selenium	7782-49-2	0.1	mg/kg	<0.1	**0.1**	<0.1	<0.1	----
Vanadium	7440-62-2	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
Zinc	7440-66-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**10400**	**2840**	**3820**	**3300**	----
Antimony	7440-36-0	5	mg/kg	<5	<5	<5	<5	----
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	----
Cobalt	7440-48-4	2	mg/kg	**22**	**3**	**34**	**10**	----
Iron	7439-89-6	50	mg/kg	**51000**	**9640**	**2380**	**6870**	----
Manganese	7439-96-5	5	mg/kg	**836**	**50**	<5	**86**	----
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	----
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	----
Vanadium	7440-62-2	5	mg/kg	**36**	**8**	<5	**14**	----
Arsenic	7440-38-2	5	mg/kg	<5	**5**	<5	<5	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	**1**	<1	----
Chromium	7440-47-3	2	mg/kg	**31**	**5**	**2**	**7**	----
Copper	7440-50-8	5	mg/kg	**36**	**32**	**110**	**34**	----
Lead	7439-92-1	5	mg/kg	<5	**16**	**11**	**17**	----
Nickel	7440-02-0	2	mg/kg	**125**	**21**	**60**	**39**	----
Zinc	7440-66-6	5	mg/kg	**52**	**47**	**12**	**56**	----
EG035S: Soluble Mercury by FIMS								
Mercury	7439-97-6	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	**0.2**	<0.1	----

Analytical Results

Sub-Matrix: **SOIL**			Client sample ID	BY031-7	----	----	----	----
			Client sampling date / time	31-AUG-2011 15:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1207808-004**	**----**	**----**	**----**	**----**
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	**0.137**	----	----	----	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1222663**	Page	: 1 of 17
Client	: **BYERWEN COAL P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MS JORDAN BACHMANN	Contact	: Customer Services
Address	: LEVEL 15 40 CREEK STREET BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: jbachmann@qcoal.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: ----	Telephone	: +61 7 3243 7222
Facsimile	: ----	Facsimile	: +61 7 3243 7218
Project	: BYERWEN (QCOAL)	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 30-AUG-2012
Sampler	: Dave Morwood	Issue Date	: 10-SEP-2012
Site	: ----		
		No. of samples received	: 27
Quote number	: BN/135/11 V7	No. of samples analysed	: 27

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics

General Comments

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

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

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

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

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

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

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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID	BY195-1 0 to 52	BY195-2 52 to 61	BY195-3 61 to 91	BY195-4 99 to 104	BY195-5 104 to 142
				Client sampling date / time	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
					EB1222663-001	EB1222663-002	EB1222663-003	EB1222663-004	EB1222663-005
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.2	8.8	9.7	9.2	9.7
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-9.4	-31.0	-118	-8.5	-126
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		2050	951	627	564	472
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		9.7	32.5	119	10.3	128
ANC as CaCO3	----	0.1	% CaCO3		1.0	3.3	12.1	1.0	13.1
Fizz Rating	----	0	Fizz Unit		0	2	3	0	3
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		----	3.3	----	----	21.9
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	3.0	----	----	6.4
Exchangeable Magnesium	----	0.1	meq/100g		----	6.4	----	----	4.5
Exchangeable Potassium	----	0.1	meq/100g		----	0.3	----	----	0.2
Exchangeable Sodium	----	0.1	meq/100g		----	2.2	----	----	0.8
Exchangeable Aluminium	----	0.1	meq/100g		----	0.1	----	----	<0.1
Cation Exchange Capacity	----	0.1	meq/100g		----	11.9	----	----	11.9
ED037: Alkalinity									
Total Alkalinity as CaCO3	----	1	mg/kg		----	174	----	----	261
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg		----	174	----	----	191
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		----	<1	----	----	70
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		----	200	----	----	80
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.01	0.05	0.04	0.06	0.05
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		----	1540	----	----	690
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		----	<10	----	----	<10
Magnesium	7439-95-4	10	mg/kg		----	10	----	----	<10
Sodium	7440-23-5	10	mg/kg		----	1050	----	----	580

