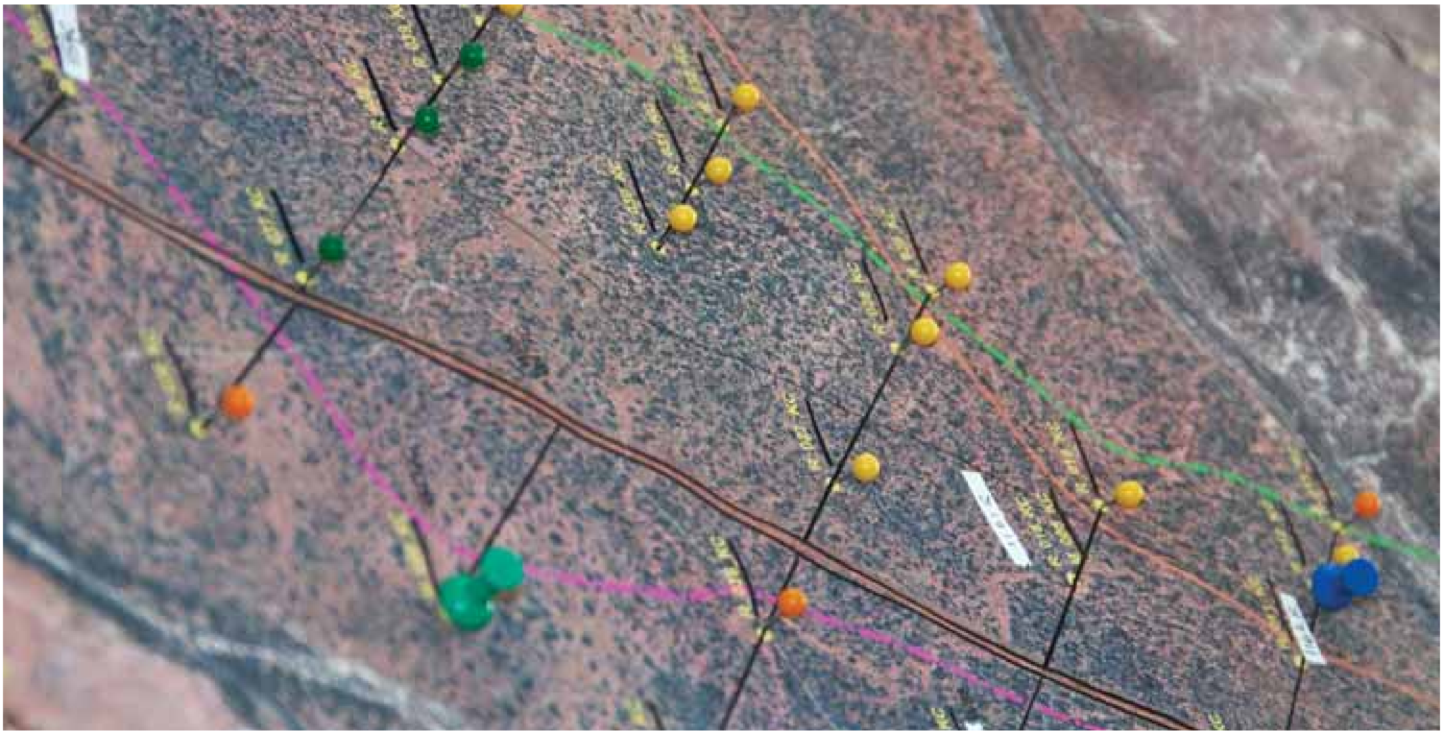
HANCOCK GALILEE PTY LTD

Kevin's Corner Project Environmental Impact Statement

Q | Mine Waste



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Kevin's Corner Project Environmental Impact Statement

Q1 | Geochemical Report

Kevins Corner Geochemical Characterisation and Assessment

Report prepared by

srk consulting

September 2011

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HCK003

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Executive Summary

Background

The Kevins Corner Project is a thermal coal deposit within the Galilee Basin, Queensland. The project is located approximately 65 km north of Alpha, 110 km southwest of the township of Clermont and approximately 360 km south west of Mackay in Central Queensland.

Approximately 3.15 billion tonnes of overburden and 151 million tonnes of coal rejects are expected to be generated over the life of mine. In addition, coarse reject and tailings products for on site disposal would also be generated from the coal wash plant from both open pit and underground operations. For every 100 t of ROM coal approximately 75 t of product coal, 17 t of coarse reject and 8 t of tailings will be produced. This amounts to approximately 150 Mt and 70 Mt of coarse and fine reject, respectively, generated over the LOM.

A geochemical characterisation and assessment of mine overburden, coal and coal reject products from the proposed Kevins Corner Project was undertaken.

Sample selection

Samples were selected to represent mine materials categorised according to the resource model.

Samples of similar lithology were allocated to one of five lithology groups. The five groups were i) Carbonaceous, ii) Sand and Gravel, iii) Clay and Soil, iv) Coal and v) Remainder (Rem).

Overburden samples collected from within the pit shell of the proposed Project from five lithology groups which are likely to represent more than 90% of the overburden (based on the lithological logging).

Coal samples were collected from economic coal seams and likely uneconomic coal seams and represent coal material that may be stockpiled or remain in the pit. Coal tailings and rejects as well as samples from the roof and floor regions adjacent to the coal seams were also obtained.

A total 294 samples were selected from 26 drillholes for analysis and testing. A further three raw coal, coarse reject and tailings samples from D Seam were generated from composite material from two additional large diameter drill holes.

Results and Discussion

Composition of mine overburden material

Overburden and interburden materials were assessed separately from coal reject, roof and floor and processed coal samples.

The overburden and interburden comprised four lithological groups as follows: i) Rem (being 85% of the estimated total overburden and interburden mass), ii) Clay and Soil (7%), iii) Sand and Gravel (4%) and iv) Carbonaceous (3%).

Acidity, Salinity, Metals

The following findings are based on paste pH and paste EC testing of 294 samples and static leach test of 29 samples.

Overburden and interburden:

- The large majority of overburden and interburden that is not immediately adjacent to coal seams is not likely to be a source of acid immediately after mining.
- There was limited evidence (one leached sample) that overburden and interburden samples from locations close to coal units that would not be mined could release acid. Some overburden and

interburden materials could be potential sources of salts (salinity). Whilst elevated soluble salts may be released from the samples over a range of pH values, the largest concentration of soluble salts would be released in the near neutral range between pH 5 and 8.

- The concentrations of metals in leachates were for the vast majority of samples very low.
- The small number of samples (3) that had higher metal releases in leach tests, originated from locations adjacent to coal seams and had acidic pH values.
- There was some evidence (two samples) that concentrations of selenium may be elevated at near neutral pH for a small amount of material.

Coal, roof, floor and processed coal products:

- Non-coal roof and floor materials may be associated with salt release over a range of pH values at a range of concentrations
- Non-coal roof and floor materials are not likely to be sources of acid.
- Undifferentiated coal is not likely to be a source of acid but may be a source of readily available salts.
- Weathered coal is unlikely to be a significant source of readily available soluble salts or acid.
- Coal rejects is potentially sources of acid (based on one sample).
- Coal rejects material is potentially a source of soluble salts (based on one sample).
- Coal tailings is unlikely to be a source of acid (based on one sample).
- Coal product is unlikely to be a significant source of readily available soluble salts but is possibly a source of acid (based on one sample).
- Three undifferentiated coal samples were leach tested. No metals were leached from these samples at elevated concentrations and most metals were at very low concentrations.

Potential AMD

Modified NPR and AMIRA methods were used to classify the potential of samples to form acid.

Two hundred and sixty six samples were tested and classified by the NPR method. A subset of 80 samples were NAG tested and classified using the AMIRA method.

There was generally good agreement in sample classification by the modified NPR and AMIRA methods.

The vast majority of overburden and interburden samples (representing 3.1 billion tonnes of overburden) were NAF (89 to 94% depending on the classification scheme). Four to 8% of the samples were PAF. However, many of the PAF samples had low capacity to produce acid (i.e. NAPP ≤ 5 kgH_2SO_4/t).

For example, of the eleven samples classified PAF under the NPR scheme eight samples had low capacity to generated acid. Under the AMIRA scheme four of the six PAF samples had a low capacity to produce acid.

The coal tailings and coarse rejects would all be classed PAF. The coal product would be classed NAF (based on one sample of each).

Of the 19 fresh Carbonaceous group samples none were classed as PAF. No weathered Carbonaceous samples were available for characterisation.

Acid production and Neutralising Capacity

The distribution of overburden and mixing during mining would likely result in acid produced in one localised region contacting nearby neutralising materials. Thus, leachate quality will generally be determined by average properties.

For the overburden and interburden lithology groups the average acid neutralising capacity (ANC) exceeds acid potential (AP) and the neutralisation potential ratio (NPR) is greater than or equal to five.

This indicates that the on average there is adequate neutralising capacity to neutralise acid that is formed. However, actual leachate quality will depend on the localised distribution of overburden and the rate of neutralising of acid.

For the coal and coal product the average NAPP values indicate that there is more neutralising capacity than acid potential but the NPR value indicates that the excess may not be enough to ensure all leachate remains neutral.

Carbonaceous Roof and Floor, Rem Roof and Floor have excess neutralising capacity (negative NAPP and NPR > 3).

For the Tailings -250 µm and Rejects +250 µm samples the NAPP and NPR indicate that both would be PAF. However, the potential to produce acid for the tailings is low and much less than that of the rejects (1.7 compared to 61.3 kgH_2SO_4/t).

Dispersivity

Samples from all lithology groups showed some potential for dispersive behaviour. The general dispersivity characteristics of each material type is summarised in below.

Table 1: General dispersivity characteristics of each material type

SRK Group	Weathering	General dispersive characteristics
Coal	Fresh	Non dispersive to slightly dispersive
Carbonaceous	Fresh	Non dispersive to slightly dispersive
Soil and clay	Soil	Non dispersive
	Clay - highly to completely weathered	Dispersive or slightly dispersive
Remaining	Moderately, highly and completely weathered	Dispersive or slightly dispersive
	Slightly weathered or fresh	Non dispersive to slightly dispersive

Material Sampling Frequency

Sample Spacing

Experimental variography indicates that sampling from drillholes space on 1000 m x 1000 m grid is adequate for interpolation and extrapolation of total S and ANC in all overburden and interburden lithology groups and for the coal group.

In the eastern half of the proposed open pit the sampled drillhole locations were approximately on 1000 m x 1000 m grid and were therefore adequately spaced. Toward the western end of the proposed open pit the samples were collected from drillholes spaced at greater than 1000 m x 1000 m. Thus, in this region there is less confidence in the expected distribution of total sulphur grade. However, drill spacing in this area does not exceed approximately 2000 m and therefore based on variography at Alpha and KC the overall distribution of holes at Kevins Corner is considered adequate.

Total Sulpur Distribution

Weathered material

In the weathered material there was 95% confidence that the mean total S content was less than 0.1 wt% for the following groups:

- Clay and soil
- Sand and gravel
- REM (excluding the 2.36 wt% S sample)

For the weathered coal and the REM (including the 2.36 wt% sample) groups the 0.1 wt% total S value was not within the 95% confidence limits of the value of the mean total S content.

No conclusion could be drawn for weathered Carbonaceous material as no samples were available for testing.

Fresh material

There is 95% confidence that the mean total sulphur content for the Coal and Carbonaceous groups do exceed the 0.1 wt%.

For the fresh Carbonaceous and fresh Coal groups there were insufficient results to demonstrate to the 95^{th} percentile confidence interval that the mean total sulphur content is above or below 0.2 or 0.3 wt%.

Combining the Kevins Corner and Alpha results for the fresh Carbonaceous group indicate at the 95% confidence level that the mean total S value was within the interval 0.153 to 0.304 wt%.

The probability of the total sulphur content exceeding 0.1 wt% for both the fresh Carbonaceous and coal group materials mined on a 100 m x 100 x 2 m block were estimated to be 100%. However, none of the Carbonaceous samples were classed PAF,

Recommendations

Based on the information currently available:

- The majority of overburden should be managed as non-acid forming material. However, there is potential for existing salinity to be washed from some overburden in response to rainfall events. Consequently, containment of run-off and water quality monitoring may be required depending on the sensitivity of ground and surface water to salinity. The results indicate that water quality predictions for the disturbed mine overburden are warranted.
- More samples of coal, roof, floor, coal rejects and coal tailings and some weathered Carbonaceous material should be characterised to improve the robustness of the current assessment of the geochemical characteristics of these materials. SRK understands that HGPL plans to undertake additional infill drilling which would allow sampling for supplemental geochemical testing of additional samples.
- Until a more robust assessment of the coal rejects has been conducted they should be considered as PAF and appropriate management strategies should be considered.
- Additional drilling should be conducted toward the western end of the proposed open pit as mining progresses. Samples from the holes should be collected and geochemically characterised).
- Samples of selected major lithologies should be kinetically tested to determine the rates of acid production, acid neutralisation and metals release. Samples with total sulphur contents above and below 0.1 wt% should be tested. Data produced should be used in conjunction with other test results to confirm that materials with a total sulphur content of less than 0.1 wt% are NAF.
- Suitable precautions should be taken to prevent water flowing over or ponding on the overburden emplacements to minimise physical erosion of the dispersive materials, and to prevent leaching of salts, which can mitigate dispersive behaviour. Good compaction may also help prevent ingress of water into the slopes. The use of flat slopes (<5% gradient if possible) or concave slopes (with steepest gradient at the top of the slope and reducing the gradient as slope length and quantity of runoff increase) is recommended to minimise any potential for gully formation.

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Disclaimer

The opinions expressed in this Report are based on the information supplied to SRK Consulting (Australasia) Pty Ltd (SRK) by Hancock Galilee Pty Ltd (HGPL). The opinions in this Report are provided in response to a specific request from Hancock to do so. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

List of Abbreviations

Term	Definition
ABCC	Acid buffering characteristic curve
ALS	Australian Laboratory Services
AMD	Acid and metalliferous drainage
ANC	Acid neutralising capacity
AP	Acid potential calculated based on all non sulphate sulphur present as pyrite (kgH_2SO_4/t)
ARD	Acid rock drainage
BFS	Bankable Feasibility Study
CarbNP	Carbonate neutralisation potential estimated from the measured inorganic carbon concentration and assuming all carbon is present as carbonate (CO_3) (kgH_2SO_4/t)
DD	Diamond drilling
EC	Electrical conductivity
GAI	Global abundance index
HGPL	Hancock Galilee Pty Ltd
ICP-MS	Inductively coupled plasma mass spectrometry
ICP-OES	Inductively coupled optical emission spectroscopy
kg	Kilogram
m	Metre
MPA	Maximum potential acidity calculated assuming that all sulphur is present as pyrite (kgH_2SO_4/t)
NAF	Non acid forming - a classification in regard to potential for rock to be acid forming
NAG	Net acid generation (kgH_2SO_4/t)
NAPP	Net acid producing potential (kgH_2SO_4/t
NP	Acid neutralising capacity (kgH_2SO_4/t)
NPR	Net Potential Ratio
PAF	Potentially acid forming - a classification in regard to potential for rock to be acid forming
PAF-LC	Potentially acid forming and of low capacity to produce acid
PFS	Prefeasibility study
pH	Negative logarithm of the concentration of hydrogen ions
RC	Reverse circulation drilling
RL	Relative levels
SRK	SRK Consulting (Australasia) Pty Ltd
TIC	Total inorganic carbon
UC	Uncertain – a classification in regard to potential for rock to be acid forming

1. Introduction

1.1 Terms of reference

The Hancock Galilee Pty Ltd (HGPL) proposed Kevins Corner Coal Project is located in the Galilee Basin, Queensland.

SRK Consulting (Australasia) Pty Ltd (SRK) was engaged to carry out a geochemical characterisation and assessment of mine overburden, coal and coal reject products from the proposed Kevins Corner Project. Tests were conducted to determine potential for:

- Release of salinity
- Generation of acid and metalliferous drainage (AMD)
- Dispersivity

1.2 Report Scope

This report documents the findings of the:

- Geochemical characterisation carried out on samples representative of overburden, roof and floor materials, as well as product coal, rejects and tailings.
- Assessment to determine whether the samples tested adequately represent other materials at the site.

The geochemical investigation assessed samples for their potential to be sources of acid and metalliferous drainage and their potential to be dispersive. A detailed list of tests is given in section 3.

1.3 Background

The Kevins Corner Project is a thermal coal deposit within the Galilee Basin, Queensland. The project is located approximately 65 km north of Alpha, 110 km southwest of the township of Clermont and approximately 360 km south west of Mackay in Central Queensland.

The project is expected to generate 26 to 27 million tonnes per annum of run of mine coal from open cut and underground operations. The scheduled mine life is 30 years and reserves are present to mine beyond 30 years.

Approximately 3.15 billion tonnes of overburden and 151 million tonnes of unmarketable material is expected to be generated over the life of mine. In addition, coarse reject and tailings products for on-site disposal would also be generated from the coal wash plant. For every 100 t of ROM coal approximately 75 t of product coal, 17 t of coarse reject and 8 t of tailings will be produced. This amounts to approximately 150 Mt and 70 Mt of coarse and fine reject, respectively, generated over the LOM.

A geochemical characterisation and assessment of mine overburden, coal and coal reject products from the proposed Kevins Corner Project was undertaken.

1.3.1 Regional Setting and Climate

The climate of the Project site is similar to that at Emerald, approximately 170 km to the south west. The region surrounding the Project site typically has hot days during summer with mean maximum daytime temperatures of approximately 35°C. Winter maximum daytime temperatures are around 23°C. Mean maximum overnight temperatures are around 9°C in July, increasing to greater than 22°C in summer.

The average annual rainfall is 556 mm/y with approximately 48% of rainfall occurring in summer. The average pan evaporation is between 2000 and 2400 mm/y.

Typical winds at the Project site are predominately from the east through to north east. The wind speed reaches 6.6 metres per second (m/s) from the east, and is on average 2.6 m/s.

1.3.2 Geological setting

The Kevins Corner Coal deposits occur within the Galilee Basin, a sequence of Late Permian to Early Triassic sedimentary rocks, exposed in a linear belt between the towns of Pentland in the north and Tambo in the south (Figure 1-1).

Late Permian, coal-bearing strata of the Galilee Basin sub-crop are found in a linear, north-trending Belt in the central portion of the exposed section of the Basin and are essentially flat lying (dip estimated at 0.5° to the west). No major, regional scale fold and fault structures have been identified in regional mapping of the Project area (Golder, 2007a and Bridge Oil, 1994).

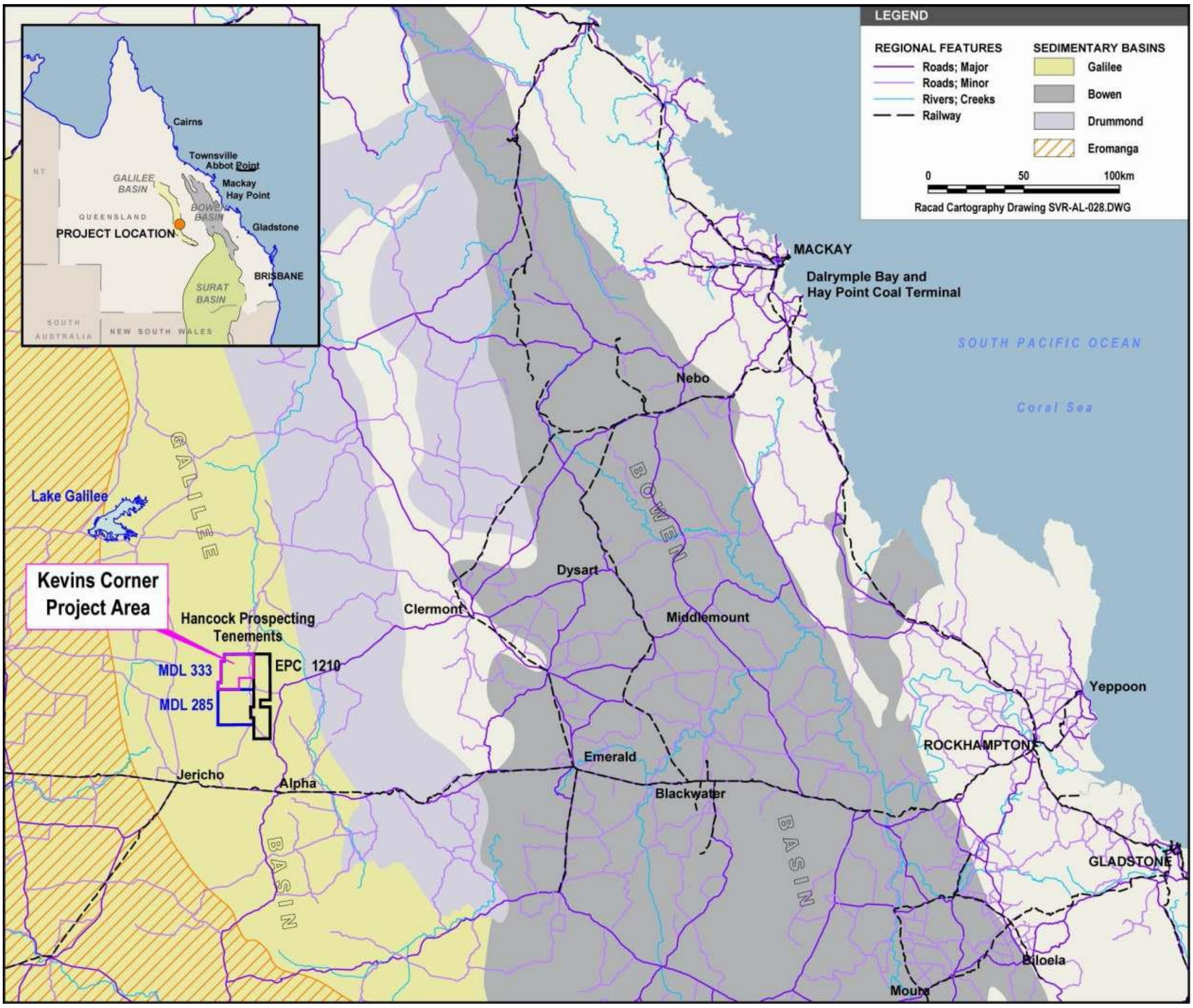

Figure 1-1: Galilee Basin, Central Queensland

The stratigraphy of the Galilee Basin in the Kevins Corner area is described in Table 1-1.

Table 1-1: Galilee Basin stratigraphy – Kevins Corner Area

<table>
<tr><th>Era</th><th>Period</th><th>Basin</th><th>Unit</th><th>Rock Type</th></tr>
<tr><td rowspan="2">Cainzoic</td><td>Quaternary</td><td></td><td></td><td>Alluvium</td></tr>
<tr><td>Tertiary</td><td></td><td></td><td>Argillaceous sandstones and clays</td></tr>
<tr><td rowspan="4">Mesozoic</td><td rowspan="3">Jurassic</td><td rowspan="3">Sub Eromanga Surat equivalent</td><td>Hutton Sandstone</td><td></td></tr>
<tr><td>Moolayember Formation</td><td></td></tr>
<tr><td>Clematis Sandstone</td><td>Quartz sandstone, minor siltstone and mudstone</td></tr>
<tr><td>Triassic</td><td></td><td>Rewan Formation</td><td>Green-grey mudstone, siltstone and labile sandstones</td></tr>
<tr><td rowspan="4">Paleozoic</td><td rowspan="2">Permian</td><td rowspan="3">Galilee</td><td>Bandanna Formation</td><td>Coal Seams (A & B), labile sandstones, siltstone and mudstone</td></tr>
<tr><td>Colinea Sandstone</td><td>Coal seams (C, D & E), labile and quartz sandstone</td></tr>
<tr><td>Late Carboniferous to Early Permian</td><td>Joe Joe Formation</td><td>Mudstone, labile sandstone, siltstone, shale and thin carbonaceous beds</td></tr>
<tr><td>Early Carboniferous</td><td>Drummond Basin</td><td></td><td></td></tr>
</table>

The coal measure stratigraphy, as defined by Hancock et al. in the Golder Associates Report (Golder, 2007a), is presented in Table 1-2. A cross-section presented in Figure 1-2 indicates the locations of coal seams within the project area.