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID: BY195-1 0 to 52	BY195-2 52 to 61	BY195-3 61 to 91	BY195-4 99 to 104	BY195-5 104 to 142
				Client sampling date / time: 28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
				EB1222663-001	EB1222663-002	EB1222663-003	EB1222663-004	EB1222663-005
ED093S: Soluble Major Cations - Continued								
Potassium	7440-09-7	10	mg/kg	----	**20**	----	----	**10**
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	----	**2170**	----	----	**1120**
Potassium	7440-09-7	50	mg/kg	----	**1100**	----	----	**780**
Calcium	7440-70-2	50	mg/kg	----	**6650**	----	----	**25700**
Magnesium	7439-95-4	50	mg/kg	----	**7230**	----	----	**11600**
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	----	----	**0.4**
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
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	----	**0.2**	----	----	<0.1
Vanadium	7440-62-2	0.1	mg/kg	----	<0.1	----	----	<0.1
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	----	**4630**	----	----	**2330**
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	----	**23**	----	----	**18**
Iron	7439-89-6	50	mg/kg	----	**45400**	----	----	**30300**
Manganese	7439-96-5	5	mg/kg	----	**650**	----	----	**758**
Molybdenum	7439-98-7	2	mg/kg	----	<2	----	----	<2
Selenium	7782-49-2	5	mg/kg	----	<5	----	----	<5
Vanadium	7440-62-2	5	mg/kg	----	**36**	----	----	**24**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID: BY195-1 0 to 52	BY195-2 52 to 61	BY195-3 61 to 91	BY195-4 99 to 104	BY195-5 104 to 142
				Client sampling date / time: 28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
				EB1222663-001	EB1222663-002	EB1222663-003	EB1222663-004	EB1222663-005
EG005T: Total Metals by ICP-AES - Continued								
Arsenic	7440-38-2	5	mg/kg	----	**8**	----	----	**6**
Cadmium	7440-43-9	1	mg/kg	----	**1**	----	----	<1
Chromium	7440-47-3	2	mg/kg	----	**14**	----	----	**8**
Copper	7440-50-8	5	mg/kg	----	**46**	----	----	**21**
Lead	7439-92-1	5	mg/kg	----	**16**	----	----	**11**
Nickel	7440-02-0	2	mg/kg	----	**66**	----	----	**41**
Zinc	7440-66-6	5	mg/kg	----	**107**	----	----	**51**
EG035S: Soluble Mercury by FIMS								
Mercury	7439-97-6	0.0005	mg/kg	----	<0.0005	----	----	<0.0005
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	<0.1	----	----	<0.1

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID	BY195-6 162 to 170	BY195-7 170 to 192	BY263-001 0 to 5	BY263-002 5 to 13	BY263-003 13 to 19
				Client sampling date / time	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
					EB1222663-006	EB1222663-007	EB1222663-008	EB1222663-009	EB1222663-010
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		9.2	9.8	8.9	9.4	9.5
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-45.2	-46.8	-5.0	-17.8	-55.7
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		815	226	343	711	517
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		48.0	48.6	5.3	18.4	56.3
ANC as CaCO3	----	0.1	% CaCO3		4.9	5.0	0.5	1.9	5.7
Fizz Rating	----	0	Fizz Unit		2	2	0	1	2
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		----	19.4	----	----	9.5
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	6.6	----	----	5.2
Exchangeable Magnesium	----	0.1	meq/100g		----	3.9	----	----	8.5
Exchangeable Potassium	----	0.1	meq/100g		----	0.3	----	----	0.2
Exchangeable Sodium	----	0.1	meq/100g		----	1.8	----	----	2.1
Exchangeable Aluminium	----	0.1	meq/100g		----	0.2	----	----	0.1
Cation Exchange Capacity	----	0.1	meq/100g		----	12.7	----	----	16.0
ED037: Alkalinity									
Total Alkalinity as CaCO3	----	1	mg/kg		----	383	----	----	400
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg		----	244	----	----	261
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		----	139	----	----	139
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		----	50	----	----	70
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.09	0.06	0.01	0.02	0.02
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		----	130	----	----	670
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		----	<10	----	----	<10
Magnesium	7439-95-4	10	mg/kg		----	<10	----	----	<10
Sodium	7440-23-5	10	mg/kg		----	290	----	----	600

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID: BY195-6 162 to 170	BY195-7 170 to 192	BY263-001 0 to 5	BY263-002 5 to 13	BY263-003 13 to 19
			Client sampling date / time	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
				EB1222663-006	EB1222663-007	EB1222663-008	EB1222663-009	EB1222663-010
ED093S: Soluble Major Cations - Continued								
Potassium	7440-09-7	10	mg/kg	----	<10	----	----	<10
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	----	**1000**	----	----	**1870**
Potassium	7440-09-7	50	mg/kg	----	**960**	----	----	**890**
Calcium	7440-70-2	50	mg/kg	----	**18700**	----	----	**14600**
Magnesium	7439-95-4	50	mg/kg	----	**11100**	----	----	**7430**
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	----	**0.4**	----	----	<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
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	----	----	<0.1
Vanadium	7440-62-2	0.1	mg/kg	----	<0.1	----	----	<0.1
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	----	**2690**	----	----	**4410**
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	----	**22**	----	----	**26**
Iron	7439-89-6	50	mg/kg	----	**43600**	----	----	**56000**
Manganese	7439-96-5	5	mg/kg	----	**1030**	----	----	**1880**
Molybdenum	7439-98-7	2	mg/kg	----	<2	----	----	<2
Selenium	7782-49-2	5	mg/kg	----	<5	----	----	<5
Vanadium	7440-62-2	5	mg/kg	----	**27**	----	----	**51**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID: BY195-6 162 to 170	BY195-7 170 to 192	BY263-001 0 to 5	BY263-002 5 to 13	BY263-003 13 to 19
				Client sampling date / time: 28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
				EB1222663-006	EB1222663-007	EB1222663-008	EB1222663-009	EB1222663-010
EG005T: Total Metals by ICP-AES - Continued								
Arsenic	7440-38-2	5	mg/kg	----	**5**	----	----	**11**
Cadmium	7440-43-9	1	mg/kg	----	<1	----	----	**1**
Chromium	7440-47-3	2	mg/kg	----	**15**	----	----	**18**
Copper	7440-50-8	5	mg/kg	----	**28**	----	----	**52**
Lead	7439-92-1	5	mg/kg	----	**16**	----	----	**18**
Nickel	7440-02-0	2	mg/kg	----	**77**	----	----	**74**
Zinc	7440-66-6	5	mg/kg	----	**77**	----	----	**108**
EG035S: Soluble Mercury by FIMS								
Mercury	7439-97-6	0.0005	mg/kg	----	<0.0005	----	----	<0.0005
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	<0.1	----	----	<0.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID	BY263-004 19 to 26	BY264-001 0 to 6	BY264-002 6 to 11	BY264-003 11 to 28	BY264-004 28 to 35
				Client sampling date / time	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
					EB1222663-011	EB1222663-012	EB1222663-013	EB1222663-014	EB1222663-015
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.6	8.6	9.2	8.4	9.7
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-5.8	-9.3	-9.8	-4.1	-45.4
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		555	1030	177	1010	842
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		6.7	9.9	9.8	4.7	45.7
ANC as CaCO3	----	0.1	% CaCO3		0.7	1.0	1.0	0.5	4.6
Fizz Rating	----	0	Fizz Unit		0	0	0	0	2
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		----	----	----	12.9	----
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	----	0.5	----
Exchangeable Magnesium	----	0.1	meq/100g		----	----	----	1.7	----
Exchangeable Potassium	----	0.1	meq/100g		----	----	----	<0.1	----
Exchangeable Sodium	----	0.1	meq/100g		----	----	----	1.4	----
Exchangeable Aluminium	----	0.1	meq/100g		----	----	----	<0.1	----
Cation Exchange Capacity	----	0.1	meq/100g		----	----	----	3.7	----
ED037: Alkalinity									
Total Alkalinity as CaCO3	----	1	mg/kg		----	----	----	87	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg		----	----	----	87	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		----	----	----	<1	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		----	----	----	190	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.03	0.02	<0.01	0.02	0.01
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		----	----	----	1810	----
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		----	----	----	<10	----
Magnesium	7439-95-4	10	mg/kg		----	----	----	<10	----
Sodium	7440-23-5	10	mg/kg		----	----	----	1200	----