Table 1-2: Late Permian Coal measure stratigraphy – Galilee Basin

<table>
<tr><th>Age</th><th>Lithology</th><th>Stratigraphic Unit</th><th>Thickness</th><th>Comments</th></tr>
<tr><td>Triassic</td><td>Green brown-purple mudstone, siltstone and labile sandstone</td><td>Rewan Formation</td><td></td><td>Only in west</td></tr>
<tr><td rowspan="15">Late Permian</td><td>Sandstone</td><td rowspan="5">Bandanna Formation</td><td>10–30 m</td><td rowspan="5">Increasingly argillaceous</td></tr>
<tr><td>Coal Seam A - contains thin dirt bands thickening from south to north</td><td>1–2.5 m</td></tr>
<tr><td>Labile sandstone, siltstone and mudstone</td><td>10 m</td></tr>
<tr><td>Coal Seam B – contains numerous dirt bands that constitute between 15 and 30% of seam. Variable in quality.</td><td>6–8 m</td></tr>
<tr><td>Labile sandstone, siltstone and mudstone</td><td>70–90 m</td></tr>
<tr><td>Coal Seam C – seam thins northward and splits apart</td><td rowspan="10">Colinlea Sandstone</td><td>2–3 m</td><td rowspan="10">Increasingly arenaceous</td></tr>
<tr><td>Labile sandstone, siltstone and mudstone</td><td>5–20 m</td></tr>
<tr><td>Coal Seam D – Stone bands present with seam thickening westward, upper section splits off main seam to north west</td><td>4.5–6 m</td></tr>
<tr><td>Labile sandstone, siltstone and mudstone</td><td>15 m</td></tr>
<tr><td>Coal Seam E – thin (0.2 m) clean coal bands, usually 2 bands E1 & E2</td><td>0.1–0.4 m</td></tr>
<tr><td>Labile sandstone, siltstone and mudstone</td><td>15 – 20 m</td></tr>
<tr><td>Coal Seam F – localised thick geological section, no working section</td><td>0.5 – 5 m</td></tr>
<tr><td>Labile sandstone, siltstone and mudstone</td><td>Unknown</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Early Permian</td><td>Labile and quartz sandstone</td><td>Undefined</td><td colspan="2">Transition to Joe Joe Formation</td></tr>
</table>

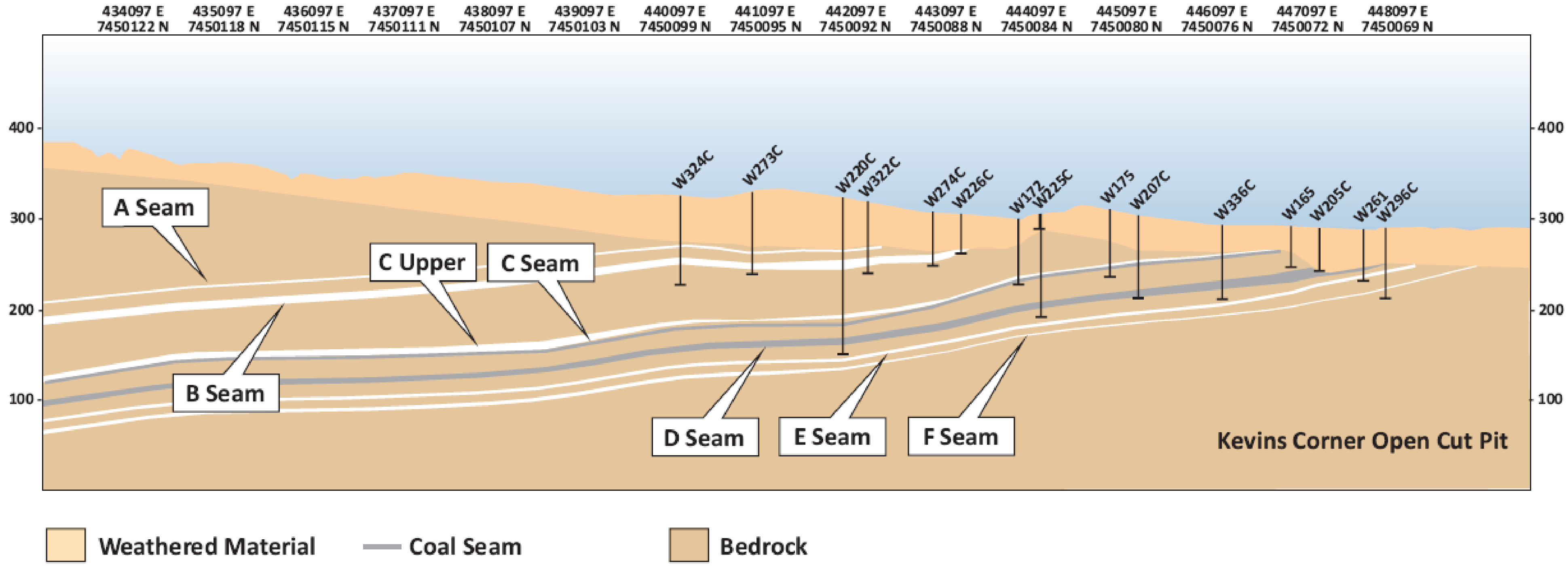

Figure 1-2: Cross section showing coal seams

2. Drilling and Sampling

Twenty coal samples and 274 non-coal overburden material samples were selected from 26 drillholes at the locations shown in Figure 2-1. One sample of composited D seam material from two drill holes had been processed in a pilot plant and the tailings – 250 µm, rejects +250 µm and the coal +250 µm samples produced were also characterised.

The origin and sample descriptions are provided in Appendix 1.

The primary objectives of the drilling and sampling program were to obtain samples:

- From major domains and a range of spatial locations from within the planned pit shell so as to reflect the geological variability and complexity in rock types.
- Representative of coal process materials.
- Representative of raw coal.

AMD sample drill spacing was variable (Figure 2-1) over the pit area with spacing from 300 m to 3000 m. An approximate average for the North South drill spacing is 1000 m and an approximate average for the east west spacing is 1000 m.

Also shown on the drillhole plan (Figure 2-1) are the locations of the proposed open cut mine areas. Due to changes in project economics the proposed open cut mine plan area has changed since the date of sampling (October 2010). The dotted line shown in Figure 2-1 indicates the originally proposed open cut mine plan area, with the currently proposed area indicated with solid lines.

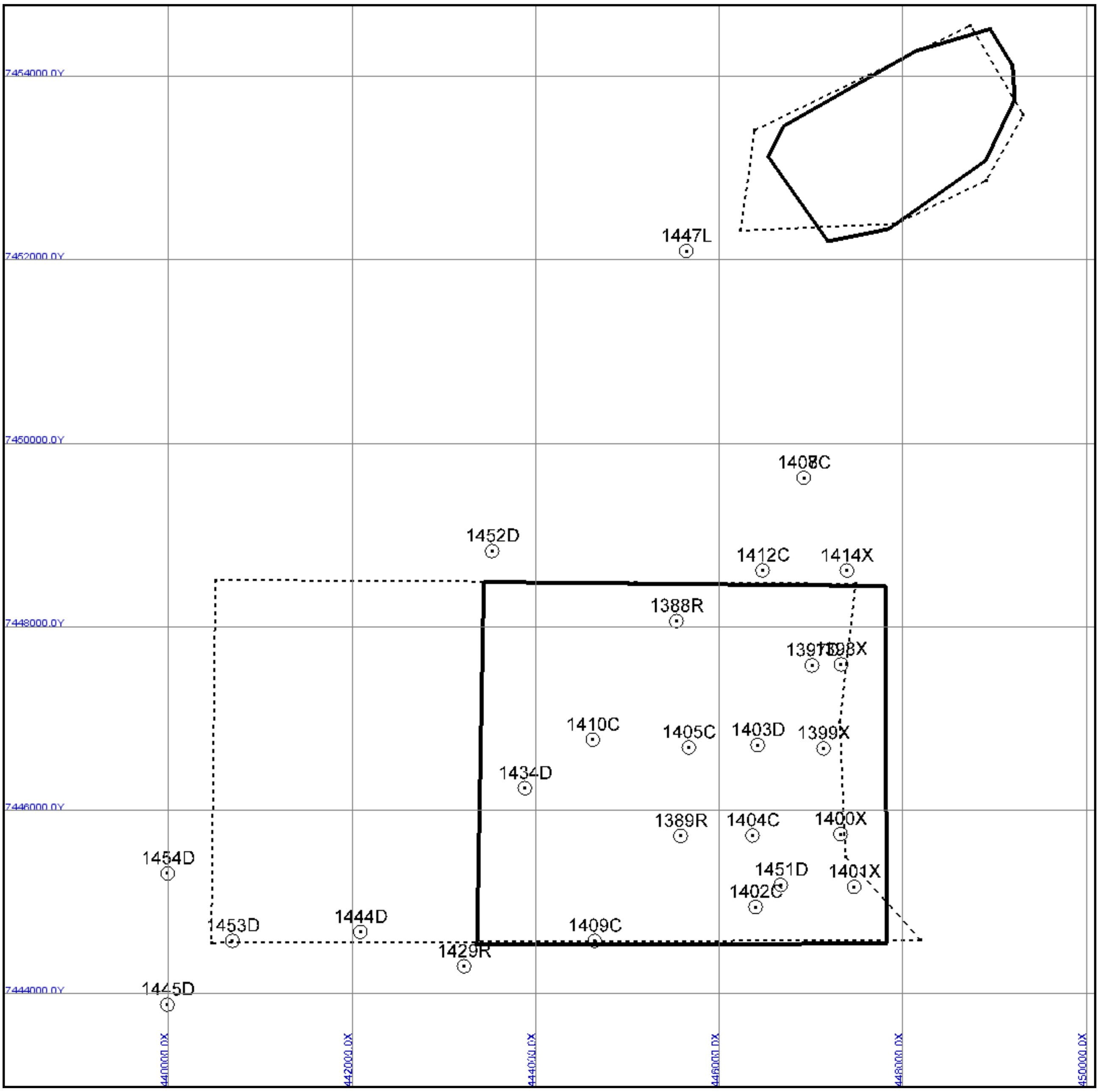

Figure 2-1: Plan of drillholes sampled for geochemical characterisation together with the evolving pit locations indicated as dashed (October 2010) and solid lines (current)

2.1 Lithology types and groups

SRK grouped all lithologies identified in the resource database into sets of lithologies likely to have similar AMD properties. This was in part to provide larger populations of samples for the statistical analysis of material characteristics as discussed in Section 5.

The major lithologies identified and the groupings are shown in Table 2-1 together with an estimate of the mass of each that would be mined estimated from the drillhole data. A comprehensive listing of the lithology codes entered in the drill logs and their relation to the summary groups is provided in Appendix 2.

Samples were collected from ‘fresh’ and weathered materials. Table 2-2 lists the number of samples in each lithology according to weathering state. In the remainder of this report the states of weathering were simplified to either fresh or weathered.

Note: Sandstone sample 1412C_17 was not allocated a weathering state and is not included in the table.

FR = Fresh, SW = slightly weathered, PW = partially weathered, WE = weathered, W = weathered, MW = moderately weathered, CW = completely weathered, HW = highly weathered.

Table 2-3 summarises the mass of material that may be mined according to group, lithology and weathering state.

A number of samples were collected from the roof and floor of the C and D coal seams. These samples and the raw coal samples could potentially have different potentials to produce and neutralise acid and metalliferous drainage from the overburden and interburden materials. Thus, these materials are discussed separately from the overburden and interburden in a number of the following sections.

Table 2-1: Groups and main overburden lithologies identified in drillholes

GROUP	Total Mass (thousand tonnes)	Lithology	Volume (thousand cubic metres)	Assumed Density	Mass (million tonnes)	Lithology code
Carbonaceous	104	Carbonaceous mudstone	16	2.3	38	XM
		Carbonaceous siltstone	15	2.3	35	XT, XX
		Other	13	2.3	31	XS, XC, XH
Clay and Soil	218	Clay	90	2	181	CL
		Soil	18	2	37	SO
Coal*		Coal	84	1.5	126	C* (except CM & CS)
		Other Coal	17	1.5	25	IC,SU,ZC,ZH,ZM,ZS,ZZ
Sand and Gravel	142	Sand	71	2	141	SA
		Gravel	0	2	1	GV
Remaining (Rem)	2689	Sandstone	631	2.15	1357	SS
		Siltstone	310	2.15	668	SL
		Claystone	125	2.15	269	CS
		Mudstone	97	2.15	209	SI
		Other	87	2.15	188	other

Table 2-2: Lithology groups, lithology and number of samples within each weathering class

Group	Lithology	Lith. code	FR	SW	PW	WE	W	MW	HW	CW
Carbonaceous	Carbonaceous mudstone	XM	5	0	0	0	0	0	0	0
Carbonaceous	Carbonaceous sandstone	XS	8	0	0	0	0	0	0	0
Carbonaceous	Carbonaceous shale	XH	6	0	0	0	0	0	0	0
Clay and soil	Clay	CL	1	8	0	0	0	3	13	9
Clay and soil	Soil	SO	0	0	0	0	0	1	1	7
Coal	Coal weathered	CW	0	0	1	0	0	0	0	2
Coal	Coal, undifferentiated	CO	11	0	1	4	0	0	0	0
Coal	Coaly shale	ZH	0	0	0	0	0	1	0	0
Rem	Claystone	CS	1	0	0	0	0	1	3	0
Rem	Conglomerate	CG	0	0	0	0	0	0	1	0
Rem	Laterite	LT	0	0	0	0	0	1	0	1
Rem	Mudstone	MS	6	0	0	1	0	2	0	0
Rem	Pebble conglomerate	PC	1	0	0	0	0	0	0	0
Rem	Sandstone	SS	80	21	1	1	1	2	8	0
Rem	Silcrete	SK	0	0	0	0	0	4	0	0
Rem	Siltstone	SL	31	1	0	1	0	14	7	2
Sand and gravel	Sand	SA	0	1	0	0	0	3	5	10
Total										293

Note: Sandstone sample 1412C_17 was not allocated a weathering state and is not included in the table.
FR = Fresh, SW= slightly weathered, PW = partially weathered, WE = weathered, W = weathered, MW = moderately weathered, CW = completely weathered, HW = Highly weathered

Table 2-3: Distribution of the mass of fresh and weathered material amongst lithologies

Group	Weathered	Fresh	Total
	Mass (Mt)		
Carbonaceous	27	77	104
Clay and soil	206	12	218
REM	1021	1669	2689
Sand and gravel	128	14	142
Subtotal	1381	1771	3152
Coal	13	138	151
Total			3304

3. Measurements

The following geochemical measurements and assays were undertaken on all samples:

- Paste pH and electrical conductivity (s:w ratio 1:2)
- Total sulphur
- Acid neutralising capacity (ANC)
- Multi-element analysis (four acid digest/aqua regia digest, ICPAES, ICPMS)

The following tests and assays were undertaken on selected samples:

- Single addition net acid generation (NAG) test
- Modified NAG test with extended boil and solution assay
- Distilled water extracts (simple leach tests) on solid. Solid to de-ionised water at a ratio of 1:3 (s:w)
- Multi-element scans of the extracts
- Chromium reducible sulphur
- Sulphate sulphur
- Carbon speciation (TIC/TOC)
- Acid Buffering Characteristic Curve

- Electrical conductivity for dispersivity (s:w ratio 1:5)
- Cation exchange capacity (CEC) and exchangeable sodium percentage (ESP)
- Emerson aggregate test

The modified NAG with extended boil test was conducted because there was potential for the total organic carbon content to be high in some samples.

Australian Laboratory Services (ALS), Brisbane, performed all testing.

4. Geochemistry Results and Discussion

4.1 Sulphur content

The frequency and accumulated distribution of total S are shown in Figure 4-1. The total S content ranged between <0.01 and 2.36 wt%. Approximately 83% of the samples have less than 0.1 wt%, 96% of the samples have less than 0.3% and over 99% of samples have a total S content of less than 1 wt%.

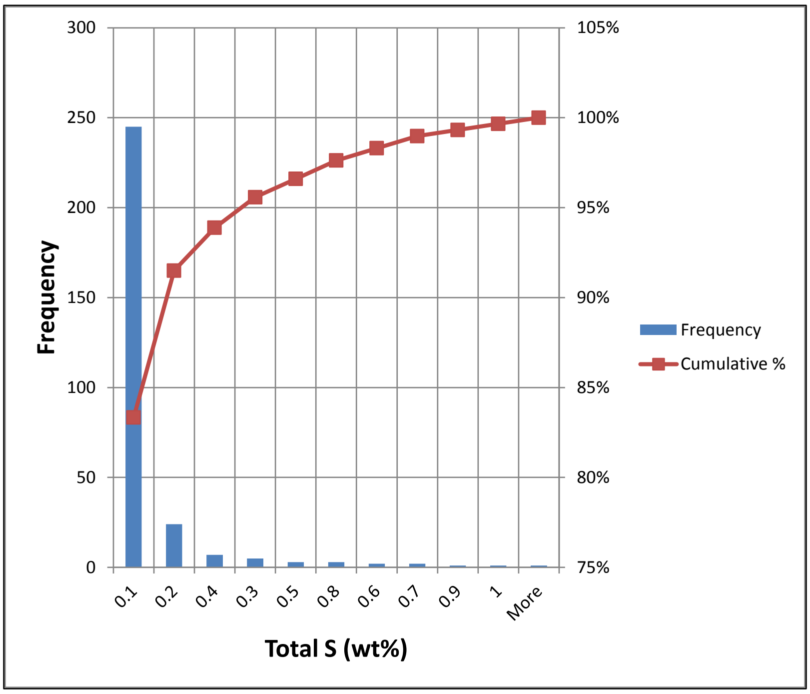

Figure 4-1: Distribution of sulphur contents of samples

4.2 Paste pH and Electrical Conductivity

Paste parameters provide an indication of the acidity and salinity of a sample at the time of testing (which can be several months after sampling). For example, acidic pH values may be used to infer the degree of weathering the sulphide minerals in the material has undergone, and the electrical conductivity may be used to infer the availability of readily soluble salts.

The paste pH and paste EC measurements were conducted on a solid to water ratio of 1 to 2. Note this is different from the solid to water ratio (of 1:5) referred to by DERM (2011).

Generally, paste pH ($pH_{1:2}$) values less than 5 indicate the presence of stored acidity (i.e. stored oxidation products; note that where the sample represents a soil organic acids may also be present) and net acid generating conditions, whereas high paste pH values suggest the presence of reactive neutralising minerals. High paste EC ($EC_{1:2}$) values may indicate a source of salinity and may be used to infer the potential for water contacting the overburden to become saline.

4.2.1 Overburden and Interburden

The results of paste measurements are tabulated in Appendix 3 and plotted in Figure 4-2 and Figure 4-3. The paste pH values for all overburden and interburden samples ranged from 3.4 to 9.9 (Figure 4-2), with 75% falling between 6 and 9. The average and median paste pH values were 7.6 and 7.9 respectively.

A small number of samples (12) had paste pH values below pH 5, and only two samples had a pH less than 4. These samples may have contained stored oxidation products and indicate that materials of the same characteristics could generate acid and reduce the pH waters contacting them without the sample undergoing further oxidation. The samples with pH less than 5 were from the carbonaceous mudstone (1), claystone (1), clay (1), sand (1), sandstone (5) and siltstone (3) groups. One of the lower pH samples was immediately adjacent an undifferentiated coal unit and the bulk of overburden is located away from coal units and typically has higher pH values.

For samples with measured total S contents of less than the detection limit (0.01 wt%) the total S content is presented as half of the detection limit, i.e. 0.005 wt%.

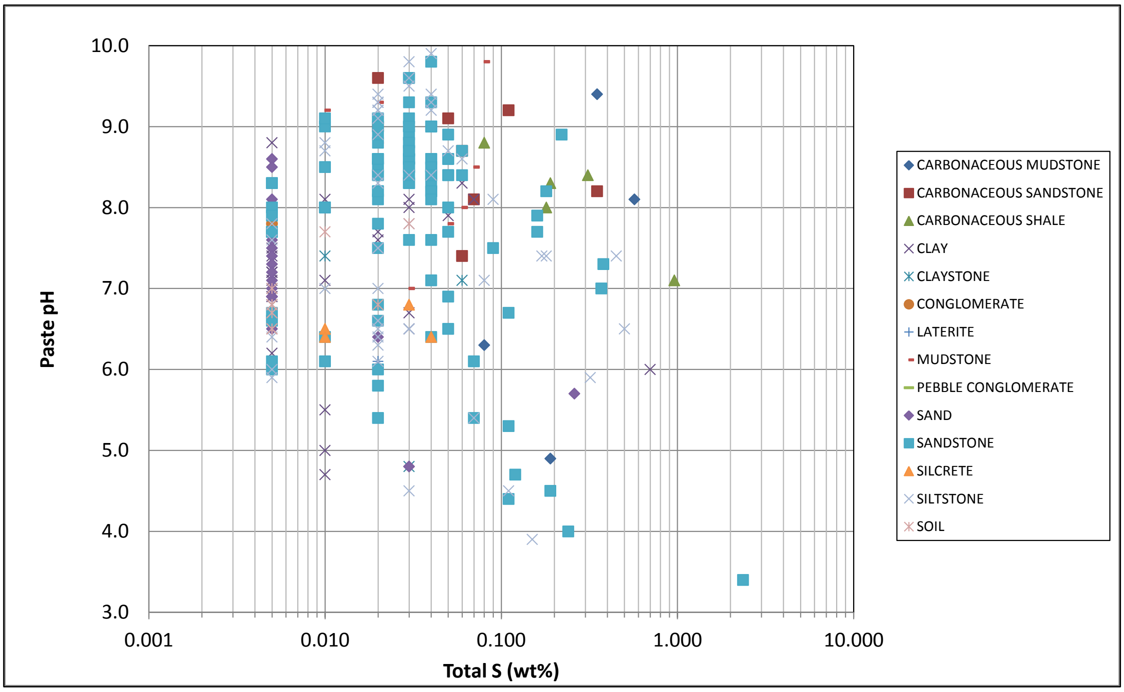

Figure 4-2: Paste pH as a function of total sulphur content for overburden and interburden by lithology

The paste EC of the samples ranged from 26 to 4880 µS/cm with an average of 1014 µS/cm and median of 739 µS/cm. The paste EC values of 102 of the 293 samples were greater than 1000 µS/cm. A plot of paste EC as a function of total sulphur for all samples is shown in Figure 4-3.

As shown in the plot, the paste EC is elevated across the range of sulphur contents, and across the range of pH values, as shown in Figure 4-4. This indicates that EC likely is indicative of salinity (salts, predominantly sodium chloride as well as sulphates, as indicated by leach extraction tests, see Section 4.6.2). The results indicate that the greatest concentration of soluble salts could be released in the near neutral range between pH 5 and 8 (where paste EC > 3000 µS/cm); however this does not consider the oxidation related release that may occur over time. Samples from the siltstone and clays lithologies gave rise to the greatest spread of paste EC values with siltstone samples having the highest frequency of elevated paste EC values.

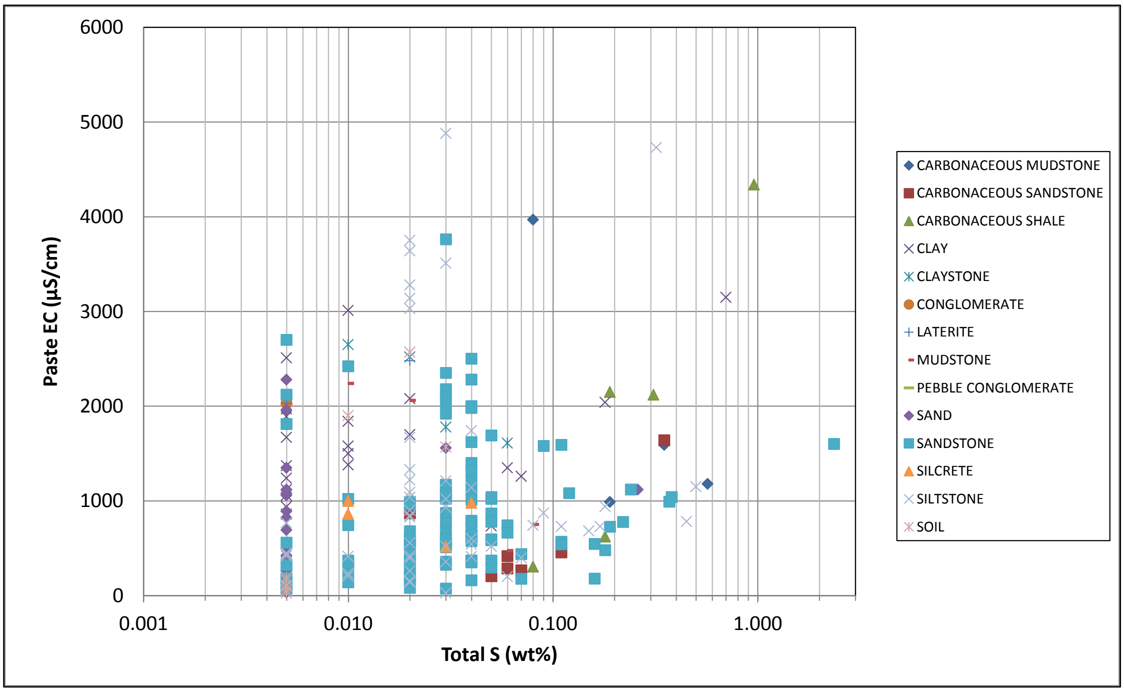

Figure 4-3: Paste EC as a function of total sulphur content for overburden and interburden samples by lithology

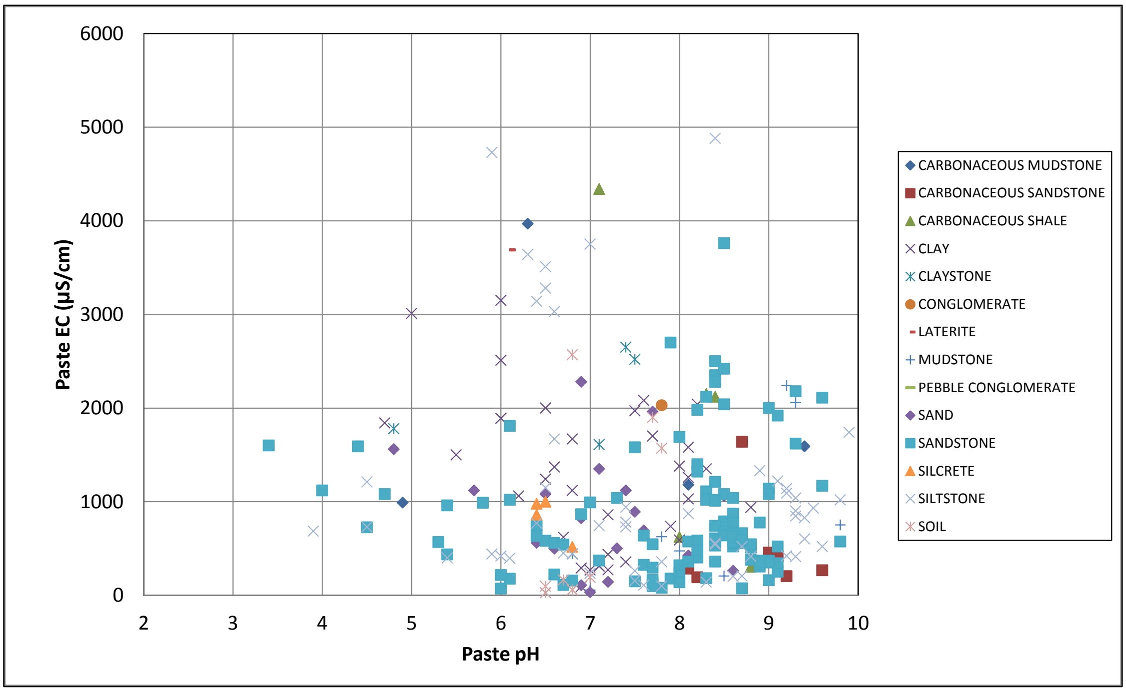

Figure 4-4: Paste EC as a function of paste pH for overburden and interburden samples by lithology

4.2.2 Coal, Roof, Floor and Processed Materials

Roof and floor samples were samples collected from immediately above or below coal seams that would be mined.

A plot of pH as a function of total S for the coal, roof, floor, and processed samples is shown in Figure 4-5. The paste pH of the 31 samples ranged from 3.1 to 9.4, with an average and median of 6.8. The three samples with a paste pH < 5, were undifferentiated coal, the processed product coal and rejects samples. None of the roof and floor samples had a pH less than 5.

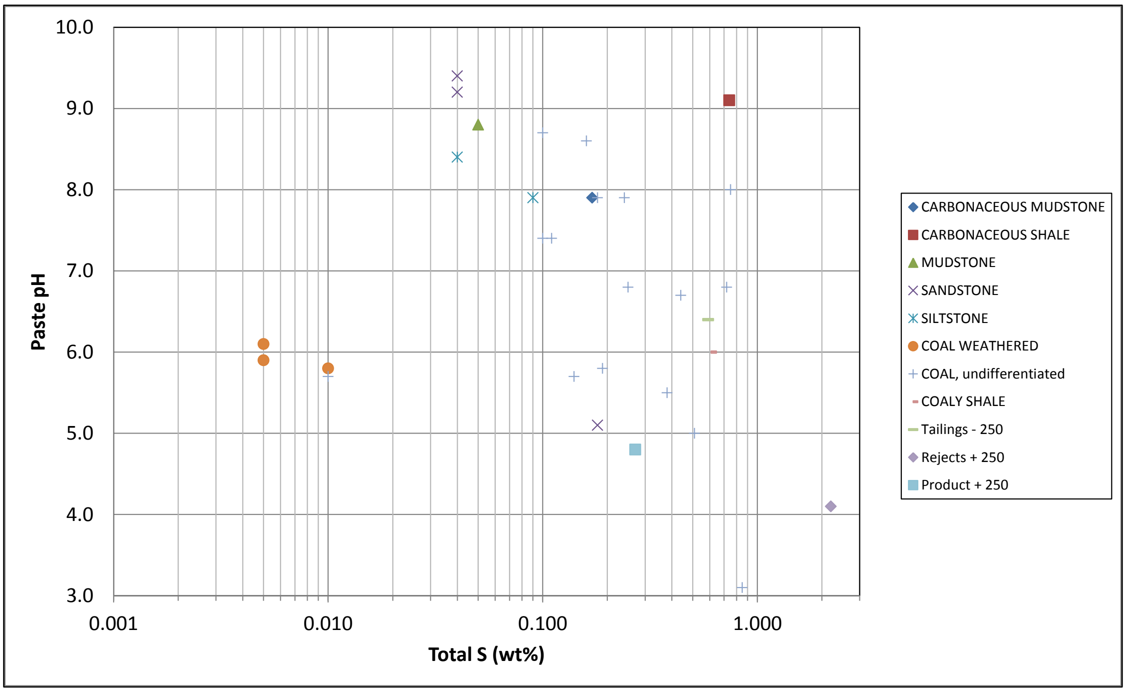

Figure 4-5: Paste pH as a function of total sulphur content for coal, roof, floor and processed samples

A plot of paste EC as a function of total sulphur is shown in Figure 4-6. The paste EC of the samples ranged from 49 to 2480 µS/cm with an average of 831 µS/cm and median of 622 µS/cm. The average paste EC value for the roof and floor samples was 876 µS/cm.

A plot of the paste EC as a function of paste pH is shown in Figure 4-7. The number of samples is for all lithologies other than undifferentiated coal is less than four.. Thus, the sample characteristics shown in the plot may not provide an accurate representation of the central tendency and distribution of paste EC of the large masses of the different materials produced by mining. However, the available data indicate that:

- Weathered coal is unlikely to be a significant source of readily available soluble salts or acid.
- Coal product is unlikely to be a significant source of readily available soluble salts but is possibly as source of acid.
- Undifferentiated coal is unlikely to be significant source of acid, but may be a source of readily available salts.
- Rejects + 250 µm material is potentially a source of acid and soluble salts.
- Non-coal roof and floor materials may be associated with salt release over a range of pH values at a range of concentrations.

4.2.3 Paste EC and pH Summary

Measurements of paste pH indicate that:

- The majority of overburden and interburden exposed to oxygen for less than two or three months and that is not immediately adjacent to coal seams is not likely to be a source of acid.
- Coal rejects and coal product +250 µm are potentially sources of acid.
- Undifferentiated coal and roof and floor materials are not likely to be sources of acid

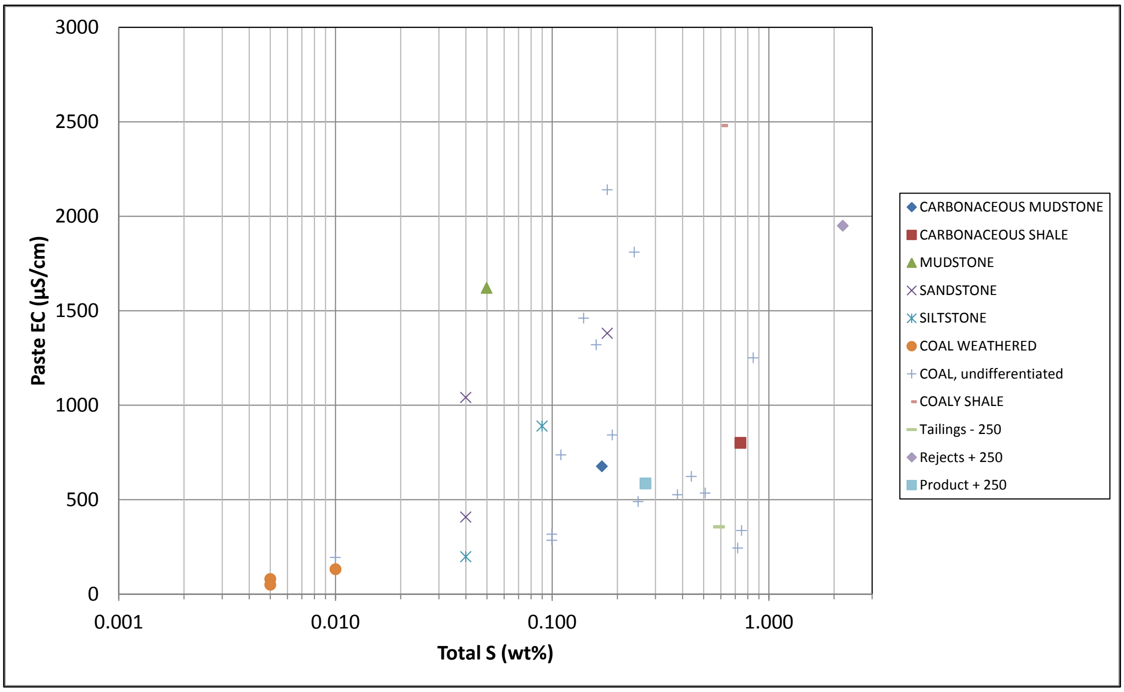

Figure 4-6: Paste EC as a function of total sulphur content for coal, roof, floor and processed samples

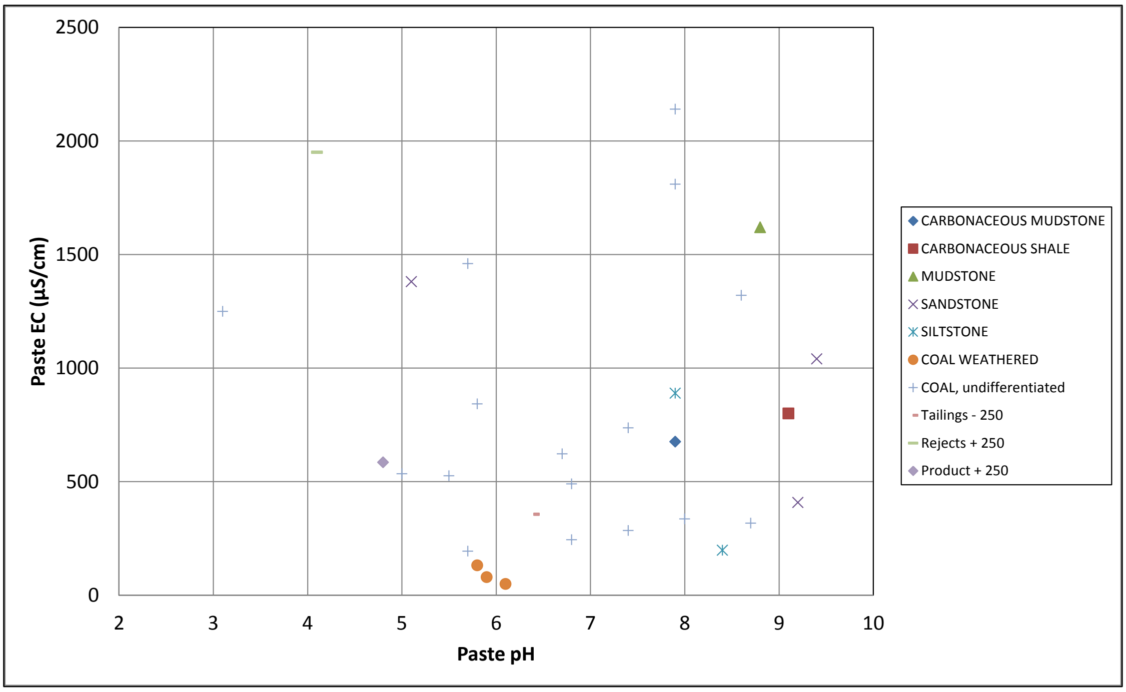

Figure 4-7: Paste EC as a function of paste pH for coal, roof, floor and processed samples

4.3 Acid Base Account

The net acid producing potential (NAPP) is the balance between the theoretical capacity of the sample to generate acid due to the oxidation of sulphides and its capacity to neutralise any acid formed, i.e. its acid neutralising capacity (ANC). The theoretical maximum potential acidity (MPA) of the sample is calculated from the total sulphur content, assuming that all sulphur is present as pyrite. The assumption that all sulphur in the sample is present as sulphide (pyrite) may overestimate the amount of acid that could potentially be generated, since sulphur may exist in other forms that are not acid forming (e.g. as organic sulphur and sulphate).

The ANC of a sample may be sourced from both carbonate and silicate minerals. The endpoint pH after the addition of hydrochloric acid (HCl) in the ANC measurement is very low (typically between pH values of 1 and 2) and may lead to reactions that occur only at a low pH (i.e. neutralisation due to dissolution of the silicate minerals) or occur at a slower rate in the field. The ANC measurement may therefore overestimate the neutralisation capacity that is available in the short term to maintain a near neutral pH.

The NAPP is calculated as follows:

$$NAPP = MPA – ANC\ (kgH_2SO_4/t)$$

Where MPA = 30.6 x S% and the sulphur content is expressed as weight percent (wt%).

The MPA, ANC and NAPP for all samples are reported in Appendix 3.

4.3.1 Acid Potential

Where a significant portion of sulphur is present as organic sulphur or sulphate, a more appropriate measure of the potential for acid generation is the acid potential (AP) of the material. The AP is calculated based on the sulphide content. The sulphide content may be estimated by subtracting the sulphate-sulphur content from the total sulphur content. Alternatively, the chromium reducible sulphur (CRS) analysis has been developed to directly measure the inorganic sulphide sulphur content of a sample over a wide range of values (Ahern et al, 2004). The sulphur quantified by the CRS method is assumed to be oxidisable sulphur.

A subset of 53 samples was submitted for sulphate sulphur measurement. Thirty-five samples were overburden and interburden samples and 18 were coal, roof and floor samples. As there was potential for samples to contain organic sulphur the samples were also subjected to the chromium reducible sulphur (CRS) analysis.

The total sulphur content of the samples is presented in the ABA table in Appendix 3. The total sulphur content of the overburden and interburden samples ranged between 0.06 and 0.96 for all but one sample (Sample 1401X-28 had a Total S content of 2.36% but appears to be carbonaceous and was located directly above a coal seam (see Figure 22).

For the coal, roof and floor samples the total sulphur content ranged between 0.09 to 0.85 wt%.

4.3.1.1 Overburden and Interburden

A plot of total sulphur minus sulphate sulphur (i.e. sulphide sulphur by convention) as a function of total sulphur for the overburden and interburden is presented in Figure 4-8. The diagonal line represents a line of equivalence, where the sulphide sulphate sulphur and total sulphur are equal. The sulphate sulphur content of the samples ranged between 0.01 and 0.29% and in general represented a small fraction of the total sulphur content. For samples with sulphur contents greater than 0.1 wt%, the majority of total S was present as non sulphate sulphur.

The CRS presented as a function of total sulphur less sulphate sulphur is shown in Figure 4-9.

The oxidisable sulphide sulphur content of the samples generally is less than the sulphide sulphur content, as calculated from the total and sulphate sulphur, ranging from <0.005 to 0.82 wt% excluding the value for sample 1401X-28. The value for 1401X-28 was 2.07 wt%. As with Figure 4-8, the line of equivalence indicates where the CRS and sulphide sulphur (by calculation) are equal. For the samples shown below the line, it is expected that a portion of the calculated sulphide sulphur exists in the form of non-oxidisable sulphur.

Approximately 50% the sulphide sulphur is present in an oxidisable form (based on CRS test results) for about 50 % of the samples. This suggests that in about half the mass of the overburden and interburden only about 50% of the calculated sulphide sulphur content is oxidisable where the total S content is greater than 0.06 wt%. The majority of these results correspond to the lower end of the sulphide content range.

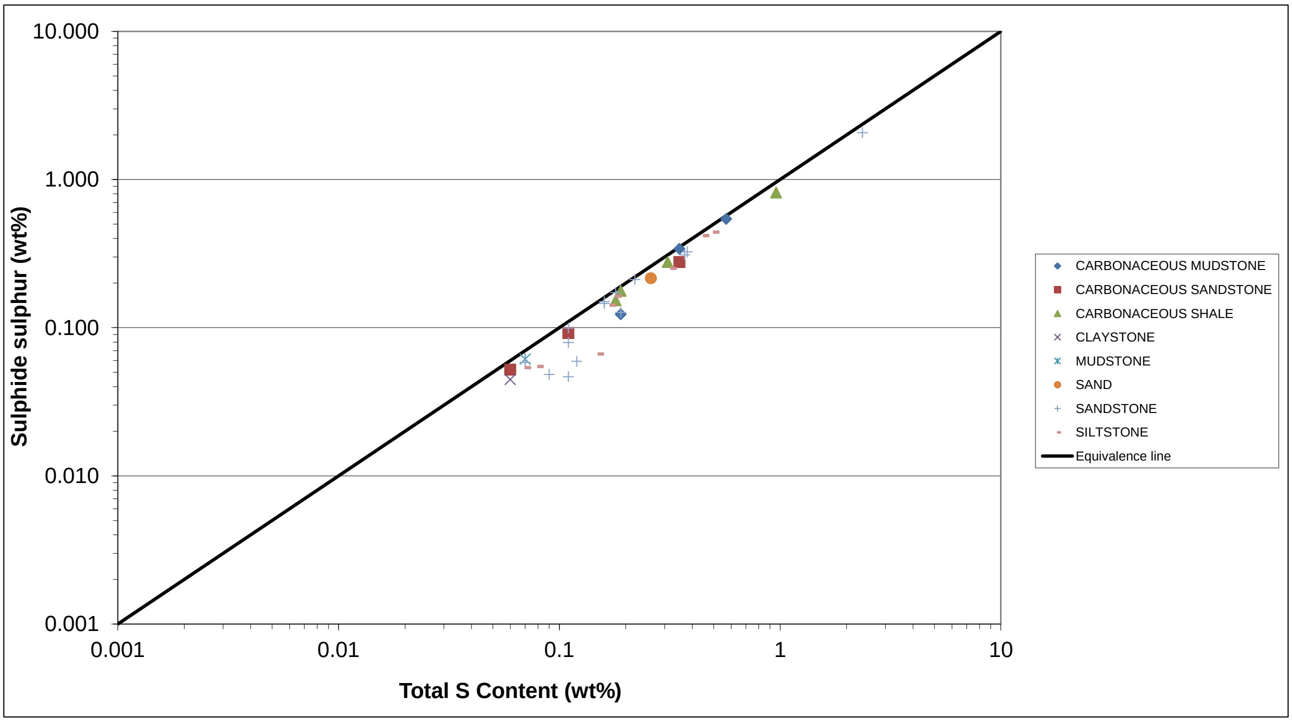

Figure 4-8: Sulphide sulphur (non sulphate sulphur) as a function of total sulphur content for overburden and interburden

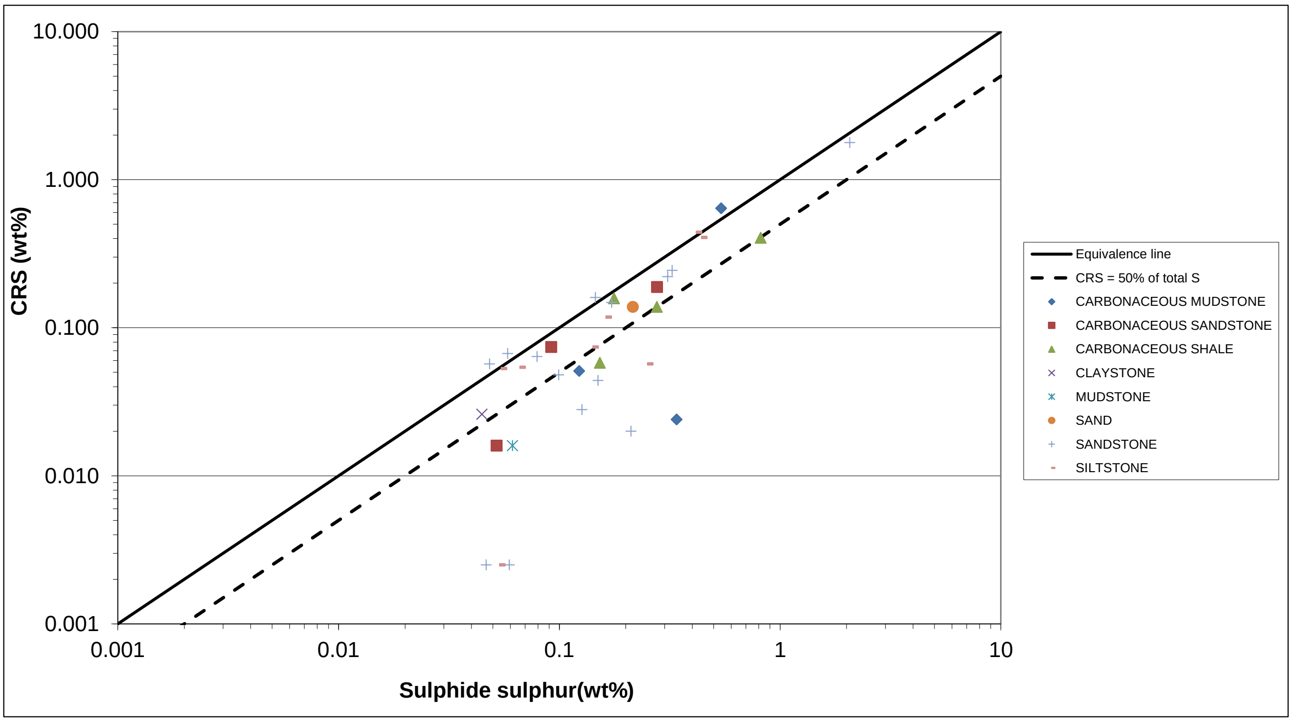

Figure 4-9: Chromium reducible sulphur as a function of sulphide sulphur content for overburden and interburden

The CRS results therefore suggest that at the higher end of the sulphur content range the sulphide sulphur content reasonable reflects the oxidisable sulphur content, whereas at the lower end of the scale, the sulphide sulphur content is likely to overestimate the potential for acid generation. Furthermore, the comparison of the sulphide sulphur content to the total sulphur content suggests that at the upper end of the scale the sulphate content is low and, combined with the CRS results, the total sulphur can be used to provide an approximation of the AP. At the lower end of the scale, however the sulphate sulphur content is significant and total sulphur would result in an overestimation of the AP.

4.3.1.2 Roof and Floor, Coal and Washery Rejects

Figure 4-10 and presents the sulphide sulphur content as a function of the total sulphur content for the coal, roof and floor material samples. Figure 4-11 compares the corresponding sulphide sulphur content with the CRS results. The sulphate sulphur ranges between 0.01 and 0.18 wt% and is a small fraction of the total sulphur (which ranges between 0.08 and 0.85 wt%), i.e. the calculated sulphide sulphur content correlates well with the total sulphur content.

The oxidisable sulphur content of the samples ranged between <0.005 and 1.15 wt% (based on the results of the CRS analyses). The CRS test results indicate that for about 60% of the samples, the oxidisable sulphur is less than 50% of the sulphide sulphur content. This suggests that for 60% the coal, roof and floor samples the sulphide sulphur and thus the total sulphur would lead to a significant overestimation of the AP of these materials.

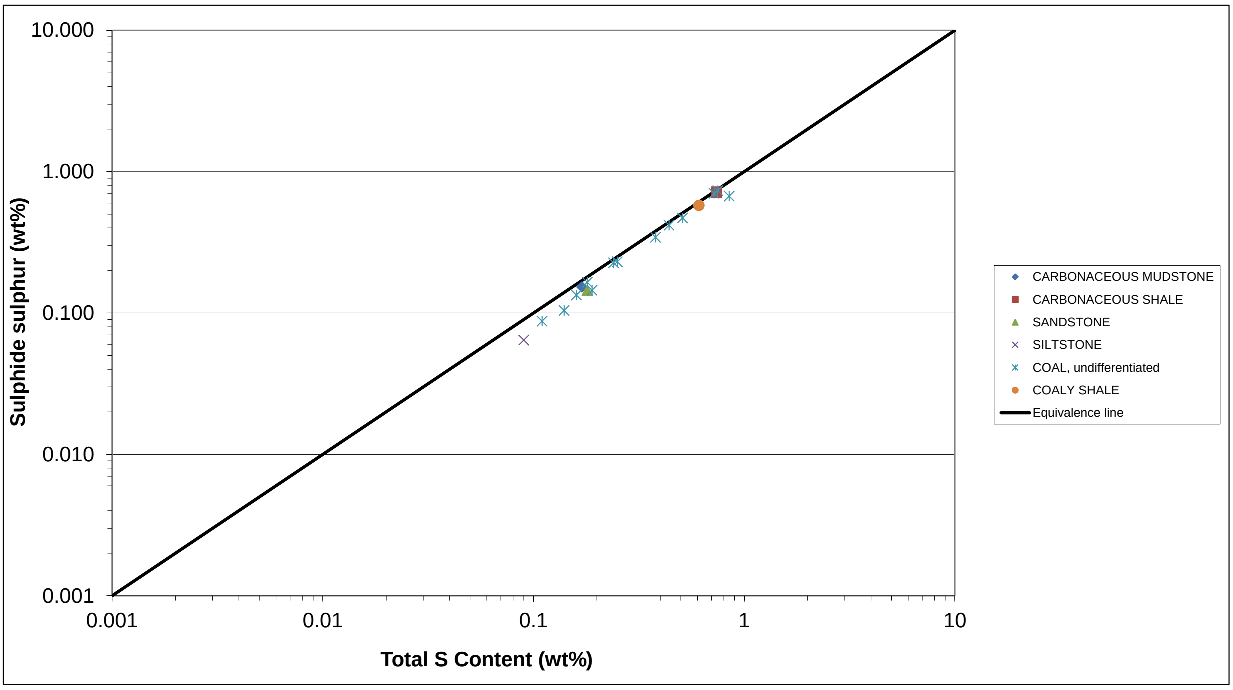

Figure 4-10: Non sulphate sulphur as a function of total sulphur content for coal and roof and floor samples

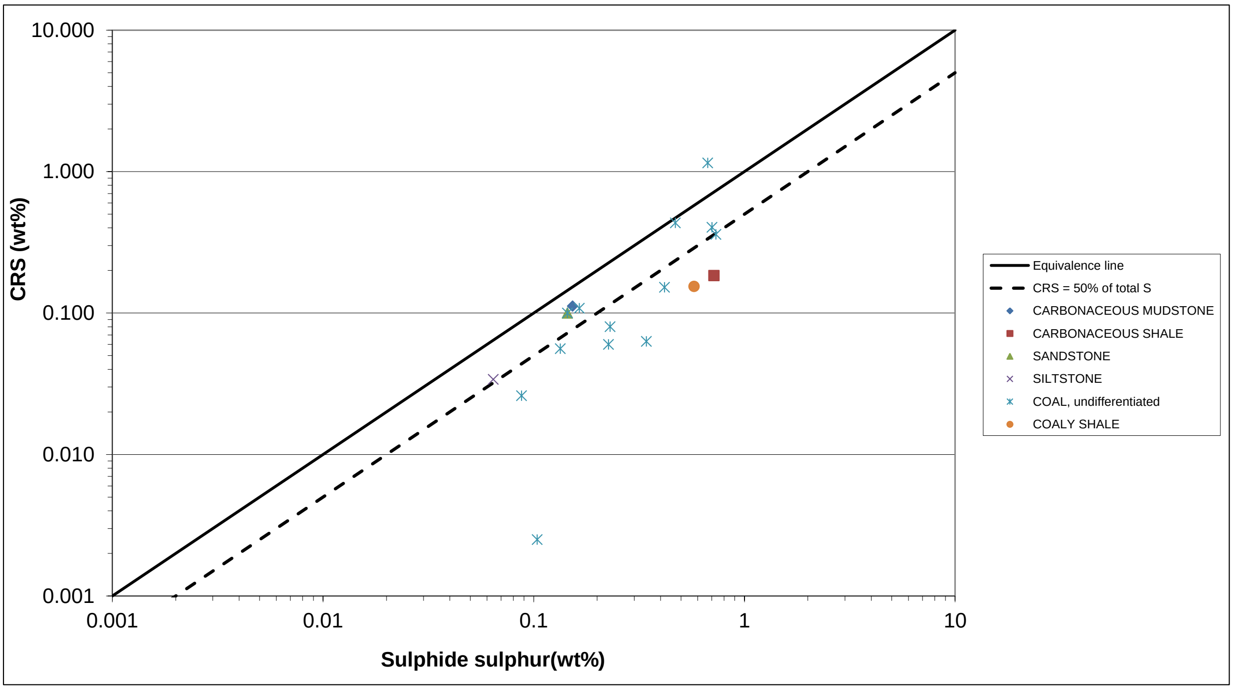

Figure 4-11: Chromium reducible sulphur as a function of sulphide sulphur content for coal and roof and floor samples

4.3.2 Acid Neutralisation Capacity

The ANC of the overburden and interburden samples ranged from 0.7 to 191 kgH_2SO_4/t, with an average of 28 kgH_2SO_4/t and a median 11.8 kgH_2SO_4/t. The values measured in the roof and floor, coal and coal reject samples were smaller, ranging from 2.4 to 47.2 kgH_2SO_4/t with an average value of 19.8 kgH_2SO_4/t and median of 11.5 kgH_2SO_4/t. The individual results are shown in the ABA table in Appendix 3.