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID	BY263-004 19 to 26	BY264-001 0 to 6	BY264-002 6 to 11	BY264-003 11 to 28	BY264-004 28 to 35
				Client sampling date / time	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
					EB1222663-011	EB1222663-012	EB1222663-013	EB1222663-014	EB1222663-015
ED093S: Soluble Major Cations - Continued									
Potassium	7440-09-7	10	mg/kg		----	----	----	<10	----
ED093T: Total Major Cations									
Sodium	7440-23-5	50	mg/kg		----	----	----	**3320**	----
Potassium	7440-09-7	50	mg/kg		----	----	----	**140**	----
Calcium	7440-70-2	50	mg/kg		----	----	----	**870**	----
Magnesium	7439-95-4	50	mg/kg		----	----	----	**3140**	----
EG005S : Soluble Metals by ICPAES									
Aluminium	7429-90-5	1	mg/kg		----	----	----	<1	----
Antimony	7440-36-0	0.1	mg/kg		----	----	----	**0.1**	----
Arsenic	7440-38-2	0.1	mg/kg		----	----	----	<0.1	----
Boron	7440-42-8	1	mg/kg		----	----	----	**1**	----
Cadmium	7440-43-9	0.1	mg/kg		----	----	----	<0.1	----
Chromium	7440-47-3	0.1	mg/kg		----	----	----	<0.1	----
Cobalt	7440-48-4	0.1	mg/kg		----	----	----	<0.1	----
Copper	7440-50-8	0.1	mg/kg		----	----	----	<0.1	----
Iron	7439-89-6	1	mg/kg		----	----	----	<1	----
Lead	7439-92-1	0.1	mg/kg		----	----	----	<0.1	----
Manganese	7439-96-5	0.1	mg/kg		----	----	----	<0.1	----
Molybdenum	7439-98-7	0.1	mg/kg		----	----	----	<0.1	----
Nickel	7440-02-0	0.1	mg/kg		----	----	----	<0.1	----
Selenium	7782-49-2	0.1	mg/kg		----	----	----	**0.1**	----
Vanadium	7440-62-2	0.1	mg/kg		----	----	----	<0.1	----
Zinc	7440-66-6	0.1	mg/kg		----	----	----	<0.1	----
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		----	----	----	**12800**	----
Antimony	7440-36-0	5	mg/kg		----	----	----	<5	----
Boron	7440-42-8	50	mg/kg		----	----	----	<50	----
Cobalt	7440-48-4	2	mg/kg		----	----	----	**22**	----
Iron	7439-89-6	50	mg/kg		----	----	----	**74100**	----
Manganese	7439-96-5	5	mg/kg		----	----	----	**431**	----
Molybdenum	7439-98-7	2	mg/kg		----	----	----	<2	----
Selenium	7782-49-2	5	mg/kg		----	----	----	<5	----
Vanadium	7440-62-2	5	mg/kg		----	----	----	**143**	----