The Ca and Mg carbonate minerals are of greatest importance in terms of neutralising acidity generated as they react rapidly and buffer in the near neutral pH range. The total inorganic carbon content (TIC) can be used to infer the carbonate mineral content and estimate the carbonate neutralization potential (CarbNP). In the overburden and interburden the CarbNP ranged from 0.8 to 180 kgH_2SO_4/t, with an average of 35.5 kgH_2SO_4/t and median of 13.1 kgH_2SO_4/t. In the coal, roof and floor materials, the CarbNP was higher and ranged from 3.3 to 118 kgH_2SO_4/t, with an average of 53 kgH_2SO_4/t and median of 48 kgH_2SO_4/t.

The CarbNP is presented as a function of ANC in Figure 4-12 and Figure 4-13. A line of equivalence is also shown on the plots (diagonal line), which indicates where the ANC equals the CarbNP. Where the CarbNP equals or exceeds the ANC (below the line of equivalence) it may be assumed that a portion of the carbonate minerals present, do not contribute to acid neutralisation (e.g. siderite ($FeCO_3$)). Where the ANC exceeds the CarbNP (above the line) it may be assumed that slower reacting silicate minerals contribute to the ANC.

Carbon speciation was carried out on 51 of the 294 samples. The 51 samples consisted of 39 overburden and interburden and 12 coal, roof and floor samples. Around 56% of the interburden and overburden samples and 92% of the roof and coal, roof and floor had an ANC/CarbNP ratio of less than 1.0 (suggesting some carbonate present does not contribute to ANC). For the other samples where the ANC/CarbNP was calculated, some of ANC is attributed to slower reacting silicate minerals. It is therefore expected that the ANC readily available to neutralise acidity for these samples is less than that indicated by the ANC test.

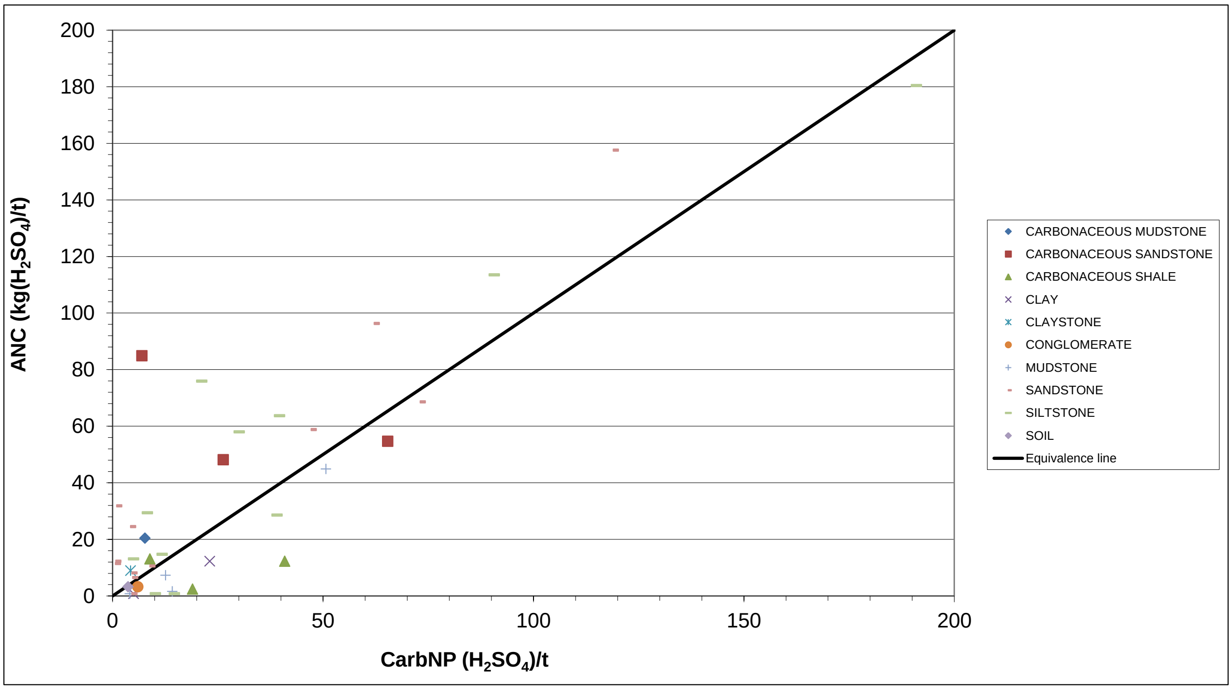

Figure 4-12: CarbNP vs ANC for overburden and interburden samples

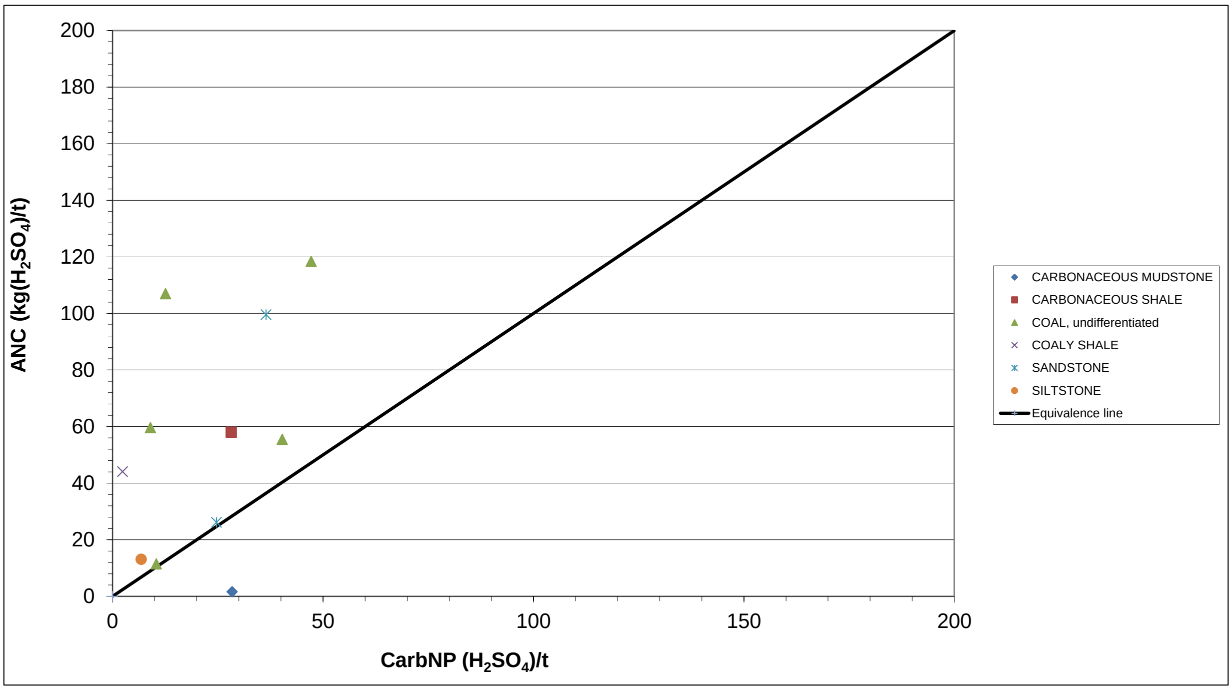

Figure 4-13: CarbNP vs ANC for coal and roof and floor material samples

Samples with a broad range of ANC values were selected for acid buffering characteristics curve (ABCC) testing. This test provides an indication of the proportion of ANC within a sample that is readily available for acid neutralisation at circum neutral pH. It involves the slow titration of the sample with hydrochloric acid, whilst continuously monitoring pH.

The ABCC results may be used to infer the availability of the neutralisation potential by calculating the equivalent ANC to pH 6. The ANC measured above pH 6 is indicative of buffering by calcium and magnesium carbonate minerals, such as calcite and dolomite.

The results of the ABCC tests are compared with the ANC and CarbNP in Table 4-1. The results show that the ABCC neutralisation potentials to pH 6 are significantly lower than those indicated by the CarbNP and ANC methods (with the exception of one sandstone sample). The neutralising capacity available to buffer above pH 6.0 ranges between <1 to 10.2 kgH_2SO_4/t and the fraction of ANC available ranges between 0 and 18% of the ANC (except the sandstone sample), suggesting the balance of neutralising capacity as measured by the ANC method may be due to reactions with aluminosilicates at low pH values. Hence, the ANC and the CarbNP may overestimate the neutralisation potential that is available immediately to buffer the pH to above 6 (i.e. to prevent the onset of acid generating conditions).

Table 4-1: Summary of neutralising capacity derived from ANC, CarbNP and ABCC test work

Sample ID	Hole ID	Lithology	Neutralising Capacity (kgH_2SO_4/t)			Available ANC to pH 6
			ANC	CarbNP	To pH 6	%
96	1388R	Sandstone	73.1	68.6	10.2	14
102	1389R	Siltstone	5.6	-	0.98	18
137	1397R	Clay	13.5	-	1.87	14
169	1412C	Sandstone	4.6	8.2	4.79	104
178	1414X	Carbonaceous Mudstone	7.7	20.4	0.69	9
196	1429R	Coal	9.8	-	0.25	3
210	1434D	Siltstone	21.2	75.9	2.34	11
213	1434D	Carbonaceous Sandstone	8.9	-	0.39	4
228	1444D	Carbonaceous Shale	8.9	13.1	Initial pH 5.88	0
267	1451D	Sandstone	4.3	24.5	Initial pH 4.42	0
271	1452D	Sandstone	36.5	-	4.70	13
277	1453D	Sandstone	62.2	96.3	7.37	12
279	1453D	Carbonaceous Sandstone	65.4	54.7	4.2	6

4.4 Sample Classification Schemes

4.4.1 Net Potential Ratio

Sample classification is based on the acid generating potential of a material. Whilst the potential may be assessed using the NAPP as described earlier, an alternative method is based on the neutralisation potential ratio (NPR). The NPR is defined as the ratio of ANC to MPA (or AP where available) (Price, 2009). For overburden, a sample may be classified using the NPR as follows:

- NPR < 1 – potentially acid forming (PAF)
- 1 < NPR < 3 – uncertain (UC)
- NPR > 3 – non acid forming (NAF)

PAF samples with NAPP values less than 5 kgH_2SO_4/t were assessed as having a low capacity to produce acid.

The acid generating potential was investigated with more detailed static test work including estimation of the oxidisable sulphur by the chromium reducible sulphur test. Where chromium reducible sulphur test results were available they were used in the calculation of the AP.

The neutralising capacity was estimated using ANC, CarbNP and ABCC testing. The number of samples subjected to the various tests differed. However as, all samples were ANC tested, classification of samples was based on the the minimum of the Total S and the CRS and ANC for all samples.

Low sulphur content samples have a low or negligible potential to produce acid and therefore pose a low or negligible risk of producing AMD. Furthermore, the CRS test results indicated that at lower total sulphur content the oxidisable sulphur content decreases. Thus, under some circumstances it can be reasonable to class some materials with low sulphur content as NAF. Total sulphur cut-off (S_{co}) values for classing samples as NAF typically range from less than 0.1 wt% to about 0.2 wt% sulphur, depending on the reaction kinetics and the material properties including occurrence of the sulphides and any ANC that may be present.

Generally, verification the choice of the cut-off would be via further geochemical testing, which would include kinetic testing of low sulphur content samples representing each of the dominant rock types at sulphur contents within the range under consideration. In the absence of verification from kinetic testing at the time of reporting the lower cut-off content of 0.1 wt% S was used, where samples with a total sulphur content below this is classed as NAF irrespective of other properties.

A cut-off of 0.1 wt% total is likely to be a reasonable choice of cut-off grade, however kinetic testing to support this choice should be undertaken.

4.4.2 Overburden and Interburden

The calculated NPR values and the sample classifications based on the NPR of overburden and interburden samples are summarised in Table 4-2 and shown in Figure 4-14. The solid line in the plot differentiates samples with characteristics that are NAF (NPR>3) from those that are UC. The dashed line differentiates the samples with PAF (NPR<1) characteristics from those that are UC. The samples below the dashed line also have a positive NAPP. Two hundred and sixty six samples were NPR tested.

The results in Figure 4-14 indicate that:

- Two hundred and fifty one samples (94%) were classed as NAF
- Four samples (2%) were classed as UC
- Eleven samples (4%) were classed as PAF, this included clay (2 samples), sand (1), sandstone (5) and siltstone (3) samples

Of the eleven PAF samples:

- one was located away from the coal seams and had a NAPP greater than 5 kgH_2SO_4/t
- five were located away from the coal seams and had NAPP less than 5 kgH_2SO_4/t (i.e. they were PAF-LC)
- two samples were located adjacent to coal seams and had NAPP greater than 5 kgH_2SO_4/t
- three samples were located adjacent to coal seams and had NAPP less than 5 kgH_2SO_4/t (i.e. they were PAF-LC)

A total of 23 samples were from locations within 2 m of the coal seam and 243 samples were from locations more distant from the coal seam. Therefore, about 22% of samples adjacent to the coal seam were PAF or PAF-LC and 2% of samples distant from the coal seams were PAF or PAF-LC. This indicates the highest concentration of PAF material is located adjacent to the coal seams.

The locations PAF-LC samples in relation to the coal that would not be mined are shown in Appendix 10.

The risk of AMD is dependent on the AP and ANC. Materials with low total S contents are associated with lower risk. For example, materials with total S content of <0.03% (MPA<0.9 kgH_2SO_4/t) can be considered to represent materials with insignificant risk whilst those with total S content of <0.1 wt% (MPA<3 kgH_2SO_4/t) can be considered to represent materials with low risk (note the crustal abundance of sulphur in a mean sediment is approximately <0.3 wt%, Bowen, 1979).

Samples with an NPR of less than three and considered of insignificant or low risk (and therefore classed NAF) are within the shaded regions of Figure 4-14. Samples with NPR > 3, i.e. those with a bove the solid black line, are classed as NAF.

Of the 266 samples 248 (92%) had a negative NAPP value indicating they had potential to neutralise acid.

Table 4-2: Summary of overburden and interburden sample classification (NPR method)

Rock type	Number of Samples			
	NAF	UC	PAF	Totals
Clay	32		2	34
Soil	9			9
Sand	18		1	19
Carbonaceous mudstone	3	1		4
Carbonaceous sandstone	8			8
Carbonaceous shale	4	1		5
Claystone	5			5
Conglomerate	1			1
Laterite	2			2
Mudstone	8			8
Pebble conglomerate	1			1
Sandstone	106	1	5	112
Silcrete	4			4
Siltstone	50	1	3	54
Subtotal	251	4	11	266
Percentage (of samples)	94	2	4	100

Note: Blanks indicate no samples were tested

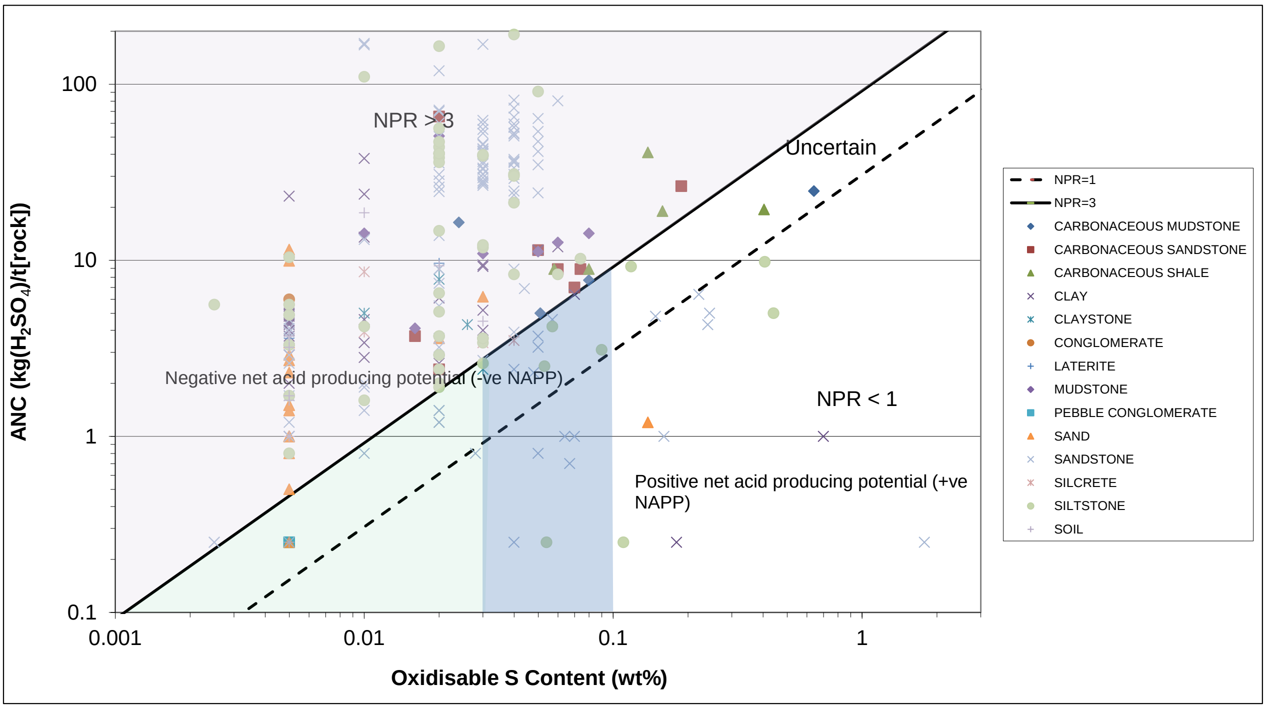

Figure 4-14: ABA plot for overburden and interburden samples

4.4.3 Coal, roof, floor and processed materials

The distribution of NPR values of samples of coal, roof, floor and processed materials are summarised in Table 4-3 and presented in Figure 4-15. The weathered and undifferentiated coal, the coaly shale coal samples would potentially be representative of coal stockpile material or uneconomic coal that would be left in the pit. A portion of the roof and floor material, which may comprise non-coal material immediately above and below the coal seams, would also remain in the pit if not selectively handled.

The calculated NAPP and NPR values and the sample classifications based on the NPR are shown in Appendix 3.

One composited sample of raw coal from two large diameter drill holes was processed in the pilot plant to produce single samples of i) tailings -250 µm, ii) rejects +250 µm, and iii) coal product +250 µm samples. Although only one sample was characterised, the results indicate that the tailings and coarse rejects would be PAF and the coal product would be NAF. More samples should be characterised provide a higher level of confidence in the geochemical classification of each product. SRK understands that HGPL plans to undertake additional infill drilling which would allow sampling for supplemental geochemical testing of additional samples.

The tailings -250 µm sample would classed PAF-LC as it had a NAPP of 1.7 kgH_2SO_4/t and the NAF rejects +250 µm sample had a NAPP of 61.3 kgH_2SO_4/t).

Figure 4-15 shows that seven of the eight roof and floor samples available for analysis were classed as NAF. One sandstone roof sample was classed PAF-LC Given the relatively small number of samples, characterisation of additional roof and floor samples should be conducted as part of the planned in-fill drilling and geochemical sampling program as exploration proceeds.

Table 4-3: Number of coal, roof and floor samples in each class (NPR method)

Rock type	Number of Samples			
	NAF	UC	PAF	Totals
Coal weathered	3			3
Coaly shale			1	1
Coal, undifferentiated	10	2	4	16
Clay				
Soil				
Sand				
Carbonaceous mudstone	1			1
Carbonaceous sandstone				
Carbonaceous shale	1			1
Claystone				
Conglomerate				
Laterite				
Mudstone	1			1
Pebble conglomerate				
Sandstone	2		1	3
Silcrete				
Siltstone	2			2
Tailings – 250 µm			1	1
Rejects + 250 µm			1	1
Product + 250 µm	1			1
Subtotal	21	2	8	31
Percentage (of samples)	68	6	26	100

Note: Blanks indicate no samples were tested

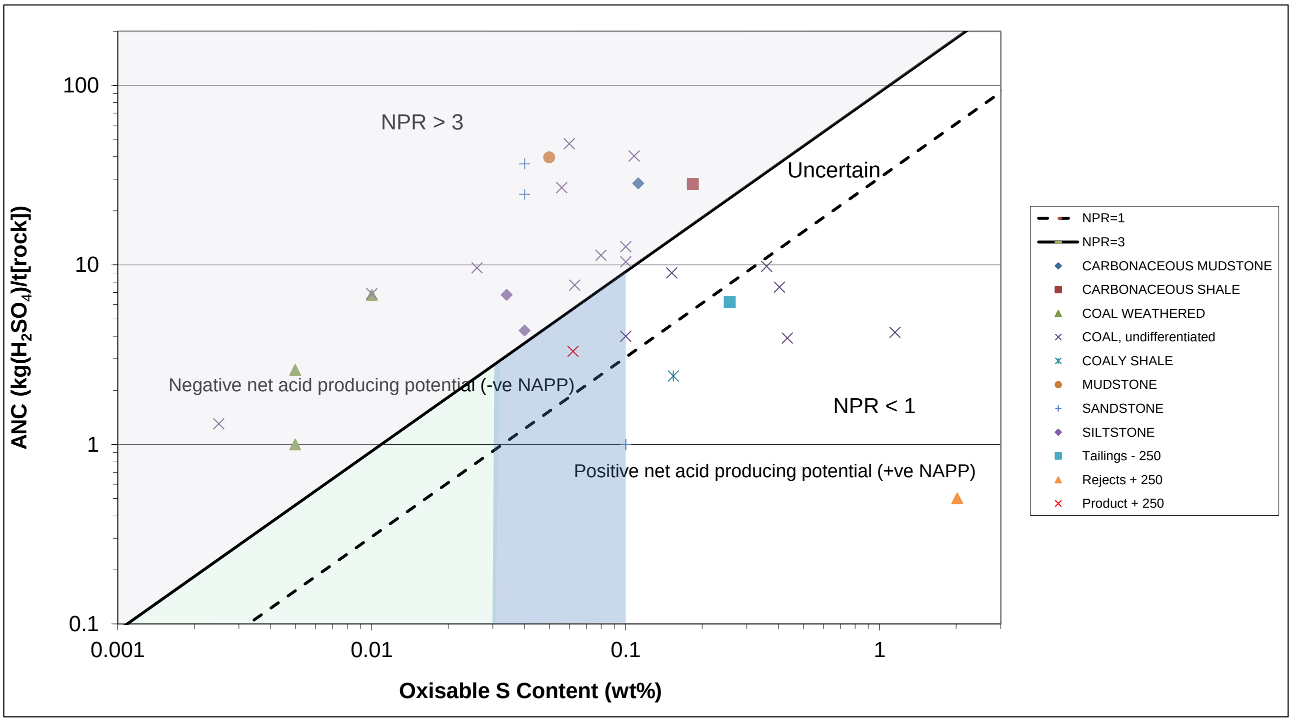

Figure 4-15: ABA plot for coal, roof and floor and process samples

4.4.4 Net Acid Generation Results

The single addition net acid generation (NAG) test measures how a sample could behave under highly oxidising conditions. The sample is contacted with the strong oxidant hydrogen peroxide, which oxidises the sulphides contained in the sample to generate acid. Concurrently, neutralising minerals that may be present react to consume all or part of the acid generated. Following a predetermined contact time, the solution pH (NAGpH) is recorded and the NAG acidity of the sample is quantified by titration with a base (sodium hydroxide).

Titration to pH 4.5 generally accounts for acidity attributable to free acid (H_2SO_4) and ferric iron generated during the oxidation of sulphide minerals (that has not been neutralised by the contained ANC). Titration from pH 4.5 to pH 7 generally accounts for acidity associated with some metals, such as copper, that are mostly soluble at pH 4.5 but practically insoluble at pH 7. Acidity attributed to unoxidised ferrous iron will also be accounted for in the titration up to pH 7 (ferrous iron remains soluble at pH 4.5; however oxidation to ferric by atmospheric oxygen accelerates as the pH increases).

There is a potential for generation of organic acids in the single addition NAG tests due to partial oxidation of Carbonaceous materials (an effect that does not occur naturally in the environment). This may lead to erroneous low NAGpH values and high acidities in the test, which are unrelated to acid generation from sulphide oxidation and can lead to misclassification of the samples. This effect is most likely to occur in samples where the organic carbon content is greater than 7% and the pyrite content is less than 0.7% (e.g. coal washery rejects (ACARP, 2008)).

AMIRA (2002) described the single addition NAG test method used to classify the rock samples according to their potential to be acid forming for samples with low organic carbon contents. The scheme takes account of both the NAGpH and the NAPP of the sample.

The extended boil NAG test may provide a more reliable measure of the acid forming potential of a Carbonaceous sample. This test is carried out if the NAGpH of the single addition NAG test is less than 4.5. Additional hydrogen peroxide is added to a split of the NAG solution, which is boiled vigorously for several hours followed by a further measurement of the pH. A sample is classified as acid producing if the solution pH is still less than 4.5.

The acid potential of the sample is uncertain if the pH is greater than 4.5. A solution assay step is then carried out on the other split of the NAG solution for the main cations generated from acid generating (S) and acid neutralising (Ca, Mg, Na, K) processes. The net acid potential is calculated from the solution composition.

As for the NPR method described above, samples with total or CRS sulphur contents of less than 0.1 wt% were classified NAF.

The samples were classified according to the scheme shown in Table 4-4. The NAG results and the sample classifications are presented in Appendix 3.

Table 4-4: Acid-base accounting classification

Class	Sub-class	Description
NAF	NAF	Samples with total S or CRS of less than Sco (= 0.1 wt%)
	NAF	Samples with a negative NAPP value and a NAG pH of ≥4.5
	NAF-Barren	As above, and also a low ANC (≤5 kgH_2SO_4/t). Such samples have little value with respect to mitigating the effects of acid production in other mine overburden materials
PAF	PAF	Samples with a positive NAPP value and a NAG pH of <4.5
	PAF-LC	PAF materials associated with low NAG acidities (NAGpH4.5 < 5 kgH_2SO_4/t)
		NAPP ≤ 5 kgH_2SO_4/t calculated NAG acidity < 6.5. kgH_2SO_4/t.
Uncertain	UC(PAF)	Samples with negative NAPP but giving NAG pH values <4.5
	UC(NAF)	Samples with NAPP ≥0 but giving NAG pH values ≥4.5. Possibly in these samples some of the sulphur present is in non-pyritic forms

Notes: S=sulphur; S_{co} = sulphur cut-off, ANC=acid neutralisation capacity; NAPP=net acid producing potential; NAG pH=pH measured during net acid generation test. At the time of reporting NAG acidities for the extended boil NAG tests were not available. It is therefore possible that some samples classified as PAF would be reclassified as PAF-LC when the NAG acidity is taken into account. Classification of samples with total S or CRS less than S_{co} is a variation from the standard AMIRA classification scheme.

4.4.4.1 Overburden and Interburden

A subset of the samples characterised using the NPR method was also tested by the NAG method. Results for 80 samples of overburden and interburden are shown in Figure 4-16. The standard NAG classification (e.g. non-acid forming, uncertain) is indicated in each quadrant of the plot. In this representation no account is taken of the reclassification of samples as NAF as a result of the minimum of the Total S or CRS value being less than 0.1 wt%. Thus, the number of samples indicated as PAF and UC in the plot is an overestimate based on the scheme described in Table 4-4. The number of samples in each class reassessed using the sulphur cut-off value, S_{co}, of 0.1 wt% is shown in Table 4-5.

The need to support quantitatively the value of S_{co} was stated earlier in Section 4.4.1. Figure 4-16 suggests that such support is required for at least the shale, siltstone and sandstone lithologies.

Eighty nine percent of samples were classed NAF, 4% UC, 5% as PAF-LC and 3% as PAF (Table 4-5). This compares to the 94 (NAF), 2 (UC) and 4% (PAF) respectively determined using the NPR method (the total percentage of the first exceeds 100% due to rounding of values). Of the six PAF samples, two were from locations immediately adjacent to coal seams, a third sample was from within 2 m of a coal seam and the remaining three were from more than 3 m from the coal seam.

Although the percentage estimated to be PAF by the AMIRA method is twice that estimated using the NPR method, each estimate has an uncertainty that reduces the significance of this difference.

The small number of samples assessed further contributes to the statistical uncertainty on the number of samples in each classification. With 80 samples NAG tested, one sample represents more than one percent of the total population. As most material is not adjacent to coal seams, the two samples selected from immediately adjacent to the coal seam result in a bias in the overall test results towards the characteristics of samples adjacent to coal seams.

NAG testing a different subset of samples assessed by the NPR method would most likely have resulted in a different distribution. Reducing the uncertainty would require that more samples be tested. However, as a larger number of samples has been classified using the NPR it would probably be more effective to perform future assessments using the NPR scheme and build on that larger data set.

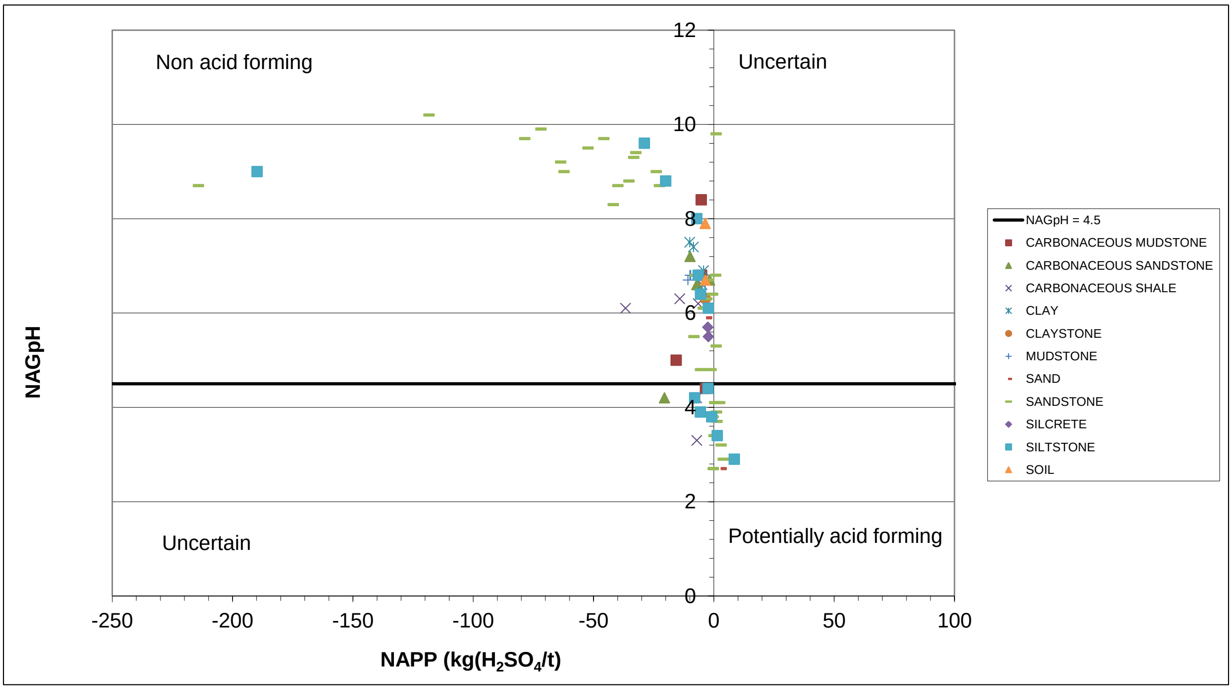

Figure 4-16: Geochemical classification plot for the overburden and interburden samples

Note: The plot represents classification of samples according to the standard AMIRA classification scheme and does not account for the total S or CRS being less than the cut-off value (S_{co}).

Table 4-5: Summary of overburden and interburden sample classification (AMIRA method)

	No. of samples					
Lithology	NAF	UC(NAF)	UC(PAF)	PAF-LC	PAF	Subtotal
Clay	4					4
Soil	2					2
Sand	2				1	3
Carbonaceous mudstone	4					4
Carbonaceous sandstone	5					5
Carbonaceous shale	4		1			5
Claystone	1					1
Conglomerate						
Laterite						
Mudstone	4					4
Pebble conglomerate						
Sandstone	32		1	4		37
Silcrete	2					2
Siltstone	11		1		1	13
Tailings - 250						
Rejects + 250						
Product + 250						
Subtotal	71		3	4	2	80
Percentage (of samples)	89%	0%	4%	5%	3%	100%

Note: Values of zero (0) have been replaced with blanks

4.4.5 Coal, roof and floor materials

The classifications of 20 coal, roof and floor samples by the standard AMIRA method are presented in Figure 4-17. Processed coal, rejects or tailings samples were not tested by the NAG method due to the high organic carbon contents. The number of samples in the various AMIRA classes are shown in Table 4-6.

The number of samples from any lithology is small and the geochemical characteristics of the set therefore may not accurately represent the distribution of characteristics present in the overburden at the site. The available data indicate that coal rejects such as undifferentiated coal and coaly shale may be PAF and that the non- coal roof and floor samples may be NAF with the exception of a pebble conglomerate. However, further testing of roof and floor material may need to be undertaken as part of the planned infill drilling and geochemical sampling/testing program to ensure that the distribution of geochemical characteristics for the various roof and floor and coal rejects is adequately understood.

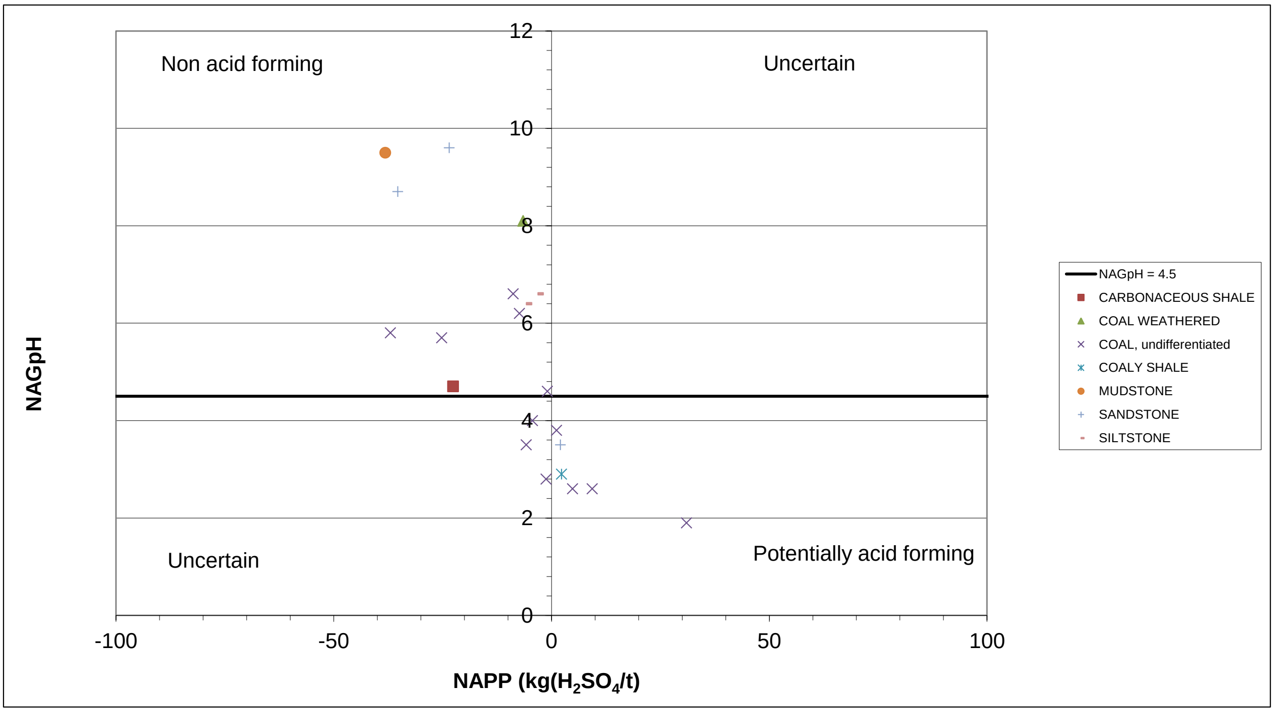

Figure 4-17: Geochemical classification plot for the coal, roof and floor samples

Note: The plot represents classification of samples according to the standard AMIRA classification scheme and does not account for the total S or CRS being less than the cut-off value (S_{co}).

Table 4-6: Number of coal, roof and floor samples in each class (AMIRA method)

	Number of samples					
Lithology	NAF	UC(NAF)	UC(PAF)	PAF-LC	PAF	Subtotal
Coal weathered	1					1
Coaly shale					1	1
Coal, undifferentiated	8			1	2	11
Clay						
Soil						
Sand						
Carbonaceous mudstone						
Carbonaceous sandstone						
Carbonaceous shale	1					1
Claystone						
Conglomerate						
Laterite						
Mudstone	1					1
Pebble conglomerate				1		1
Sandstone	2					2
Silcrete						
Siltstone	2					2
Tailings - 250						
Rejects + 250						
Product + 250						
Subtotal	15			2	3	20
Percentage	75%	0%	0%	10%	15%	100%

4.5 Acid Producing and Neutralisation Balance

The overall balance of the acid production and acid neutralising capacity for each lithology group was calculated. For each group the average AP and average ANC were calculated and the NAPP and NPR were calculated from the average values.

Table 4-7 shows that there is excess neutralising capacity (negative NAPP and NPR > 3) for each overburden and interburden lithology group.

Table 4-8 shows that there is excess neutralising capacity (negative NAPP and NPR > 3) for each roof and floor lithology group.

For the coal and coal product the average NAPP values indicate there is more neutralising capacity than acid potential but the NPR value indicates that the excess may not be enough to ensure all leachate remains neutral.

For the Tailings -250 µm and Rejects +250 µm samples the NAPP and NPR indicate that both would be PAF. However, the potential to produce acid for the tailings is low and much less than that of the rejects (1.7 compared to 61.3 kgH_2SO_4/t).

NAPP and NPR values indicate that the coal product will not be acid producing.

Table 4-7: Acid producing and acid neutralising account for overburden and interburden

	Proportion of mass	Average AP	Average ANC	NAPP	NPR
Group	%	kgH_2SO_4/t			
Carbonaceous	3	3.7	16.8	-13	5
Clay and Soil	7	1.0	6.4	-5	6
Rem	85	1.4	26.7	-25	19
Sand and Gravel	4	0.4	2.8	-2	7

Note: Total of proportion of mass is not 100 due to rounding of values

Table 4-8: Acid producing and acid neutralising account for coal, roof, floor and processed coal materials

Group	AP	ANC	NAPP	NPR
	kgH_2SO_4/t			
Coal	4.7	11.3	-6.6	2.4
Carbonaceous Roof and Floor	4.5	28.3	-23.8	6.2
Rem Roof and Floor	1.6	18.8	-17.3	12.1
Product + 250um	1.9	3.3	-1.4	1.7
Rejects + 250um	61.8	0.5	61.3	0.01
Tailings – 250um	7.9	6.2	1.7	0.79

4.6 Elemental Abundance and Solubility

4.6.1 Elemental Abundance

Quantitative elemental analysis of solid samples was undertaken to determine the abundance of elements in the samples (see Appendix 5. All samples were also leached with de-ionised water (solid:water ratio 1:3, Price, 2009) and quantitative elemental analysis was conducted on the leachate to identify readily soluble elements that may be flushed from the overburden.

A direct comparison of the measured abundances of the elements was made with the average abundance of elements in the sediment documented by Bowen (1979). As the abundance of elements varies many-fold, a log base 2 index was developed to simplify comparison of measured abundances with average abundances. The index, called the global abundance index (GAI), was reported by Förstner (1993).

The GAI indicates which elements are 'enriched' in the sample with respect to a reference average abundance. The GAI is calculated using the following formula:

$$\text{GAI} = Int\left(\log_2\left(\frac{\text{Measured Concentration}}{1.5 \times \text{Average Abundance}}\right)\right)$$

An example of GAI values is provided in Table 4-9. In the table *n* is the ratio of the measured abundance in the sample to the reference material abundance.

Table 4-9: Ranges of the Ratio of the Measured Concentration to Average Abundance (n) and the Corresponding Global Abundance Index

***n* range**	**GAI**
$1 < n < 3$	0
$3 \leq n < 6$	1
$6 \leq n < 12$	2
$12 \leq n < 24$	3

Zero or positive GAI values indicate enrichment of the element in the sample when compared to average-crustal abundances. As a general rule, a GAI of 3 or higher signifies enrichment that warrants further evaluation. GAI values are presented in Appendix 6.

All 297 samples were submitted for whole rock assay analysis. Elements that were identified as enriched in a number of samples were Ag, As, Re, Sb, Se and Te. The results indicated that 49% of the samples were enriched in Re and 73 % in Te. Enrichment of the remaining elements was less frequent, occurring between 1% and 3% for Ag, Sb and Se, with As only enriched in one sample (0.3%).

Whilst these elements are enriched, further evaluation of their leachability is required (see Section 4.6.2). Of these, selenium is considered the most likely to leach at potentially significant concentrations when exposed to oxidising conditions for extended periods.

The evaluation should determine whether the elements are present in a leachable form and if they pose a risk to the environment once released.

4.6.2 Solute Release

Simple leach tests (Price, 2009) were carried out on 29 samples at a solid:water ratio 1:3 over a period of 24 hours. Full results are presented in Appendix 7. The tests provide an indication of the solubility of elements and salts that are already present in the samples and form a basis for an initial assessment of the potential for changes to water quality as a result of contact with the overburden. Since the physical and chemical conditions of the leach test will not be the same as those expected in the 'as placed' environment (e.g. solubility constraints, liquid to solid ratio, particle size, etc.), the leach composition is not expected to be representative of that which may develop in the field. The results cannot be directly extrapolated to predict the leachate quality expected to seep from a dump of the material, but are useful to provide an indication of the readily leachable elements that may be present.

While the leach extraction test results cannot be used to directly estimate the water quality that would be released from the mine overburden materials, the results can be used to identify solutes that could potentially be released at concentrations sufficient to warrant further investigation. As leachate results cannot be directly compared with water quality guidelines until scale-up effects and actual site conditions are incorporated into the leachate release/loading rates, the results are compared to Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC (2000)) only to identify solutes that potentially may be of significance. Note however that water quality predictions need to consider actual site conditions and are not part of the current scope/report. Elements that exceeded ANZECC (2000) guideline values for stock watering are shaded in Figure 4-12.

Overburden and Interburden

Twenty four (24) of the leached samples were from overburden and interburden. The pH and concentration of 58 elements were measured in each leachate.

- The pH of the large majority (19) of resultant solutions was in the near neutral range (pH 6 to 8).
- Three samples produced solutions with acidic pH values (i.e. pH < 5). The three samples (1451D_267, 1401X_28, 1429R_42) were from locations close to coal units (see Table 4-10).
- The concentrations of the elements in the leachate were for the vast majority of samples very low and less than guideline values.
- The concentration of Se exceeded stock water guidelines for two of the samples at near neutral pH.
- The other four exceedances were in acidic leachates (i.e. pH between 3.36 and 4.89). All samples generating these leachates were from locations adjacent to coal seams.
- Elements that exceeded stock water guidelines were Al (1 sample), Ni (2 samples) and SO_4 (1 sample).

Coal and Roof

Three undifferentiated coal samples and two roof samples were leached.

- One undifferentiated coal sample (1410C_28) produced acidic leachate.
- None of the samples produced leachate with metal concentrations that exceeded stock water guideline values.

Static testing indicated that a small portion of undifferentiated coal samples were PAF. Therefore, it is possible that solute release at concentrations in excess of guideline values will occur. It is therefore recommended that further leach testing of coal and roof and floor materials is undertaken. This should include kinetic leach testing to provide information on acid generation and neutralisation rates.

Salinity

Some salinity was present in all the samples as indicated by the release of Na (5 to 197 mg/L) and Cl (1 to 234 mg/L). Sulphate concentrations ranged from 1 mg/L to 1,180 mg/L. The presence of sulphates indicate that some sulphide mineral oxidation products were present in the samples.

The average sulphate concentration was:

- 157 mg/L for the samples of roof and coal material and
- 123 mg/L for the overburden and interburden samples.

An appreciable portion (>10%) of some elements (e.g. Ca, Cd, Mg, Mn, Mo, Na, Ni, SO_4, Sr and Zn) in 11 of the solid samples were leached into solution from the solid.

With the exception of Na and SO_4, the leaching of the majority of these elements was associated with three samples. These samples were 1410C_28 (coal) and two samples that were adjacent to coal units (1451D_267 and 1401X_28).

It is possible that the leached elements are associated with dissolution of readily soluble salts (possibly sourced from contained pore water), or desorption from cation exchange sites on mineral surfaces (particularly in the case of major cations such as Na). The release of these species could be expected to occur over the short term (as a short term flush) and would be expected to diminish in the longer term.

Table 4-10: Samples with parameter concentrations that exceed ANZECC Guidelines

Element			pH	Al	Ni	Se	SO_4
Units			pH Unit	mg/L	mg/L	mg/L	mg/L
LOD			0.01	0.01	0.001	0.01	1
ANZECC Guidelines	Stock Water		-	5	1	0.02	1000
Sample ID	Lithology	Proximity to Coal					
1445D_240	Carbonaceous Sandstone	Distant	8.25	1.62	0.005	0.03	40
1454D_288	Siltstone	Distant	7.28	1.25	0.008	0.09	146
1451D_267	Sandstone	Adjacent	4.89	1.7	1.19	0.01	272
1401X_28	Sandstone	Adjacent	3.36	42.2	1.31	<0.01	550
1429R_42	Clay	Adjacent	4.73	1.44	0.112	<0.01	1180
1410C_28	Coal, undifferentiated	Coal	2.94	4.01	0.259	<0.01	628

5. Geostatistical Assessment

A geostatistical assessment was undertaken to assess the global and spatial variability of the measured values of total S and ANC. Specifically the objectives were to determine whether material classification data and AMD samples were sufficient in number and appropriately spaced to have:

a) Confidence in the volumes and locations of the lithological groups.

b) Confidence in the global, non-spatial, AMD parameter statistics (mean, variance and others) for the - lithological groups.

c) Confidence in the local spatial distribution and variability of AMD parameters within the lithological groups (from samples and locations).

Geostatistical methods can assist in addressing the points listed under step (b).

In most mining projects a much larger quantity of information is available on the material classification via geological logging than is available on the AMD parameters. Confidence in the quantities and proportions, as per point (a) above, of specific geological units is often assumed to be adequate and not require verification by statistical or geostatistical methods.

The Kevins Corner project had a large resource drilling database with the majority of holes geologically logged. The geostatistical analysis focused on the confidence in the adequacy of sample spacing and examination of the total S and ANC distributions above particular thresholds, as per points (b) and (c) above.

5.1 Total sulphur mean values

For all groups except weathered coal, sufficient samples were assessed to establish whether the average sulphur content of each group was either below or above the 0.1% total S threshold at the 95% confidence level.

In the weathered material there was 95% confidence that the mean total S content was less than 0.1 wt% for the following groups: clay and soil, sand and gravel, and REM (excluding the 2.36 wt% S sample).

For the REM (including the 2.36 wt% sample) group the 0.1 wt% total S value was not within the 95% confidence limits.

For the weathered coal group the 0.1 wt% total S value was not within the 95% confidence limits.

No conclusion could be drawn for weathered Carbonaceous material as no samples were available for testing.

The 0.2% and 0.3% total S thresholds for the fresh Carbonaceous and fresh Coal groups fall inside the 95% confidence intervals and we therefore do not have sufficient confidence that their mean is above or below these thresholds.

Combining the Kevins Corner and Alpha data for the fresh Carbonaceous group and calculating the 95% confidence interval on the mean gives an interval from 0.153 to 0.304 % total S. The 0.2 % and 0.3% thresholds are still within this interval.

More sampling of the fresh Carbonaceous group, is required if 0.2% or 0.3% total S become the critical thresholds of interest.

5.1.1 Sample spacing

The combined Alpha and Kevins Corner data indicate that sample spacing of 1000 m x 1000 m is adequate for interpolation and extrapolation of total S and ANC for Kevins Corner for all lithology groups and for the coal seams.

In the eastern half of the proposed open pit the sampled drillhole locations were approximately on a 1000 m x 1000 m grid and were therefore adequately spaced. Toward the western end of the proposed open pit the samples were collected from drillholes spaced at greater than 1000 m x 1000 m. Thus, in this region there is less confidence in the expected distribution of total sulphur grade. However, drill spacing in this area does not exceed approximately 2000 m and therefore based on variography at Alpha and KC the overall distribution of holes at Kevins Corner is considered adequate.

5.1.2 Probabilities of exceeding Total S thresholds

For groups where the mean total S value of analysed samples is below the threshold of interest there is still a chance that some areas/tonnages within each group will have total S values higher than values that may be considered low risk on the basis of the sulphur content. The probability of a 100 m x 100 m x 2 m block, which is the likely scale of selectively mining overburden, of a particular group exceeding specific thresholds was reported in Appendix 2.

Two key findings were that the probability of the total S content exceeding 0.1 wt% for both the fresh Carbonaceous and coal group materials mined on a 100 m x 100 x 2 m block were estimated to be 100%.

Small numbers of samples for some groups, such as the fresh Carbonaceous group, limit the accuracy and precision of the estimated overall proportions of a group above any given total S threshold. However the similarity of the statistical distributions total sulphur content with those of the Alpha project give added confidence to the global statistics.

5.1.3 Mining selectivity

Aside from coal, the Carbonaceous units contain the highest total S values but form a relatively small proportion, approximately 4%, of the fresh overburden. A better understanding of the spatial locations and thickness of the various Carbonaceous units is required to understand if they are likely to be mined in significant volumes, and whether they will be placed separately or will be mixed in with the majority of overburden material. SRK understands that HGPL has committed to selective mining of potentially problematic units if they can be visually identified or identified by geochemical and geological testing.

In some areas the Carbonaceous material may be thick enough to mine separately as it is likely to be a distinctly different colour to other groups and visual selection may be possible. In other areas the occurrences will be too thin to be mined selectively.

The resource drilling database for Kevins Corner shows that over the entire drillhole length:

- 75% of Carbonaceous group material exists as downhole intervals > 0.5 m long
- 60% as intervals >1 m long; and
- 40% > 2 m long

5.1.4 Recommendations

Additional drilling and geochemical characterisation that includes total sulphur analysis should be conducted to improve the estimate of the total sulphur distribution in the western region of the Kevins Corner pit. SRK understand that HGPL has committed to this and has plans for infill drilling and geochemical sampling.

6. Dispersivity Assessment

6.1.1 Introduction

Sodic soils can be dispersive when wet. In non-dispersive soils, the clay fraction remains flocculated in still water, and the water needs to be flowing above a threshold velocity to cause erosion. By contrast, there is no threshold velocity for dispersive soil, the clay particles go into suspension even in still water and therefore are highly susceptible to erosion and piping.

The potential for dispersivity is determined primarily by the mineralogy and chemistry of the clay fraction of the material, and by the dissolved salts in the pore and eroding fluids. The presence of exchangeable sodium is the principal chemical factor contributing to the soil dispersion. The exchangeable sodium percentage (ESP) is determined by measuring the concentration of all the exchangeable cations (Cation Exchange Capacity or CEC) in the soil and expressing the amount of exchangeable sodium as a percentage of the CEC.

Another property that governs the susceptibility of clayey soils to dispersion is the total content of dissolved salts (TDS, also assessed indirectly as electrical conductivity, EC) in the soil pore or eroding water. Generally, the lower the TDS or EC, the greater the susceptibility of sodium saturated soils to dispersion. Soils with high content of dissolved salts may remain flocculated even if the ESP is high.

Thus, for a given eroding fluid, the boundary between the flocculated and deflocculated (when dispersion can occur) states depends on the mineralogy and sodium content of the clay, the salt concentration of pore water and the eroding water.

Dispersion is assessed for mine overburden materials as the rapid erosion of these materials can cause tunnel erosion and gullying in the overburden emplacements, which can affect their long term stability and sustainability. In addition to having a high susceptibility to gully erosion, sodic soils can also show severe surface crusting, low infiltration and hydraulic conductivity and hard, dense subsoils.

6.1.2 Testing for Dispersivity

Dispersivity can be assessed by means of chemical tests to ascertain potential causes of dispersion, or by physical tests to observe the effect of dispersion. It is recommended that a variety of tests be conducted, because dispersion is not well identified by a single test.

For this project, the following three tests were used to assess dispersion potential:

- Exchangeable sodium percentage (ESP) and cation exchange capacity (CEC)
- Electrical conductivity (EC)
- Emerson aggregate test

Chemical dispersivity tests comprise the ESP, CEC and EC tests, whereas the Emerson aggregate test is a physical test.