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID: BY263-004 19 to 26	BY264-001 0 to 6	BY264-002 6 to 11	BY264-003 11 to 28	BY264-004 28 to 35
				Client sampling date / time: 28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
				EB1222663-011	EB1222663-012	EB1222663-013	EB1222663-014	EB1222663-015
EG005T: Total Metals by ICP-AES - Continued								
Arsenic	7440-38-2	5	mg/kg	----	----	----	<5	----
Cadmium	7440-43-9	1	mg/kg	----	----	----	**1**	----
Chromium	7440-47-3	2	mg/kg	----	----	----	**146**	----
Copper	7440-50-8	5	mg/kg	----	----	----	**36**	----
Lead	7439-92-1	5	mg/kg	----	----	----	<5	----
Nickel	7440-02-0	2	mg/kg	----	----	----	**71**	----
Zinc	7440-66-6	5	mg/kg	----	----	----	**35**	----
EG035S: Soluble Mercury by FIMS								
Mercury	7439-97-6	0.0005	mg/kg	----	----	----	<0.0005	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	<0.1	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID	BY264-005 35 to 42.6	248RF 44 to 44.38	263RF 29.34 to 29.84	272RF 72.54 to 72.94	275RF 58.34 to 58.74
				Client sampling date / time	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
					EB1222663-016	EB1222663-017	EB1222663-018	EB1222663-019	EB1222663-020
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		9.1	9.2	8.3	9.0	9.2
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t		-54.8	4.8	6.8	-1.6	-2.9
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		559	397	322	331	342
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		56.9	4.7	2.7	4.0	3.5
ANC as CaCO3	----	0.1	% CaCO3		5.8	0.5	0.3	0.4	0.4
Fizz Rating	----	0	Fizz Unit		2	0	0	0	0
EA026 : Chromium Reducible Sulfur									
Chromium Reducible Sulphur	----	0.005	%		----	0.280	0.114	0.053	0.017
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		7.9	----	----	----	----
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		2.2	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		4.6	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		0.2	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		1.7	----	----	----	----
Exchangeable Aluminium	----	0.1	meq/100g		<0.1	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		8.7	----	----	----	----
ED037: Alkalinity									
Total Alkalinity as CaCO3	----	1	mg/kg		348	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg		313	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg		35	----	----	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		280	----	----	----	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		0.07	0.31	0.31	0.08	0.02
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	10	mg/kg		640	----	----	----	----
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		<10	----	----	----	----

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID: BY264-005 35 to 42.6	248RF 44 to 44.38	263RF 29.34 to 29.84	272RF 72.54 to 72.94	275RF 58.34 to 58.74
				Client sampling date / time: 28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
				EB1222663-016	EB1222663-017	EB1222663-018	EB1222663-019	EB1222663-020
ED093S: Soluble Major Cations - Continued								
Magnesium	7439-95-4	10	mg/kg	<10	----	----	----	----
Sodium	7440-23-5	10	mg/kg	**640**	----	----	----	----
Potassium	7440-09-7	10	mg/kg	<10	----	----	----	----
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	**1420**	----	----	----	----
Potassium	7440-09-7	50	mg/kg	**780**	----	----	----	----
Calcium	7440-70-2	50	mg/kg	**9580**	----	----	----	----
Magnesium	7439-95-4	50	mg/kg	**5520**	----	----	----	----
EG005S : Soluble Metals by ICPAES								
Aluminium	7429-90-5	1	mg/kg	<1	----	----	----	----
Antimony	7440-36-0	0.1	mg/kg	<0.1	----	----	----	----
Arsenic	7440-38-2	0.1	mg/kg	<0.1	----	----	----	----
Boron	7440-42-8	1	mg/kg	<1	----	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	----	----	----	----
Chromium	7440-47-3	0.1	mg/kg	<0.1	----	----	----	----
Cobalt	7440-48-4	0.1	mg/kg	<0.1	----	----	----	----
Copper	7440-50-8	0.1	mg/kg	<0.1	----	----	----	----
Iron	7439-89-6	1	mg/kg	<1	----	----	----	----
Lead	7439-92-1	0.1	mg/kg	<0.1	----	----	----	----
Manganese	7439-96-5	0.1	mg/kg	<0.1	----	----	----	----
Molybdenum	7439-98-7	0.1	mg/kg	<0.1	----	----	----	----
Nickel	7440-02-0	0.1	mg/kg	<0.1	----	----	----	----
Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----
Vanadium	7440-62-2	0.1	mg/kg	<0.1	----	----	----	----
Zinc	7440-66-6	0.1	mg/kg	<0.1	----	----	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**2520**	----	----	----	----
Antimony	7440-36-0	5	mg/kg	<5	----	----	----	----
Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
Cobalt	7440-48-4	2	mg/kg	**19**	----	----	----	----
Iron	7439-89-6	50	mg/kg	**48200**	----	----	----	----
Manganese	7439-96-5	5	mg/kg	**1120**	----	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	----	----	----	----

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID: BY264-005, 35 to 42.6	248RF, 44 to 44.38	263RF, 29.34 to 29.84	272RF, 72.54 to 72.94	275RF, 58.34 to 58.74
			Client sampling date / time	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
				EB1222663-016	EB1222663-017	EB1222663-018	EB1222663-019	EB1222663-020
EG005T: Total Metals by ICP-AES - Continued								
Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
Vanadium	7440-62-2	5	mg/kg	**33**	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	**9**	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**9**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**41**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**14**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**37**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**78**	----	----	----	----
EG035S: Soluble Mercury by FIMS								
Mercury	7439-97-6	0.0005	mg/kg	<0.0005	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID: 248FL 52.59 to 53	263FL 35.65 to 36.1	268FL 62 to 62.45	272FL 82.6 to 83	275F 67.98 to 68.39
				Client sampling date / time: 28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00	28-AUG-2012 15:00
				EB1222663-021	EB1222663-022	EB1222663-023	EB1222663-024	EB1222663-025
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.3**	**9.0**	**9.3**	**9.3**	**9.0**
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	**0.7**	**1.5**	**-2.3**	<0.5	**-1.8**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**345**	**630**	**306**	**310**	**456**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**2.4**	**2.8**	**3.2**	**3.3**	**3.6**
ANC as CaCO3	----	0.1	% CaCO3	**0.2**	**0.3**	**0.3**	**0.3**	**0.4**
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**0**	**0**
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	**0.102**	**0.117**	**0.025**	**0.113**	**0.037**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.10**	**0.14**	**0.03**	**0.12**	**0.06**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID: GM-r C5 Composite of 17>20	GM-f C6 Composite of 21>25	----	----	----
				Client sampling date / time: 30-AUG-2012 15:00	30-AUG-2012 15:00	----	----	----
				EB1222663-026	EB1222663-027	----	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**9.0**	**9.3**	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**366**	**378**	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**2.2**	**2.4**	----	----	----
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	**107**	**152**	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	**107**	**63**	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<1	**89**	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**120**	**120**	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	**430**	**430**	----	----	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	----	----	----
Magnesium	7439-95-4	10	mg/kg	<10	<10	----	----	----
Sodium	7440-23-5	10	mg/kg	**370**	**380**	----	----	----
Potassium	7440-09-7	10	mg/kg	<10	<10	----	----	----
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	**1120**	**1230**	----	----	----
Potassium	7440-09-7	50	mg/kg	**820**	**990**	----	----	----
Calcium	7440-70-2	50	mg/kg	**630**	**690**	----	----	----
Magnesium	7439-95-4	50	mg/kg	**880**	**1080**	----	----	----
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	**1.8**	**0.8**	----	----	----
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	----	----	----