For the ESP and CEC a sub-sample of material was dried and pulverised to better than 85% passing 75 microns as pulp. The EC (1:5) was also performed on the pulp. The Emerson aggregate test was tested "as received" with no further sample preparation.

An ESP greater than 6% may indicate dispersive properties, and greater than 15% indicates highly dispersive properties. However, factors such as clay type (determined indirectly from the CEC) and total dissolved salts (assessed using the EC) govern the overall behaviour of the material. Materials with a CEC less than 15 meq/100g are generally classified as non-dispersive (Gerber and von Maltitz Harmse, 1987). A high dissolved salt content may mask the effect of the high sodium content, which can cause soils with a high ESP to behave as a non-dispersive material.

A chart for predicting dispersion based on the ESP and EC is given in Figure 6-1 (Rengasamy et al. 1984). This takes the sodium percentage as well as the effect of dissolved salts into consideration. Materials with low ESP are classed as non-dispersive; materials with high ESP and low EC are classed as dispersive; and materials with high ESP and high EC are classed as potentially dispersive. Soils in the last category can revert to a dispersive behaviour by either leaching of the high salt content, or by mechanical re-working of the materials. (The chart shows EC in units dS/m, converted from the laboratory test values reported in units of µS/cm by dividing by 1000.)

Figure 6-1 provides a guide to the dispersive nature of many soils. However, it was developed specifically for the surface soils (red-brown earths) in south eastern Australia and this should be considered when using it to assess sub-surface materials.

The Emerson aggregate test (also called the crumb test) is a simple and effective test to assess dispersivity. A block of soil (about 2cm in diameter) is placed in still water and the reaction between soil and water (slaking or dispersion) noted. If no reaction occurs, the sample is remoulded and placed back into solution, which is then shaken, to stimulate reaction. The sample is also tested for gypsum. A flow chart for the testing and classification of soils using this test is shown in Appendix 8 together with photographic examples of highly dispersive, slightly dispersive and non-dispersive samples.

6.1.3 Sample Selection

Dispersivity testing was conducted on samples from Kevins Corner (34 and 17 samples were submitted for physical and chemical testing respectively). The samples selected are shown in Table 6-1 and cover all major material types and weathering grades, with emphasis on materials more likely to show dispersive behaviour.

Table 6-1: Sample selection

Lithology Group	Rock type	Number of Samples: Emerson Testing	Number of Samples: Chemical Testing
Coal	Coal	2	1
Clay and Soil	Clay (weathered layers)	6	2
	Soil	2	1
Carbonaceous	Carb. Mudstone	2	1
	Carb. Shale	3	2
	Carb. Sandstone	2	
Remaining	Mudstone	3	3
	Siltstone	7	4
	Sandstone	5	3
	Laterite	1	
	Claystone	1	

6.1.4 Test Results

Test results are provided in Appendix 9. An assessment of the dispersivity of each sample is shown in Table 6-2.

Table 6-2: Assessment of Dispersivity

Sample ID	Lithology Group	Rock Type	Weathering	Emerson Test	CEC & ESP	ESP vs EC Chart	Assessed Dispersivity
1429R - 194	Coal	Coal	FR	S	S	P	Slightly
1429R - 196	Coal	Coal	FR	N			Nondispersive
1412C - 171	Carbonaceous	Carb. Mudstone	FR	N	N	P	Nondispersive
1453D - 278	Carbonaceous	Carb. Mudstone	FR	S			Slightly
1434D - 213	Carbonaceous	Carb. Sandstone	FR	L			Slightly

Sample ID	Lithology Group	Rock Type	Weathering	Emerson Test	CEC & ESP	ESP vs EC Chart	Assessed Dispersivity
1445D - 240	Carbonaceous	Carb. Sandstone	FR	L			Slightly
1429R - 192	Carbonaceous	Carb. Shale	FR	S			Slightly
1445D - 235	Carbonaceous	Carb. Shale	FR	N	D	P	Nondispersive
1454D - 288	Carbonaceous	Carb. Shale	FR	S	N	P	Slightly
1397D - 137	Clay/Soil	Clay	HW	D	S		Dispersive
1402C - 152	Clay/Soil	Clay	HW	S			Slightly
1403D - 160	Clay/Soil	Clay	MW	D			Dispersive
1403D - 161	Clay/Soil	Clay	SW	S			Slightly
1414X - 175	Clay/Soil	Clay	CW	D			Dispersive
1451D - 264	Clay/Soil	Clay	CW	S	N	P	Slightly
1402C - 151	Clay/Soil	Soil	CW	N			Nondispersive
1453D - 275	Clay/Soil	Soil	CW	N	N	P	Nondispersive
1412C - 166	Remaining	Laterite	CW	S			Slightly
1389R - 102	Remaining	Siltstone	CW	D			Dispersive
1414X - 177	Remaining	Siltstone	CW	D	D	P	Dispersive
1434D - 206	Remaining	Claystone	HW	S	S	P	Slightly
1412C - 167	Remaining	Siltstone	HW	S	D	P	Dispersive
1388R - 96	Remaining	Sandstone	HW	D			Dispersive
1429R - 191	Remaining	Mudstone	MW	D	D	P	Dispersive
1397D - 138	Remaining	Siltstone	MW	S			Slightly
1434D - 207	Remaining	Sandstone	MW	S			Slightly
1397D - 141	Remaining	Sandstone	SW	S	N	P	Nondispersive
1429R - 193	Remaining	Mudstone	FR	L	N	P	Nondispersive
1454D - 289	Remaining	Mudstone	FR	L			Nondispersive
1389R - 107	Remaining	Sandstone	FR	N	N	P	Nondispersive
1453D - 279	Remaining	Sandstone	FR	S	S	P	Slightly
1412C - 170	Remaining	Siltstone	FR	L	N	D	Nondispersive
1451D - 265	Remaining	Siltstone	FR	L			Slightly
1454D - 286	Remaining	Siltstone	FR	N	S	P	Nondispersive

Where D = dispersive, S = slightly dispersive, L= slightly dispersive when remoulded, P = potentially dispersive and N = nondispersive

The ESP versus EC chart (Figure 6-1) shows that all the samples except one would be classed as potentially dispersive (Class 2B) due to their high exchangeable sodium percent but high dissolved salt content. This indicates that the materials may become dispersive when leached without the addition of calcium compounds, and if there is no generation of electrolytes due to mineral weathering.

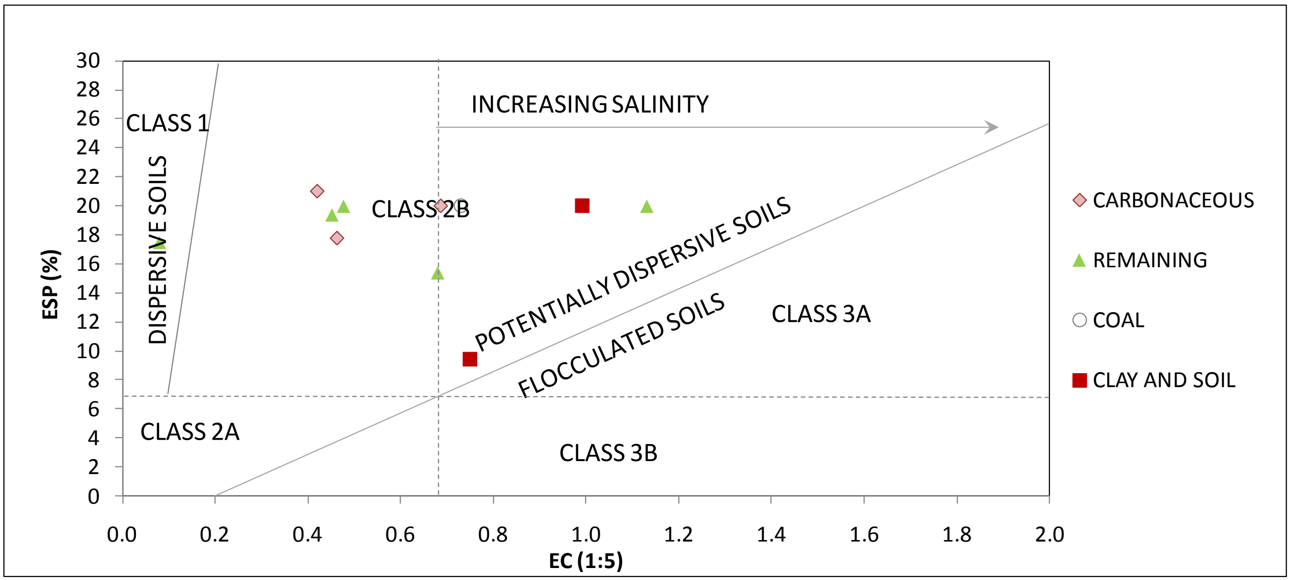

Figure 6-1: ESP and EC (dS/m) chart (Rengasamy et al. 1984)

Where samples were submitted for both physical and chemical testing, there was reasonable agreement in their classification by both methods. The slightly dispersive materials tended to show more variability between the physical and chemical test results.

6.1.5 Conclusions

The general dispersivity characteristics of each material type is summarised in Table 6-3.

Table 6-3: General dispersivity characteristics of each material type

SRK Group	Weathering	General dispersive characteristics
Coal	Fresh	Non dispersive to slightly dispersive
Carbonaceous	Fresh	Non dispersive to slightly dispersive
Soil and clay	Soil	Non dispersive
	Clay - highly to completely weathered	Dispersive or slightly dispersive
Remaining	Moderately, highly and completely weathered	Dispersive or slightly dispersive
	Slightly weathered or fresh	Non dispersive to slightly dispersive

All groups showed some potential for dispersive behaviour. Soils, coal and Carbonaceous and slightly weathered Rem material generally displayed non dispersive to slightly dispersive characteristics. More weathered materials (clay or material from the Rem group) were characterised as slightly to highly dispersive.

The dispersive characteristics of the material may contribute to erosion of the overburden emplacements. Thus, suitable precautions should be taken to prevent water flow over or ponding on the overburden emplacements. This will minimise physical gully erosion of the dispersive materials and reduce leaching of excess salts, which act to prevent dispersive behaviour. The use of shallow or concave slopes (with steepest gradient at the top of the slope and reduced gradient at the toe of the slope) has been recommended to minimise gully formation (Loch, 2005; Vacher et al, 2004). In addition, good compaction may assist in reducing ingress of water into the slopes.

Storage of the clays and weathered materials within the core of the storage areas is recommended as these materials have the highest dispersion characteristics. SRK understands that HGPL has committed to storing highly saline/sodic overburden within the core of the out-of-pit and in-pit storage areas.

7. Conclusions

Acidity, Salinity, Metals

The following findings are based on paste pH and paste EC testing of 294 samples and static leach test of 29 samples.

Overburden and interburden:

- The large majority of overburden and interburden that is not immediately adjacent to coal seams is not likely to be a source of acid immediately after mining.
- There was limited evidence (one leached sample) that overburden and interburden samples from locations close to coal units that would not be mined could release acid.
- Some overburden and interburden materials could be potential sources of salts (salinity). Whilst elevated soluble salts may be released from the samples over a range of pH values, the largest concentration of soluble salts would be released in the near neutral range between pH 5 and 8.
- The concentrations of metals in leachates were for the vast majority of samples very low.
- The small number of samples (3) that had higher metal releases in leach tests, originated from locations adjacent to coal seams and had acidic pH values.
- There was some evidence (two samples) that concentrations of selenium may be elevated at near neutral pH for a small amount of material.

Coal, roof, floor and processed coal products:

- Non-coal roof and floor materials may be associated with salt release over a range of pH values at a range of concentrations
- Non-coal roof and floor materials are not likely to be sources of acid.
- Undifferentiated coal is not likely to be a source of acid but may be a source of readily available salts.
- Weathered coal is unlikely to be a significant source of readily available soluble salts or acid.
- Coal rejects is potentially sources of acid (based on one sample).
- Coal rejects material is potentially a source of soluble salts (based on one sample).
- Coal tailings is unlikely to be a source of acid (based on one sample).
- Coal product is unlikely to be a significant source of readily available soluble salts but is possibly a source of acid (based on one sample).
- Three undifferentiated coal samples were leach tested. No metals were leached from these samples at elevated concentrations and most metals were at very low concentrations.

Potential AMD

There was generally good agreement in sample classification by the modified NPR and AMIRA methods (Figure A).

The vast majority of overburden and interburden samples (representing 3.1 billion tons of overburden) were NAF. Depending on the classification scheme, 4 to 8% of the samples were PAF. However, many of the PAF samples had low capacity to produce acid (i.e. NAPP ≤ 5 kgH_2SO_4/t).

For example, of the eleven samples classified PAF under the NPR scheme eight samples had low capacity to generated acid. Under the AMIRA scheme four of the six PAF samples had a low capacity to produce acid.

The coal product, tailings and coarse rejects would all be classed PAF. The coal product had a low capacity to produce acid.

Of the 19 Fresh Carbonaceous group samples none were classed as PAF. No weathered Carbonaceous samples were available for characterisation.

Acid production and Neutralising Capacity

The distribution of overburden and mixing during mining would likely result in acid produced in one localised region contacting nearby neutralising materials. Thus, leachate quality will generally be determined by average properties.

For the overburden and interburden lithology groups the average acid neutralising capacity (ANC) exceeds acid potential (AP) and the neutralisation potential ratio (NPR) is greater than or equal to five.

This indicates that the on average there is adequate neutralising capacity to neutralise acid that is formed. However, actual leachate quality will depend on the localised distribution of overburden and the rate of neutralising of acid.

For the coal and coal product the average NAPP values indicate that there is more neutralising capacity than acid potential but the NPR value indicates that the excess may not be enough to ensure all leachate remains neutral.

Carbonaceous Roof and Floor, Rem Roof and Floor have excess neutralising capacity (negative NAPP and NPR > 3).

For the Tailings -250 µm and Rejects +250 µm samples the NAPP and NPR indicate that both would be PAF. However, the potential to produce acid for the tailings is low and much less than that of the rejects (1.7 compared to 61.3 kgH_2SO_4/t).

Dispersivity

Samples from all lithology groups showed some potential for dispersive behaviour. The general dispersivity characteristics of each material type are summarised in below.

Table 7-1: General dispersivity characteristics of each material type

SRK Group	Weathering	General dispersive characteristics
Coal	Fresh	Non dispersive to slightly dispersive
Carbonaceous	Fresh	Non dispersive to slightly dispersive
Soil and clay	Soil	Non dispersive
	Clay - highly to completely weathered	Dispersive or slightly dispersive
Remaining	Moderately, highly and completely weathered	Dispersive or slightly dispersive
	Slightly weathered or fresh	Non dispersive to slightly dispersive

Material Sampling Frequency

<u>Sample Spacing</u>

Experimental variography indicates that sampling from drillholes space on 1000 m x 1000 m grid is adequate for interpolation and extrapolation of total S and ANC in all overburden and interburden lithology groups and for the coal group.

In the eastern half of the proposed open pit the sampled drillhole locations were approximately on1000 m x 1000 m grid and were therefore adequately spaced. Toward the western end of the proposed open pit the samples were collected from drillholes spaced at greater than 1000 m x 1000 m. Thus, in this region there is less confidence in the expected distribution of total sulphur grade. However, drill spacing in this ara and do not exceed approximately 2000 m and therefore based on variography at Alpha and KC the overall distribution of holes at Kevins Corner is considered adequate.

Total Sulphur Distribution

Weathered material

In the weathered material there was 95% confidence that the mean total S content was less than 0.1 wt% for the following groups:

- clay and soil,
- sand and gravel, and
- REM (excluding the 2.36 wt% S sample).

For the weathered coal and the REM (including the 2.36 wt% sample) groups the 0.1 wt% total S value was not within the 95% confidence limits of the value of the mean total S content.

No conclusion could be drawn for weathered Carbonaceous material as no samples were available for testing.

Fresh material

There is 95% confidence that the mean total sulphur content for the Coal and Carbonaceous groups do exceed the 0.1 wt%.

For the Fresh Carbonaceous and Fresh Coal groups there were insufficient results to demonstrate to the 95th percentile confidence interval that the mean total sulphur content is above or below 0.2 or 0.3 wt%.

Combining the Kevins Corner and Alpha results for the Fresh Carbonaceous group indicate at the 95% confidence level that the mean total S value was within the interval 0.153 to 0.304 wt%.

The probability of the total sulphur content exceeding 0.1 wt% for both the Fresh Carbonaceous and coal group materials mined on a 100 m x 100 x 2 m block were estimated to be 100%. However, none of the Carbonaceous samples were classed PAF,

8. Recommendations

Based on the information currently available:

- The majority of overburden should be managed as non-acid forming material. However, there is potential for existing salinity to be washed from some overburden in response to rainfall events. Consequently, containment of run-off and water quality monitoring may be required depending on the sensitivity of ground and surface water to salinity. The results indicate that water quality predictions for the disturbed mine overburden are warranted.

- More samples of coal, roof, floor, coal rejects and coal tailings and some weathered Carbonaceous material should be characterised to improve the robustness of the current assessment of the geochemical characteristics of these materials.

- Until a more robust assessment of the coal rejects has been conducted they should be considered as PAF and appropriate management strategies should be considered.

- Additional drilling should be conducted toward the western end of the proposed open pit as mining progresses. Samples from the holes should be collected and geochemically characterised).

- Samples of selected major lithologies should be kinetically tested to determine the rates of acid production, acid neutralisation and metals release. Samples with total sulphur contents above and below 0.1 wt% should be tested. Data produced should be used in conjunction with other test results to confirm that materials with a total sulphur content of less than 0.1 wt% are NAF.

- Suitable precautions should be taken to prevent water flowing over or ponding on the overburden emplacements to minimise physical erosion of the dispersive materials, and to prevent leaching of salts, which can mitigate dispersive behaviour. Good compaction may also help prevent ingress of water into the slopes. The use of flat slopes (<5% gradient if possible) or concave slopes (with steepest gradient at the top of the slope and reducing the gradient as slope length and quantity of runoff increase) is recommended to minimise any potential for gully formation.

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Appendices

Appendix 1: Sample Information

ALS Sample ID	Client Sample ID	Sample ID reported by Salva	Location (e.g. Drill hole)	From (m)	To (m)	Roof/floor	Lithology	Lithology code	Weathering
EB1019995001	1388R_95	95	1388R	1	4		SAND	SA	HW
EB1019995002	1388R_96	96	1388R	16	19		SANDSTONE	SS	HW
EB1019995003	1388R_97	97	1388R	58.95	59.45	ROOF	SANDSTONE	SS	FR
EB1019995004	1388R_100	100	1388R	89	91.4		SANDSTONE	SS	FR
EB1019995005	1389R_102	102	1389R	9	12		SILTSTONE	SL	CW
EB1019995006	1389R_103	103	1389R	52.67	53.17	ROOF	SILTSTONE	SL	FR
EB1019995007	1389R_104/105/106	104/15/106	1389R	53.17	55.95		COAL, undifferentiated	CO	FR
EB1019995008	1389R_107	107	1389R	81.03	83.44		SANDSTONE	SS	FR
EB1019995009	1397D_134	134	1397D	0	2.84		CLAY	CL	HW
EB1019995010	1397D_135	135	1397D	5.28	6.53		CLAY	CL	HW
EB1019995011	1397D_136	136	1397D	11.41	13.34		SAND	SA	HW
EB1019995012	1397D_137	137	1397D	17.85	19.3		CLAY	CL	HW
EB1019995013	1397D_138	138	1397D	24.62	25.14		SILTSTONE	SL	MW
EB1019995014	1397D_139	139	1397D	28.59	29.37		SANDSTONE	SS	SW
EB1019995015	1397D_140	140	1397D	33.38	34.92		SANDSTONE	SS	FR
EB1019995016	1397D_141	141	1397D	36.89	38.41		SANDSTONE	SS	SW
EB1019995017	1397D_146	146	1397D	56.21	56.84	FLOOR	SILTSTONE	SL	FR
EB1019995018	1402C_151	151	1402C	0	2		SOIL	SO	CW
EB1019995019	1402C_152	152	1402C	4	7		CLAY	CL	HW
EB1019995020	1402C_153	153	1402C	12	13.5		SILTSTONE	SL	HW
EB1019995021	1403D_159	159	1403D	8.59	9.8		SAND	SA	HW
EB1019995022	1403D_160	160	1403D	11.64	12.52		CLAY	CL	MW
EB1019995023	1403D_161	161	1403D	20.84	21.91		CLAY	CL	SW
EB1019995024	1403D_162	162	1403D	25.24	26.47		CLAYSTONE	CS	FR
EB1019995025	1403D_163	163	1403D	35.27	37.37		SILTSTONE	SL	FR
EB1019995026	1403D_164	164	1403D	49.51	50.07		PEBBLE CONGLOMERATE	PC	FR
EB1019995027	1403D_165	165	1403D	52.53	53.6		SANDSTONE	SS	FR
EB1019995028	1412C_166	166	1412C	2	3		LATERITE	LT	CW
EB1019995029	1412C_167	167	1412C	11	14		SILTSTONE	SL	HW
EB1019995030	1412C_168	168	1412C	14	16		SANDSTONE	SS	W
EB1019995031	1412C_169	169	1412C	41.58	42.04		SANDSTONE	SS	FR
EB1019995032	1412C_170	170	1412C	59.55	60.43		SILTSTONE	SL	FR
EB1019995033	1412C_171	171	1412C	63.25	65.73		CARBONACEOUS MUDSTONE	XM	FR
EB1019995034	1412C_173	173	1412C	71.11	71.69		SANDSTONE	SS	FR
EB1019995035	1414X_175	175	1414X	0	1		CLAY	CL	CW
EB1019995036	1414X_176	176	1414X	20	22		CONGLOMERATE	CG	HW
EB1019995037	1414X_177	177	1414X	29	31		SILTSTONE	SL	CW
EB1019995038	1414X_178	178	1414X	31	33		CARBONACEOUS MUDSTONE	XM	FR
EB1019995039	1429R_190	190	1429R	0	2		SOIL	SO	HW
EB1019995040	1429R_191	191	1429R	29	30		MUDSTONE	MS	MW
EB1019995041	1429R_192	192	1429R	46.37	46.84		CARBONACEOUS SHALE	XH	FR
EB1019995042	1429R_193	193	1429R	106.31	106.81	ROOF	MUDSTONE	MS	FR
EB1019995043	1429R_194	194	1429R	110	113		COAL, undifferentiated	CO	FR
EB1019995044	1429R_195	195	1429R	124	124.5	ROOF	SANDSTONE	SS	FR
EB1019995045	1429R_196	196	1429R	135.5	138.02		COAL, undifferentiated	CO	FR
EB1019995046	1434D_205	205	1434D	0	0.65		SOIL	SO	CW
EB1019995047	1434D_206	206	1434D	13.21	13.8		CLAYSTONE	CS	HW
EB1019995048	1434D_207	207	1434D	33.45	34.79		SANDSTONE	SS	MW
EB1019995049	1434D_208	208	1434D	48.1	49.79		SILTSTONE	SL	FR
EB1019995050	1434D_209	209	1434D	66.89	69.02		SANDSTONE	SS	FR

ALS Sample ID	Client Sample ID	Sample ID reported by Salva	Location (e.g. Drill hole)	From (m)	To (m)	Roof/floor	Lithology	Lithology code	Weathering
EB1019995051	1434D_210	210	1434D	91.61	92.47		SILTSTONE	SL	FR
EB1019995052	1434D_211	211	1434D	135.16	137.89		SANDSTONE	SS	FR
EB1019995053	1434D_212	212	1434D	143.42	145.2		CARBONACEOUS SANDSTONE	XS	FR
EB1019995054	1434D_213	213	1434D	147.4	148.39		CARBONACEOUS SANDSTONE	XS	FR
EB1019995055	1444D_227	227	1444D	120.89	121.41		SANDSTONE	SS	FR
EB1019995056	1444D_228	228	1444D	126.67	127.74		CARBONACEOUS SHALE	XH	FR
EB1019995057	1444D_229	229	1444D	132.46	133		SILTSTONE	SL	FR
EB1019995058	1445D_233	233	1445D	63.24	63.66		CARBONACEOUS SANDSTONE	XS	FR
EB1019995059	1445D_234	234	1445D	71.91	72.69		SILTSTONE	SL	FR
EB1019995060	1445D_235	235	1445D	78.843	80.34	ROOF	CARBONACEOUS SHALE	XH	FR
EB1019995061	1445D_237	237	1445D	149.29	150.21		CARBONACEOUS SANDSTONE	XS	FR
EB1019995062	1445D_238	238	1445D	152.89	154.5		SANDSTONE	SS	FR
EB1019995063	1445D_239	239	1445D	159.59	160.55		CARBONACEOUS SANDSTONE	XS	FR
EB1019995064	1445D_240	240	1445D	160.82	161.48		CARBONACEOUS SANDSTONE	XS	FR
EB1019995065	1445D_241	241	1445D	164.48	166.26		SILTSTONE	SL	FR
EB1019995066	1451D_264	264	1451D	3.3	6		CLAY	CL	CW
EB1019995067	1451D_265	265	1451D	28.36	29.8		SILTSTONE	SL	FR
EB1019995068	1451D_266	266	1451D	42.69	43.36		CARBONACEOUS SANDSTONE	XS	FR
EB1019995069	1451D_267	267	1451D	46.88	47.96		SANDSTONE	SS	FR
EB1019995070	1452D_268	268	1452D	3.14	4.7		CLAY	CL	CW
EB1019995071	1452D_269	269	1452D	21.56	22.18		CLAYSTONE	CS	HW
EB1019995072	1452D_270	270	1452D	28.08	28.81		SILTSTONE	SL	FR
EB1019995073	1452D_271	271	1452D	48.11	49.48		SANDSTONE	SS	FR
EB1019995074	1452D_272	272	1452D	87.1	89.14		SILTSTONE	SL	FR
EB1019995075	1452D_273	273	1452D	99.09	99.88		MUDSTONE	MS	FR
EB1019995076	1452D_274	274	1452D	112.5	113.56		SANDSTONE	SS	FR
EB1019995077	1453D_275	275	1453D	0.9	1.7		SOIL	SO	CW
EB1019995078	1453D_276	276	1453D	19.13	20.46		CLAYSTONE	CS	HW
EB1019995079	1453D_277	277	1453D	50.98	52.2		SANDSTONE	SS	FR
EB1019995080	1453D_278	278	1453D	58.26	58.83		CARBONACEOUS MUDSTONE	XM	FR
EB1019995081	1453D_279	278	1453D	58.26	58.83		CARBONACEOUS SANDSTONE	XS	FR
EB1019995082	1453D_280	279	1453D	85.53	86.8		SANDSTONE	SS	FR
EB1019995083	1453D_281	280	1453D	111.64	112.41		SILTSTONE	SL	FR
EB1019995084	1453D_282	281	1453D	136.5	138.1		SANDSTONE	SS	FR
EB1019995085	1454D_284	282	1453D	148.93	150.25		SILTSTONE	SL	FR
EB1019995086	1454D_285	284	1454D	53.36	54.03		SILTSTONE	SL	FR
EB1019995087	1454D_286	285	1454D	77.83	79.58		SANDSTONE	SS	FR
EB1019995088	1454D_288	286	1454D	94.21	95.04		SILTSTONE	SL	FR
EB1019995089	1454D_289	288	1454D	172.59	173.07		CARBONACEOUS SHALE	XH	FR
EB1019995090	1454D_290	289	1454D	173.3	173.87		MUDSTONE	MS	FR
EB1100364001	1398X_1	1	1398X	0	1		SOIL	SO	CW
EB1100364002	1398X_2	2	1398X	1	2		SAND	SA	CW
EB1100364003	1398X_9	9	1398X	8	9		SAND	SA	CW
EB1100364004	1398X_14	14	1398X	13	14		SAND	SA	CW
EB1100364005	1398X_19	19	1398X	18	19		CLAY	CL	HW
EB1100364006	1398X_22	22	1398X	21	22		SAND	SA	HW
EB1100364007	1398X_28	28	1398X	26	28		SAND	SA	MW
EB1100364008	1398X_5032	32	1398X	31	32		SANDSTONE	SS	SW
EB1100364009	1398X_33	42	1398X	41	42	ROOF	SANDSTONE	SS	FR
EB1100364010	1398X_34	44	1398X	43	44		COAL, undifferentiated	CO	FR

ALS Sample ID	Client Sample ID	Sample ID reported by Salva	Location (e.g. Drill hole)	From (m)	To (m)	Roof/floor	Lithology	Lithology code	Weathering
EB1100364011	1399X_2	2	1399X	1	2		SOIL	SO	CW
EB1100364012	1399X_6	6	1399X	5	6		SAND	SA	CW
EB1100364013	1399X_11	11	1399X	10	11		SAND	SA	CW
EB1100364014	1399X_19	19	1399X	18	19		SAND	SA	CW
EB1100364015	1399X_24	24	1399X	23	24		SAND	SA	CW
EB1100364016	1399X_31	31	1399X	30	31		CLAY	CL	SW
EB1100364017	1399X_32	32	1399X	31	32		CLAY	CL	SW
EB1100364018	1399X_34	34	1399X	33	34		SANDSTONE	SS	SW
EB1100364019	1399X_35	35	1399X	34	35		SANDSTONE	SS	SW
EB1100364020	1399X_36	36	1399X	35	36		SANDSTONE	SS	SW
EB1100364021	1400X_2	2	1400X	1	2		SOIL	SO	MW
EB1100364022	1400X_7	7	1400X	6	7		SAND	SA	MW
EB1100364023	1400X_11	11	1400X	10	11		SAND	SA	MW
EB1100364024	1400X_25	25	1400X	24	25		CLAY	CL	MW
EB1100364025	1400X_26	26	1400X	25	26		COALY SHALE	ZH	MW
EB1100364026	1401X_2	2	1401X	1	2		SOIL	SO	CW
EB1100364027	1401X_3	3	1401X	2	3		SOIL	SO	CW
EB1100364028	1401X_15	15	1401X	14	15		SAND	SA	HW
EB1100364029	1401X_27	27	1401X	26	27		SANDSTONE	SS	SW
EB1100364030	1401X_28	28	1401X	27	28		SANDSTONE	SS	SW
EB1100364031	1404C_2	2	1404C	1	2		CLAY	CL	MW
EB1100364032	1404C_4	4	1404C	3	4		SANDSTONE	SS	MW
EB1100364033	1404C_8	8	1404C	7	8		SILTSTONE	SL	MW
EB1100364034	1404C_11	11	1404C	10	11		SILTSTONE	SL	MW
EB1100364035	1404C_18	18	1404C	17	18		SILTSTONE	SL	MW
EB1100364036	1404C_19	19	1404C	18	19		SILTSTONE	SL	MW
EB1100364037	1404C_20	20	1404C	19	20		SILTSTONE	SL	MW
EB1100364038	1404C_22	22	1404C	21	22		SILTSTONE	SL	MW
EB1100364039	1404C_24	24	1404C	23	24		SILTSTONE	SL	MW
EB1100364040	1405C_1	1	1405C	0	1		CLAY	CL	CW
EB1100364041	1405C_6	6	1405C	5	6		SILTSTONE	SL	SW
EB1100364042	1405C_19	19	1405C	18	19		SANDSTONE	SS	SW
EB1100364043	1405C_20	20	1405C	19	20		SANDSTONE	SS	SW
EB1100364044	1405C_21	21	1405C	20	21		SANDSTONE	SS	FR
EB1100364045	1405C_22	22	1405C	21	22		SANDSTONE	SS	FR
EB1100364046	1405C_25	25	1405C	24	25		SANDSTONE	SS	FR
EB1100364047	1405C_26	26	1405C	25	26		SANDSTONE	SS	FR
EB1100364048	1405C_28	28	1405C	27	28		SANDSTONE	SS	FR
EB1100364049	1405C_30	30	1405C	29	30		SANDSTONE	SS	FR
EB1100364050	1405C_31	31	1405C	30	31		SANDSTONE	SS	FR
EB1100364051	1405C_32	32	1405C	31	32		SANDSTONE	SS	FR
EB1100364052	1405C_33	33	1405C	32	33		SANDSTONE	SS	FR
EB1100364053	1405C_36	36	1405C	35	36		SANDSTONE	SS	FR
EB1100364054	1405C_40	40	1405C	39	40		SANDSTONE	SS	FR
EB1100364055	1405C_42	42	1405C	41	42		SANDSTONE	SS	FR
EB1100364056	1405C_43	43	1405C	42	43		SANDSTONE	SS	FR
EB1100364057	1405C_44	44	1405C	43	44		SANDSTONE	SS	FR
EB1100364058	1405C_48	48	1405C	47	48		SANDSTONE	SS	FR
EB1100364059	1405C_49	49	1405C	48	49		SANDSTONE	SS	FR
EB1100364060	1405C_50	50	1405C	49	50		SANDSTONE	SS	FR

ALS Sample ID	Client Sample ID	Sample ID reported by Salva	Location (e.g. Drill hole)	From (m)	To (m)	Roof/floor	Lithology	Lithology code	Weathering
EB1100364061	1405C_51	51	1405C	50	51		SANDSTONE	SS	FR
EB1100364062	1405C_52	52	1405C	51	52		SANDSTONE	SS	FR
EB1100364063	1405C_53	53	1405C	52	53		SANDSTONE	SS	FR
EB1100364064	1405C_54	54	1405C	53	54		SANDSTONE	SS	FR
EB1100364065	1407C_78603	3	1407C	2	3		SAND	SA	CW
EB1100364066	1407C_78606	6	1407C	5	6		SILTSTONE	SL	MW
EB1100364067	1407C_78610	10	1407C	9	10		SILTSTONE	SL	MW
EB1100364068	1407C_78611	11	1407C	10	11		SILTSTONE	SL	MW
EB1100364069	1407C_78612	12	1407C	11	12		CLAY	CL	HW
EB1100364070	1407C_78614	14	1407C	13	14		CLAY	CL	HW
EB1100364071	1407C_78616	16	1407C	15	16		CLAY	CL	HW
EB1100364072	1407C_78619	19	1407C	18	19		CLAY	CL	HW
EB1100364073	1407C_78621	21	1407C	20	21		CLAY	CL	HW
EB1100364074	1407C_78624	24	1407C	23	24		SILTSTONE	SL	HW
EB1100364075	1407C_78627	27	1407C	26	27		SILTSTONE	SL	HW
EB1100364076	1407C_78628	28	1407C	27	28		SILTSTONE	SL	HW
EB1100364077	1407C_78630	30	1407C	29	30		SANDSTONE	SS	SW
EB1100364078	1407C_78631	31	1407C	30	31		SANDSTONE	SS	SW
EB1100364079	1407C_78632	32	1407C	31	32		SANDSTONE	SS	SW
EB1100364080	1407C_78633	33	1407C	32	33		SANDSTONE	SS	SW
EB1100364081	1408C_78650	3	1408C	2	3		SAND	SA	SW
EB1100364082	1408C_78704	7	1408C	6	7		SILTSTONE	SL	MW
EB1100364083	1408C_78708	11	1408C	10	11		SILTSTONE	SL	MW
EB1100364084	1408C_78712	15	1408C	14	15		CLAY	CL	HW
EB1100364085	1408C_78715	18	1408C	17	18		CLAY	CL	HW
EB1100364086	1408C_78717	20	1408C	19	20		CLAY	CL	HW
EB1100364087	1408C_78720	23	1408C	22	23		SILTSTONE	SL	HW
EB1100364088	1408C_78725	28	1408C	27	28		SILTSTONE	SL	HW
EB1100364089	1408C_78726	29	1408C	28	29		SANDSTONE	SS	SW
EB1100364090	1408C_78727	30	1408C	29	30		SANDSTONE	SS	SW
EB1100364091	1408C_78728	31	1408C	30	31		SANDSTONE	SS	SW
EB1100364092	1408C_78730	33	1408C	32	33		SANDSTONE	SS	SW
EB1100364093	1409C_5	5	1409C	4	5		SANDSTONE	SS	PW
EB1100364094	1409C_11	11	1409C	10	11		COAL WEATHERED	CW	CW
EB1100364095	1409C_12	12	1409C	11	12		COAL WEATHERED	CW	CW
EB1100364096	1409C_13	13	1409C	12	13		COAL WEATHERED	CW	PW
EB1100364097	1409C_14	14	1409C	13	14		COAL, undifferentiated	CO	PW
EB1100364098	1409C_17	17	1409C	16	17		SANDSTONE	SS	FR
EB1100364099	1409C_19	19	1409C	18	19		SANDSTONE	SS	FR
EB1100364100	1409C_22	22	1409C	21	22		SANDSTONE	SS	FR
EB1100364101	1409C_23	23	1409C	22	23		SANDSTONE	SS	FR
EB1100364102	1409C_24	24	1409C	23	24		SANDSTONE	SS	FR
EB1100364103	1409C_25	25	1409C	24	25		MUDSTONE	MS	FR
EB1100364104	1409C_26	26	1409C	25	26		CARBONACEOUS MUDSTONE	XM	FR
EB1100364105	1409C_27	27	1409C	26	27	ROOF	CARBONACEOUS MUDSTONE	XM	FR
EB1100364106	1409C_29	39	1409C	30	42		SANDSTONE	SS	FR
EB1100364107	1409C_30	45	1409C	42	48		SANDSTONE	SS	FR
EB1100364108	1409C_31	51	1409C	48	54		SANDSTONE	SS	FR
EB1100364109	1409C_32	58	1409C	54	60		SANDSTONE	SS	FR
EB1100364110	1409C_33	62	1409C	60	66		SANDSTONE	SS	FR

ALS Sample ID	Client Sample ID	Sample ID reported by Salva	Location (e.g. Drill hole)	From (m)	To (m)	Roof/floor	Lithology	Lithology code	Weathering
EB1100364111	1409C_34	72	1409C	66	72		SILTSTONE	SL	FR
EB1100364112	1410C_1	1	1410C	0	1		SAND	SA	CW
EB1100364113	1410C_2	2	1410C	1	2		LATERITE	LT	MW
EB1100364114	1410C_3	3	1410C	2	3		SANDSTONE	SS	HW
EB1100364115	1410C_8	8	1410C	7	8		SANDSTONE	SS	HW
EB1100364116	1410C_13	13	1410C	12	13		SANDSTONE	SS	WE
EB1100364117	1410C_17	17	1410C	16	17		SILTSTONE	SL	WE
EB1100364118	1410C_22	22	1410C	21	22		MUDSTONE	MS	WE
EB1100364119	1410C_28	28	1410C	27	28		COAL, undifferentiated	CO	WE
EB1100364120	1410C_29	29	1410C	28	29		COAL, undifferentiated	CO	WE
EB1100364121	1410C_30	30	1410C	29	30		COAL, undifferentiated	CO	WE
EB1100364122	1410C_31	31	1410C	30	31		COAL, undifferentiated	CO	WE
EB1100364123	1410C_35	35	1410C	34	35		SILTSTONE	SL	FR
EB1100364124	1410C_40	40	1410C	39	40		SANDSTONE	SS	FR
EB1100364125	1410C_46	46	1410C	45	46		SANDSTONE	SS	FR
EB1100364126	1410C_47	47	1410C	46	47		SANDSTONE	SS	FR
EB1100364127	1410C_48	48	1410C	47	48		SANDSTONE	SS	FR
EB1100364128	1410C_49	49	1410C	48	49		SANDSTONE	SS	FR
EB1100364129	1410C_50	50	1410C	49	50		SANDSTONE	SS	FR
EB1100364130	1410C_51	51	1410C	50	51		SANDSTONE	SS	FR
EB1100364131	1410C_57	57	1410C	56	57		SILTSTONE	SL	FR
EB1100364132	1410C_58	58	1410C	57	58		SANDSTONE	SS	FR
EB1100364133	1410C_59	59	1410C	58	59		SANDSTONE	SS	FR
EB1100364134	1410C_60	60	1410C	59	60		SANDSTONE	SS	FR
EB1100364135	1410C_65	65	1410C	64	65		SANDSTONE	SS	FR
EB1100364136	1410C_70	70	1410C	69	70		SANDSTONE	SS	FR
EB1100364137	1410C_74	74	1410C	73	74		SANDSTONE	SS	FR
EB1100364138	1410C_78	78	1410C	77	78		SANDSTONE	SS	FR
EB1100364139	1410C_84	84	1410C	83	84		SILTSTONE	SL	FR
EB1100364140	1412C_1	1	1412C	0	1		CLAY	CL	CW
EB1100364141	1412C_8	7	1412C	7	8		SANDSTONE	SS	HW
EB1100364142	1412C_17	16	1412C	16	17		SANDSTONE	SS	0
EB1100364143	1412C_19	19	1412C	18	19		SANDSTONE	SS	FR
EB1100364144	1412C_20	20	1412C	19	20		SANDSTONE	SS	FR
EB1100364145	1412C_21	21	1412C	20	21		SANDSTONE	SS	FR
EB1100364146	1412C_22	22	1412C	21	22		SANDSTONE	SS	FR
EB1100364147	1412C_23	23	1412C	22	23		SANDSTONE	SS	FR
EB1100364148	1412C_27	27	1412C	26	27		SANDSTONE	SS	FR
EB1100364149	1412C_28	28	1412C	27	28		SANDSTONE	SS	FR
EB1100364150	1412C_51	52	1412C	51	52		SANDSTONE	SS	FR
EB1100364151	1412C_52	53	1412C	52	53		SANDSTONE	SS	FR
EB1100364152	1412C_53	54	1412C	53	54		SANDSTONE	SS	FR
EB1100364153	1412C_56	57	1412C	56	57		SANDSTONE	SS	FR
EB1100364154	1414X_3	3	1414X	2	3		SANDSTONE	SS	HW
EB1100364155	1414X_8	8	1414X	7	8		SANDSTONE	SS	HW
EB1100364156	1414X_14	14	1414X	13	14		SANDSTONE	SS	HW
EB1100364157	1414X_25	25	1414X	24	25		SANDSTONE	SS	HW
EB1100364158	1429R_24	24	1429R	23	24		CLAYSTONE	CS	MW
EB1100364159	1429R_26	26	1429R	25	26		SILTSTONE	SL	MW
EB1100364160	1429R_31	31	1429R	30	31		MUDSTONE	MS	MW

ALS Sample ID	Client Sample ID	Sample ID reported by Salva	Location (e.g. Drill hole)	From (m)	To (m)	Roof/floor	Lithology	Lithology code	Weathering
EB1100364161	1429R_33	33	1429R	32	33		SANDSTONE	SS	SW
EB1100364162	1429R_38	38	1429R	37	38		SANDSTONE	SS	SW
EB1100364163	1429R_41	41	1429R	40	41		COAL, undifferentiated	CO	FR
EB1100364164	1429R_42	42	1429R	41	42		CLAY	CL	FR
EB1100364165	1429R_43	43	1429R	42	43		CARBONACEOUS SHALE	XH	FR
EB1100364166	1429R_44	44	1429R	43	44		CARBONACEOUS SHALE	XH	FR
EB1100364168	1429R_74	74	1429R	73	74		SILTSTONE	SL	FR
EB1100364169	1429R_80	80	1429R	79	80		SILTSTONE	SL	FR
EB1100364170	1429R_83	83	1429R	82	83		SILTSTONE	SL	FR
EB1100364171	1429R_84	84	1429R	83	84		SILTSTONE	SL	FR
EB1100364172	1429R_85	85	1429R	84	85		SILTSTONE	SL	FR
EB1100364173	1429R_88	88	1429R	87	88		SILTSTONE	SL	FR
EB1100364174	1429R_92	92	1429R	91	92		SILTSTONE	SL	FR
EB1100364175	1429R_95	95	1429R	94	95		SANDSTONE	SS	FR
EB1100364176	1429R_98	98	1429R	97	98		SANDSTONE	SS	FR
EB1100364178	1429R_119	119	1429R	118	119		SILTSTONE	SL	FR
EB1100364179	1429R_120	120	1429R	119	120		SILTSTONE	SL	FR
EB1100364180	1429R_121	121	1429R	120	121		SILTSTONE	SL	FR
EB1100364181	1429R_122	122	1429R	121	122		SILTSTONE	SL	FR
EB1100364182	1429R_129	129	1429R	128	129		SANDSTONE	SS	FR
EB1100364183	1429R_130	130	1429R	129	130		SANDSTONE	SS	FR
EB1100364184	1429R_131	131	1429R	130	131		COAL, undifferentiated	CO	FR
EB1100364185	1429R_132	132	1429R	131	132		MUDSTONE	MS	FR
EB1100364186	1429R_133	133	1429R	132	133		MUDSTONE	MS	FR
EB1100364187	1429R_139	139	1429R	138	139		COAL, undifferentiated	CO	FR
EB1100364188	1429R_140	140	1429R	139	140		COAL, undifferentiated	CO	FR
EB1100364189	1429R_141	141	1429R	140	141		COAL, undifferentiated	CO	FR
EB1100364190	1429R_142	142	1429R	141	142		COAL, undifferentiated	CO	FR
EB1100364191	1429R_143	143	1429R	142	143		COAL, undifferentiated	CO	FR
EB1100364192	1447L_34	0	1447L	3	4		SAND	SA	CW
EB1100364193	1447L_37	0	1447L	6	7		CLAY	CL	CW
EB1100364194	1447L_39	0	1447L	8	9		CLAY	CL	CW
EB1100364195	1447L_41	0	1447L	10	11		CLAY	CL	CW
EB1100364196	1447L_43	0	1447L	12	13		CLAY	CL	CW
EB1100364197	1447L_46	0	1447L	15	16		SILCRETE	SK	MW
EB1100364198	1447L_47	0	1447L	16	17		SILCRETE	SK	MW
EB1100364199	1447L_50	0	1447L	19	20		SILCRETE	SK	MW
EB1100364200	1447L_52	0	1447L	21	22		SILCRETE	SK	MW
EB1100364201	1447L_54	0	1447L	23	24		SANDSTONE	SS	SW
EB1100364202	1447L_60	0	1447L	29	30		CLAY	CL	SW
EB1100364203	1447L_63	0	1447L	32	33		CLAY	CL	SW
EB1100364204	1447L_66	0	1447L	35	36		CLAY	CL	SW
EB1100364205	1447L_70	0	1447L	39	40		CLAY	CL	SW
EB1100364206	1447L_77	0	1447L	46	47		CLAY	CL	SW
EB1023365001	Tailings - 250		Tailings - 250	-	-	Tailings - 250	Tailings - 250	-	-
EB1023365002	Rejects + 250		Rejects + 250	-	-	Rejects + 250	Rejects + 250	-	-
EB1023365003	Product + 250		Product + 250	-	-	Product + 250	Product + 250	-	-

Appendix 2: Geostatistics

1. Geostatistical Assessment

1.1 Definition of the problem

One objective of AMD testing is to identify material types that are PAF. Ultimately, knowledge of the locations and tonnages of PAF materials is required to enable planning of handling and placement during mining, stockpiling and backfilling. To address this on a step by step basis, a series of questions need to be answered. These are listed in order of project stage (discovery through to operation) and in order of increasing sampling effort required. Step one relates to the definition of units or material types for AMD classification purposes. Step two relates to the sampling of those units.

1 Determine what needs to be sampled:

- a) Determine what defines the units which are likely to be PAF.
- b) Determine whether the units are present as discrete volumes that are selectable during waste mining or whether they are likely to be mixed in with other material when moved.
- \- Define a scale of material type classification at which AMD sampling and classification should take place. For example (from largest to smallest), by weathering only or by mine wide lithology group or mine wide individual lithology or at block scale of the selective mining unit.

2 Determine whether material classification data and AMD samples are sufficient in number and appropriately spaced to have:

- a) Confidence in the volumes and locations of the chosen units at the required scale.
- b) Confidence in the global, non spatial, AMD parameter statistics (mean, variance and others) over the relevant units (from samples).
- c) Confidence in the local spatial distribution and variability of AMD parameters within the relevant units (from samples and locations).

Geostatistical methods can assist in answering the questions listed under step two.

In most mining projects a much larger quantity of information is available on the material classification via geological logging than is available on the AMD parameters. Confidence in the quantities and proportions, as per points 2 (a) above, of specific geological units is often assumed to be adequate and not require verification by statistical or geostatistical methods.

The Kevins Corner project has a large resource drilling database with the majority of holes geologically logged in detail. Therefore this geostatistical analysis report will not focus on the confidence in the quantities, proportions or locations of the geological units but will simply present the quantities as modelled. The geostatistical analysis focuses on the confidence in the adequacy of sample spacing and examination of the total S and ANC distributions above particular thresholds, as per points 2 (b) and (c) above.

1.2 AMD Sampling

This analysis covers assay values for total sulphur and Acid Neutralising Capacity (ANC) from 271 non coal and 19 coal samples selected by SRK.

These samples came from 26 holes as shown in Figure 1-1. At the time of sampling (October 2010) the proportion of open cut mine plan area compared to underground was larger than that at the time of this report. This was due to changes in the economics of the project. The two different areas are shown as dashed and solid lines in Figure 1-1.

AMD sample drill spacing is variable (Figure 1-1) over the pit area with spacing’s from 300 m to 3000 m. An approximate average for the North South drill spacing is 1000 m and an approximate average for the east west spacing is 1000 m.

Figure 1-2 shows the proximity of Kevin's Corner proposed pit outline to the Alpha project proposed pit outline.

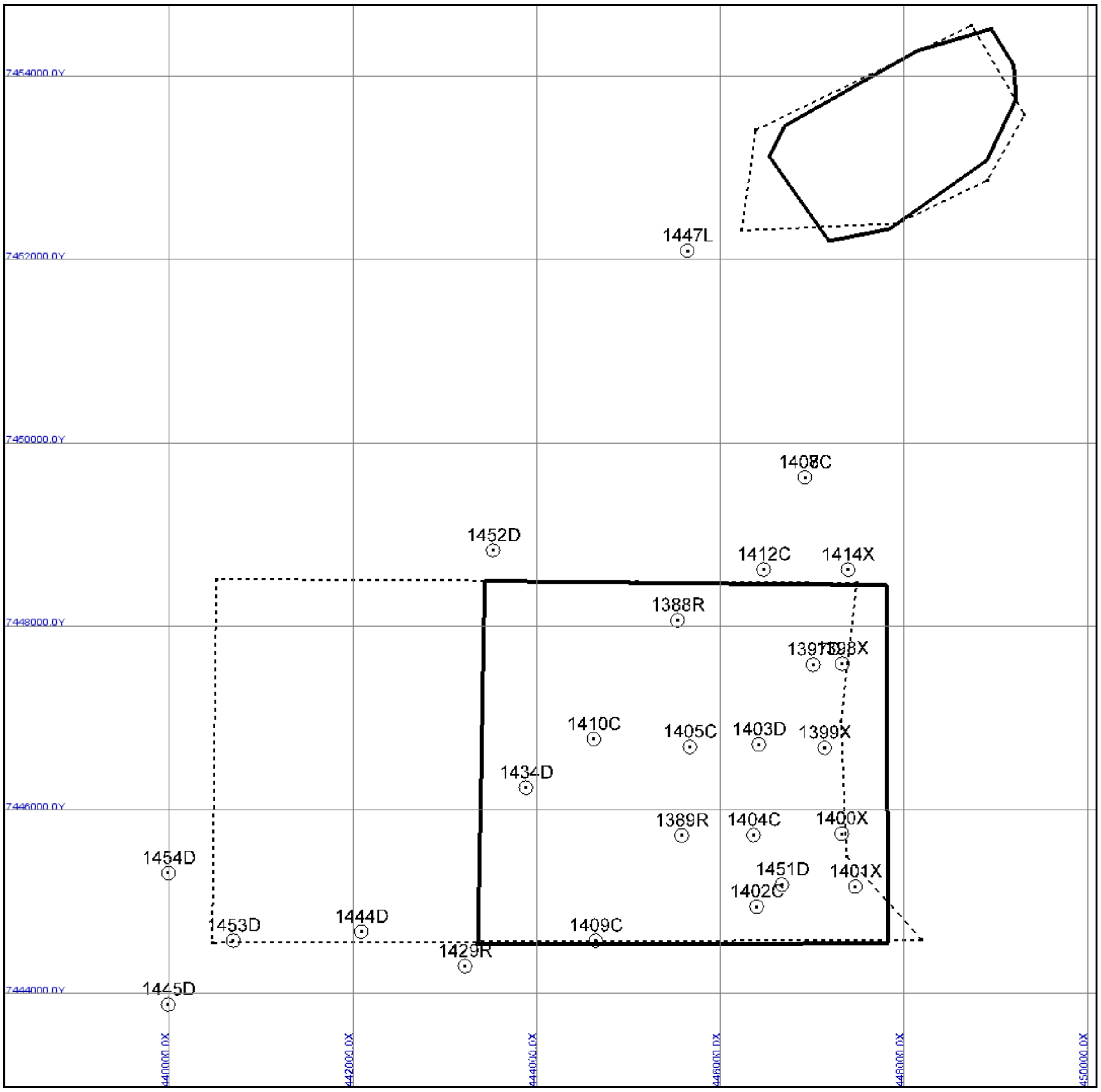


Figure 1-1: AMD sample hole layout with old (dashed) and new pit positions

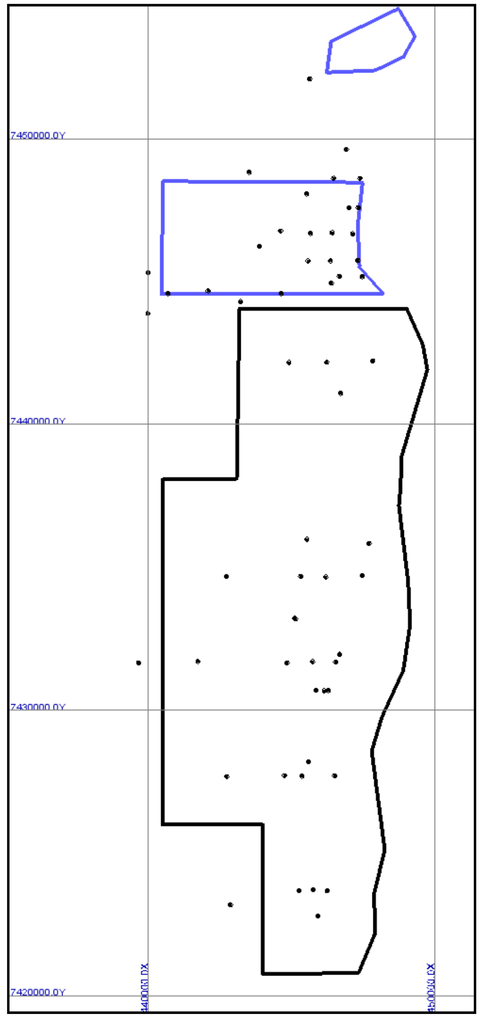


Figure 1-2: Kevin's Corner (Blue) and Alpha (Black) Pit Outlines with AMD sample locations

1.3 Summary Statistics

A summary of statistics for all groups is given in Table 1-1. All parameters were weighted by the downhole sample length. The grey areas indicate that no samples from these groups existed in the holes available for sampling. See Appendix A for listings of lithologies in each SRK group.