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID: GM-r C5 Composite of 17>20	GM-f C6 Composite of 21>25	----	----	----
			Client sampling date / time	30-AUG-2012 15:00	30-AUG-2012 15:00	----	----	----
				EB1222663-026	EB1222663-027	----	----	----
EG005S : Soluble Metals by ICPAES - Continued								
Lead	7439-92-1	0.1	mg/kg	<0.1	<0.1	----	----	----
Manganese	7439-96-5	0.1	mg/kg	<0.1	<0.1	----	----	----
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	**0.3**	**0.2**	----	----	----
Vanadium	7440-62-2	0.1	mg/kg	**0.1**	<0.1	----	----	----
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	**2360**	**2190**	----	----	----
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	**9**	**7**	----	----	----
Iron	7439-89-6	50	mg/kg	**1040**	**870**	----	----	----
Manganese	7439-96-5	5	mg/kg	<5	<5	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	<2	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	<5	----	----	----
Vanadium	7440-62-2	5	mg/kg	**11**	**5**	----	----	----
Arsenic	7440-38-2	5	mg/kg	**8**	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	**2**	**2**	----	----	----
Copper	7440-50-8	5	mg/kg	**48**	**41**	----	----	----
Lead	7439-92-1	5	mg/kg	**17**	**19**	----	----	----
Nickel	7440-02-0	2	mg/kg	**26**	**19**	----	----	----
Zinc	7440-66-6	5	mg/kg	**31**	**16**	----	----	----
EG035S: Soluble Mercury by FIMS								
Mercury	7439-97-6	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----

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TEST RESULTS

Client :	ALS Environmental Brisbane	Report No. :	R11337
Address :	32 Shand Street, Stafford	Job No. :	117634002/4
Project :	Delivered Samples	Date Received :	30/09/2011
Batch No. :	EB1118517	Sampled by :	Client

EMERSON CLASSIFICATION

Reg'n No.	Sample No.	Sample ID	Description	Emerson Classification Number
11304907	25	BY073-1	(CH) Silty CLAY, brown	1

Remarks : Deionised water at 20 °C used in Emerson Class test.

Test Procedure : AS 1289 3.8.1

Prepared by NF Checked by GH

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NATA

4/10/11

Nick Farrer
Approved Signatory

Senior Technical Officer
NATA Accred. No. : 1961

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www.golder.com.au

TEST RESULTS

Client :	ALS Environmental Sydney	Report No. :	R11418
Address :	284 Woodpark Road, Smithfield	Job No. :	117634002/15
Project :	Delivered Samples	Date Received :	3/10/2011
Batch No. :	ES1118644	Sampled by :	Client

EMERSON CLASSIFICATION

Reg'n No.	Sample No.	Sample ID	Description	Emerson Classification Number
11305044	1	BY132-1	(CL) Silty CLAY, red brown.	5
11305045	2	BY132-2	(CI) Silty CLAY, brown.	2
11305046	3	BY132-3	(CI) Silty CLAY, brown.	5
11305047	4	BY132-4	(SM) Silty SAND, grey.	2
11305048	5	BY132-5	(SC) Clayey SAND, brown.	4
11305049	6	BY132-6	(GM) Silty GRAVEL, brown.	5
11305050	7	BY132-7	(CH) Silty CLAY, dark brown.	3
11305051	8	BY132-8	(SM) Silty SAND, brown.	5
11305052	9	BY132-9	(SM) Silty SAND, brown.	4
11305053	10	BY132-10	(CH) Silty CLAY, brown.	4
11305054	11	BY132-11	(CI) Sandy CLAY, brown.	6
11305055	12	BY132-12	(SM) Silty SAND, brown.	6
11305056	13	BY127-1	(CI) Silty CLAY, brown.	5

Remarks : Deionised water at 20 °C used in Emerson Class test.

Test Procedure : AS 1289 3.8.1

Prepared by NF Checked by CV

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TEST RESULTS

Client :	ALS Environmental Brisbane	Report No. :	R11939
Address :	32 Shand Street, Stafford	Job No. :	117634002/4
Project :	Delivered Samples	Date Received :	2/12/2011
Batch No. :	EB1125857	Sampled by :	Client

EMERSON CLASSIFICATION

Reg'n No.	Sample No.	Sample ID	Description	Emerson Classification Number
11307007	11	BY107-1	(CH) Silty CLAY, brown.	1
11307008	92	BY082-1	(CH) Silty CLAY, brown.	6
11307009	138	BY047-1	(CH) Silty CLAY, brown.	1

Remarks : Deionised water at 20 °C used in Emerson Class test.

Test Procedure : AS 1289 3.8.1

Prepared by KB Checked by NF

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19/12/11

Nick Farrer
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NATA Accred. No. : 1961

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