For the Weathered REM group there is a high outlier of 2.36 % for Total S, which was logged as a Sandstone lithology. If this is removed the average Total S value drops from 0.06 % to 0.04 %. It is not clear why such a large total S value was associated with sandstone. The sample may have been given an inappropriate code during the logging or the sample may have been poorly selected when physically extracted from the adjacent material. If no errors occurred during logging and sampling, then this outlier demonstrates the potential for small volumes of high total S material to exist and not be differentiated in the drill hole logs.

With the exception of coal, all weathered groups have similar Total S averages, which are well below the threshold of interest of 0.1% Total S. These groups can therefore be considered as a single group for further analysis of Total S. The fresh material groups require further examination.

Histograms for all groups are shown in the appendices.

Table 1-1: Summary statistics

Group Weath	Kevins Corner S n	S avg	S max	S sd	ANC n	ANC avg	ANC max	ANC sd
Clay & Soil	42	0.03	0.7	0.1	42	7	37.8	7.44
Sand & Gravel	19	0.03	0.26	0.07	19	3.56	11.5	3.71
REM	73	0.06	2.36	0.26	73	14.39	191	29.67
Carb								
Coal	9	0.26	0.85	0.29	9	6.17	12.6	3.78
Group Fresh	**Kevins Corner S n**	**S avg**	**S max**	**S sd**	**ANC n**	**ANC avg**	**ANC max**	**ANC sd**
Clay & Soil								
Sand & Gravel								
REM	120	0.06	0.5	0.08	120	41.34	216	36.5
Carb	17	0.23	0.96	0.23	17	14.08	40.9	10.7
Coal	10	0.23	0.72	0.18	10	16.87	47.2	13.91

1.3.1 Confidence Intervals on the Mean

Confidence intervals on the means were calculated using ‘bootstrapping’ (random sub-sampling to build multiple possible distributions from the same data) in preference to the classical method. The classical method of calculating confidence intervals assumes a near ‘normal’ distribution. The total S distributions were highly skewed or multi modal and therefore it was inappropriate to assume a ‘normal’ distribution. The bootstrapping technique is more appropriate under these conditions but also gives correct confidence intervals for normally distributed data.

Confidence on the mean does not imply confidence in the maximum, minimum or variance of the group distribution.

Weathered material

Statistical assessment shows that for the weathered groups (with the exception of coal), there is 95% confidence that the respective means do not exceed the 0.1% total S (assuming removal of the REM outlier).

Fresh material

In the fresh material there is 95% confidence that mean of the REM group does not exceed 0.1%. An example of the Fresh REM confidence interval on a histogram is shown in Figure 1-3.

There is 95% confidence that the mean of the total S for the Coal and Carbonaceous groups do exceed the 0.1%.

For all groups, except weathered coal, we can conclude that we have sufficient samples to be 95% confident that the mean of the group is either below or above the 0.1%.

The location of other thresholds in relation to the confidence interval can be evaluated by examining Table 1-2.

If the threshold of interest falls inside of these ranges then more samples are required to narrow the width of the 95% confidence interval. For example the 0.2% and 0.3% total S thresholds for both the Fresh Carbonaceous and Fresh Coal groups fall inside the 95 % confidence intervals. We therefore do not have sufficient confidence that their mean is above or below these thresholds.

More sampling of the Fresh Carbonaceous group, would be required if 0.2% or 0.3% total S become the critical thresholds of interest.

Combining the Kevin's Corner and Alpha data for the Fresh Carbonaceous group and calculating the 95% confidence interval on the mean gives an interval from 0.153 to 0.304 % total S. The 0.2 % and 0.3% thresholds are still within this interval. Even with the additional data from Alpha additional sampling would still be required.

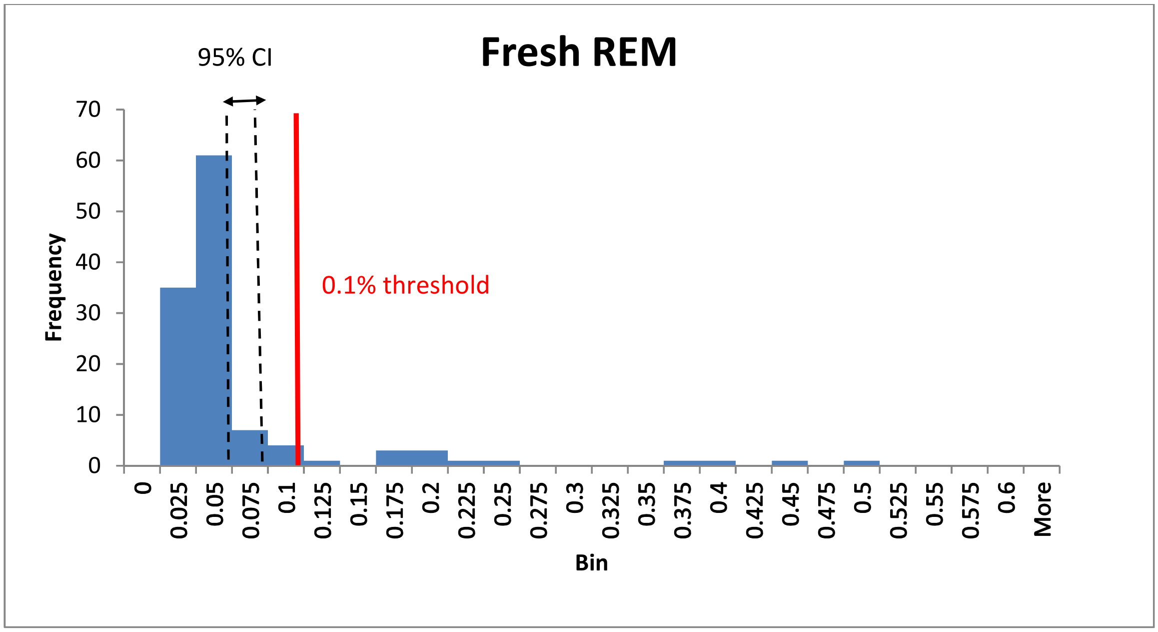


Figure 1-3: Histogram of Fresh Rem total S with 95% confidence intervals (CI)

Table 1-2: Confidence intervals on the mean

Domain	TOTS			ANC		
	Mean	Lower 95% CI	Upper 95% CI	Mean	Lower 95% CI	Upper 95% CI
Group Weath						
Clay & Soil	0.033	0.014	0.068	6.6	4.6	9.0
Sand & Gravel	0.025	0.010	0.052	2.8	1.6	4.3
REM	0.068	0.028	0.138	11.1	6.3	17.8
REM (Ex 2.36)	0.036	0.026	0.048	11.2	6.3	18.0
Carb						
Coal	0.258	0.083	0.463	6.2	3.7	8.7
Group Fresh						
Clay & Soil						
Sand & Gravel						
REM	0.058	0.045	0.074	35.8	29.3	42.9
Carb	0.246	0.135	0.381	15.3	10.4	20.6
Coal	0.270	0.156	0.406	16.0	7.2	26.3

1.3.2 Roof and Floor

The roof and floor sample average Total S is 0.17 % from eight samples with a maximum of 0.74% Total S. These eight samples come from various lithologies within the Carbonaceous and REM SRK groups and are included in the group statistics in Table 1-1.

1.4 Variography

1.4.1 Methodology – assessing spatial variability

Geostatistical methods are best applied to 'domains' (or material types or units) that have a single statistical population with a single mode. These domains are typically defined by geological units each formed under a particular set of circumstances therefore potentially having a range of quality values distinctly different to other units.

The initial task in any geostatistical analysis is to group the available data into domains that have a logical rationale for containing similar values (eg. lithology). If sufficient data is available each initial domain is then analysed statistically to determine if the potential domain contains a 'natural' single population or if further classification is required. Also, domains are examined to see if they have similar enough statistics to be combined. For example two or more geologically different lithologies may have similar AMD properties and could therefore be assigned to a single domain for geostatistical analysis. More samples per domain would provide a more robust statistical analysis.

SRK grouped all lithology codes found in the resource database into sets of lithologies that are likely to have similar properties in terms of AMD characteristics. See Appendix A for listings of lithologies in each SRK group.

The spatial variability of values of total S and ANC were assessed using geostatistical techniques. These techniques are well established in the mining industry and used to estimate the spatial variability of parameters (regionalised variables) associated with resources and in quantifying the resource (e.g. coal, gold, iron ore).

If experimental variography does not show any structure or ranges beyond the smallest sample spacing then no spatial correlation exists between samples at or above the smallest sample spacing. This means that values of parameters at unknown locations cannot be interpolated or extrapolated with any confidence and the mean of all of the samples in the domain is the best estimate at any unknown location.

The NAPP and NPR were not assessed geostatistically as they are calculated values that rely on the underlying total S and ANC measurements. Decisions on the adequacy of the drill spacing are based on the estimated ranges of the total S and ANC experimental variograms (see technical notes section for discussion on variography).

EC and pH were not assessed geostatistically. It is not valid to calculate variograms on parameters that are non-additive such as pH and NPR (see technical notes section).

1.4.2 Results - Sample Spacing for ANC

Experimental variography shows spatial correlation from 1500 m to 4500 m in all individual waste groups with sufficient data for interpretation of experimental variograms. This indicates that current drill spacing of 1000 m by 1000 m is probably adequate for interpolation or extrapolation of ANC values at un-sampled locations for all groups.

Groups that did not have sufficient samples for interpretation of experimental variograms were Weathered Sand and Gravel, Weathered Coal and Fresh Coal. Sample spacing adequacy for ANC within these groups is not quantifiable from the limited number of Kevin's Corner samples taken.

Results from the Alpha work on Fresh Coal (SRK, 2010) indicate that sample spacings up to 5000 m are adequate for interpolation of ANC in the coal seams and this result can be extended to Kevin's Corner as the same seams are being mined and the summary statistics for coal are similar between the two projects.

1.4.3 Results - Sample Spacing for total Sulphur

Total S experimental variography shows a range of around 2500 m for the overall weathered material excluding coal. Total S values in the weathered material excluding coal average less than 0.1 % total S with an 8 % probability of any one sample being greater than 0.1% total S. More detailed analysis of the weathered units is not considered necessary given the low levels of total S.

Experimental variography for total S in the fresh SRK Remaining (REM) lithology group shows ranges of around 1500 m. This indicates that the current drill spacing of 1000 m by 1000 m is sufficient to interpolate or extrapolate total S values at un-sampled locations in the fresh REM group.

Experimental variography for total S in the fresh SRK Carbonaceous lithology group shows no spatial correlation. This indicates that the Total S in this group is highly variable over short distances and that the current drill spacing may be insufficient to interpolate or extrapolate total S values at un-sampled locations in the carbonaceous group with the low number of samples (17) currently available.

The Kevins Corner project is immediately adjacent to the Alpha Project and the same coal seams will be mined at both projects. Thus, the data for both projects can be combined.

Combining data from the Alpha and Kevins Corner projects for the fresh Rem group shows an experimental variogram range of 2500 m.

Using data from both the Alpha and Kevins Corner projects increases the number of samples of Fresh carbonaceous group material increases to 44. The interpreted range in the experimental variography of is then around 5000 m. This indicates that the current drill spacing of 1000 m by 1000 m is probably sufficient to interpolate or extrapolate total S values at un-sampled locations in the fresh SRK Carbonaceous group for Kevin’s Corner.

The carbonaceous material makes up 4% of the total fresh waste material. However It does not occur in a single well defined seam but occurs as multiple lenses of varying thickness and is in different positions in the profile in different holes (see graphical logs in Appendix F). In some areas it may be thick enough to mine separately as it is likely to be a distinctly different colour to other groups and visual selection may be possible. In other areas the occurrences will be too thin to mine selectively.

The distribution of the high total S within the overall fresh material is such that there are proportions of the material that may be problematic. This is quantified in Section 1.5.

Sample spacing for total S within the coal is not quantifiable from the limited number of Kevins Corner coal samples taken. Results from the Alpha work (SRK, 2010) indicate that sample spacings up to 4000 m are adequate for interpolation of total S in the coal seams.

Experimental and model, pairwise relative, omnidirectional variograms are presented in the appendices.

1.5 Probabilities above thresholds and the support effect

1.5.1 Methodology – assessing global statistics

In a classical statistical analysis a confidence interval on the mean of a distribution can be quoted. For example there is a 95% confidence that the mean of a particular group lies between values X and Y. This requires a decision to be made on what is an appropriate interval (e.g. 75%, 95%, 99%) for acceptance of what constitutes a ‘sufficient’ number of samples.

It may not be always sufficient to make decisions on acid drainage potential from the mean AMD parameter values of rock group or lithology. Some samples within any one grouping may be above potentially problematic thresholds and some samples may be below.

If the mean of a unit of interest is not well above or well below any threshold of interest then further analysis may be useful in determining the units overall properties.

To help understand the distribution of parameter values within groupings the probability of a parameter value associated with a sample being greater than any chosen threshold can be calculated from the available samples.

Experimental probabilities of a sample being above any selected threshold can be obtained from the inverse cumulative distribution of the samples in each group or lithology. The higher the number of samples the higher the confidence in the probabilities.

1.5.2 Results – Threshold Probabilities

The probabilities above a series of Total S thresholds are presented in Table 1-3. For example, the probability of an individual sample total sulphur content exceeding 0.1 wt% for a sample of fresh REM material was 11%.

Table 1-3: Probability of an individual total sulphur sample value being above specified thresholds (at sample volume)

Group / lithology	Number of samples	Thresholds				
		0.10%	0.20%	0.30%	0.50%	1%
Weath all ex coal	134	8%	3%	2%	2%	0%
Fresh all ex coal	138	16%	7%	6%	2%	0%
Fresh Carbonaceous	17	54%	24%	22%	16%	0%
Fresh REM	120	11%	5%	4%	0%	0%
Fresh Coal SRK	10	66%	29%	22%	8%	0%

The probabilities presented in Table 1-3 above relate to sample size volumes. These values can be somewhat misleading as the waste will not be mined with equipment with the selectivity as small as that of a drill rig. The size of the selective mining unit should be taken into consideration as this will change the variability of the parameter under consideration.

As the selective unit size (block size) increases then any distribution of a material property will lose the highest highs and the lowest lows due to the volume variance effect. This compresses the histogram of the distribution as the support size increases. The effect is termed the volume variance relationship and often referred to as the support effect. See figure Figure 1-4.

Reducing the selectivity to mining unit size changes the probability of a parameter value exceeding any particular threshold value.

Section 1.4 demonstrated that variograms can be modelled for total S for various lithology groups. Thus, it is possible to model the change of support effect and estimate distributions (histograms) of total S at any given selectivity size. In cases where no variogram can be modelled, an almost pure nugget effect can be used. This was done for the Fresh Carbonaceous group.

Assuming a selective unit size of 100 m x 100 m x 2 m the probabilities of the average total S content of the unit exceeding specified threshold values are as shown in Table 1-4.

Table 1-4: Total sulphur probabilities above thresholds by group (100 m x 100 m x 2 m block)

Group / lithology	Number of samples	Thresholds				
		0.10%	0.2%	0.30%	0.50%	1%
Weath all ex coal	134	7%	4%	3%	2%	1%
Fresh all ex coal	138	23%	7%	3%	0%	0%
Fresh Carbonaceous	17	100%	79%	3%	0%	0%
Fresh REM	120	14%	5%	2%	0%	0%
Coal SRK	10	100%	52%	22%	2%	0%

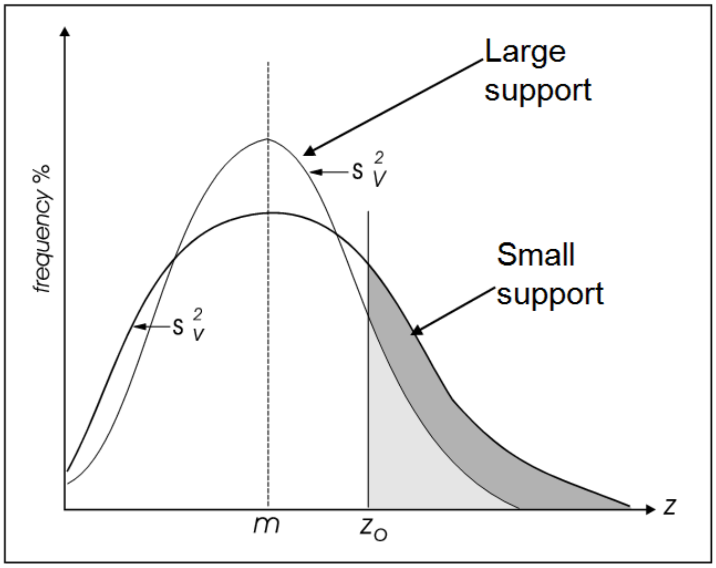


Figure 1-4: Support effect on the histogram

1.6 Group Proportions and Volume Calculations

For the pit material the resource drilling database was used to:

- determine the overall proportion of each lithology and
- model the overall proportions of:
  - weathered waste
  - fresh waste and
  - seam coal material.

The total waste bank cubic metres (bcm) came from the mine plan waste schedule provided by URS in March 2011.

Due to the wide variation in the sequence, frequency, thickness and distribution of downhole lithologies as logged it was not practical to create surfaces or closed solids that modelled each and every lithological code, or group. A statistical method was therefore used to estimate the overall proportions and volumes of each lithology group within each unit.

All holes were assigned a weight based on their area of influence. This was done using a cell declustering routine in the Isatis geostatistical software package. A cell size of 1000 m by 1000 m was used as this appeared to be the maximum drill spacing over the Kevins Corner pit area. All lithology codes in each hole were then assigned the weight attributed to their respective holes.

The downhole thickness of each lithology interval logged in the database was then multiplied by the area of influence weight. The weight-thicknesses were then summed for each group within each unit. The summed weight-thicknesses represent the relative proportions of each group within each unit. The volumes of each weathered units within the Kevins Corner pit outline are calculated from wireframed solids created from the topography modelled top of fresh surface. The relative proportions and volumes of each group within each unit were then calculated. Some NON ROCK codes remain in the final proportions. These are relate to core loss, or non logged intervals.

The group proportions and derived volumes and tonnages are shown in Table 1-5.

Table 1-5: Unit volumes and proportions

Weathered Ex Coal seam models C & D		**kbcm**	**Assumed density**	**kt**
Carbonaceous	2%	11 543	2.30	26 550
Clay and soil	15%	102 917	2.00	205 834
Coal	1%	8 838	1.50	13 257
Non rock	3%	22 048	2.00	44 095
Rem	69%	474 710	2.15	1 020 627
Sand and gravel	9%	64 103	2.00	128 205
Grand total	100%	684 159		1 438 568
Fresh ex coal seam models c & d				
		kbcm	**Assumed density**	**kt**
Carbonaceous	4%	33 485	2.30	77 015
Clay and soil	1%	5 836	2.00	11 673
Coal	10%	92 036	1.50	138 053
Non rock	0%	1 469	2.00	2 937
Potential an	0%	14	2.15	30
Rem	85%	776 203	2.15	1 668 836
Sand and gravel	1%	6 799	2.00	13 597
Grand total	100%	915 841		1 912 142
Weathered	43%	684 159		
Fresh	57%	915 841		
Total Scheduled Waste kbcm		1 600 000		

1.7 Comparisons with the Alpha data

The summary statistics for Kevins Corner and Alpha projects are shown in Table 1-6 and Table 1-7. All domains with samples compare well for the mean, maximum and standard deviation. This is expected, as the geological units are the same formation and are immediately adjacent to as those at Alpha. It also confirms that the two independent sampling programs are unlikely to contain significant bias for total S and ANC.

The probabilities of the mean sulphur content being above specified total S thresholds are also consistent with those of the Alpha project (SRK, 2010).

Table 1-6: Summary Statistics for Kevins Corner

Group Weath	Kevins Corner S n	S avg	S max	S sd	ANC n	ANC avg	ANC max	ANC sd
Clay & Soil	42	0.03	0.7	0.1	42	7	37.8	7.44
Sand & Gravel	19	0.03	0.26	0.07	19	3.56	11.5	3.71
REM	73	0.06	2.36	0.26	73	14.39	191	29.67
Carb								
Coal	9	0.26	0.85	0.29	9	6.17	12.6	3.78
Group Fresh	**Kevins Corner S n**	**S avg**	**S max**	**S sd**	**ANC n**	**ANC avg**	**ANC max**	**ANC sd**
Clay & Soil								
Sand & Gravel								
REM	120	0.06	0.5	0.08	120	41.34	216	36.5
Carb	17	0.23	0.96	0.23	17	14.08	40.9	10.7
Coal	10	0.23	0.72	0.18	10	16.87	47.2	13.91

Table 1-7: Summary statistics for Alpha

Group Weath	Alpha S n	S avg	S max	S sd	ANC n	ANC avg	ANC max	ANC sd
Clay & Soil	30	0.04	0.18	0.05	30	8.39	54.6	12.11
Sand & Gravel	16	0.02	0.1	0.02	16	2.58	7	1.93
REM	57	0.03	0.13	0.34	57	4.6	50	6.34
Carb	2	0.06	0.08	0.02	2	5.15	7.6	3.46
Coal	7	0.2	0.58	0.21	7	8.62	15.9	3.29
Group Fresh	**Alpha S n**	**S avg**	**S max**	**S sd**	**ANC n**	**ANC avg**	**ANC max**	**ANC sd**
Clay & Soil								
Sand & Gravel								
REM	90	0.06	0.33	0.06	90	15.49	222	36.03
Carb	27	0.18	1.16	0.23	27	11.71	46.9	13.18
Coal	48	0.3	0.76	0.18	48	11.43	161	25.586

1.7.1 Combined Alpha and Kevin's Corner Variography

For both the Alpha and Kevin's Corner data sets individually, the Fresh Carbonaceous groups did not contain sufficient samples to show any structure in the Total S experimental variograms. Combining the two data sets gives 44 samples and the variography is interpretable as shown in Figure 1-5. This now shows some structure and ranges of around 6000 m for ANC and 5000 m for Total S.

The Carbonaceous group is not a contiguous unit but a group of numerous occurrences of various carbonaceous lithologies. It occurs as multiple lenses of varying thickness and is in different positions in the profile in different holes.

The variography for the combined Kevin's Corner and Alpha REM group is also shown in Figure 1-6 as a comparison to the variography seen in Kevin's Corner alone (Appendix Figure 12:).

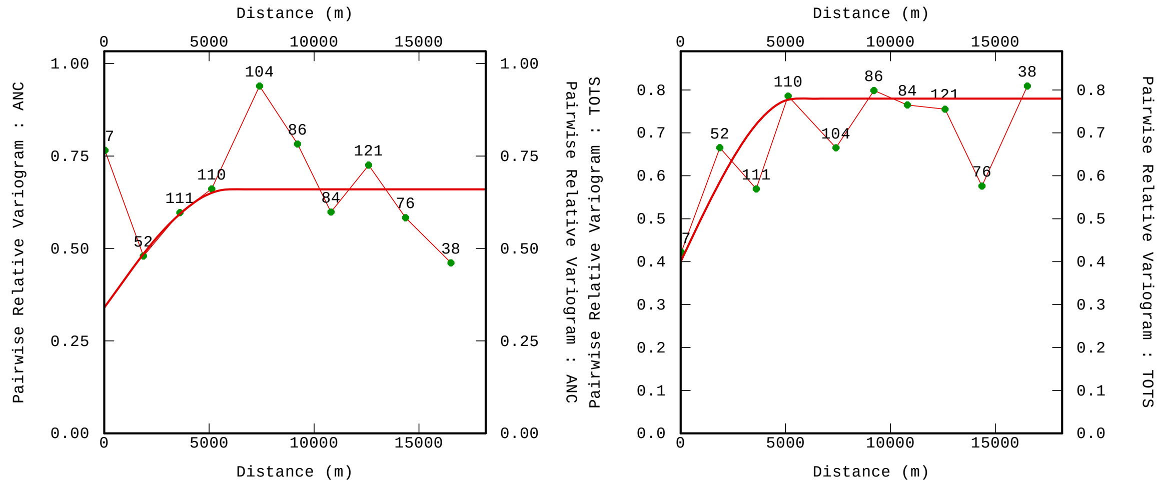


Figure 1-5: Experimental and model variograms for ANC and Total S fresh carbonaceous group Alpha and Kevin's Corner combined

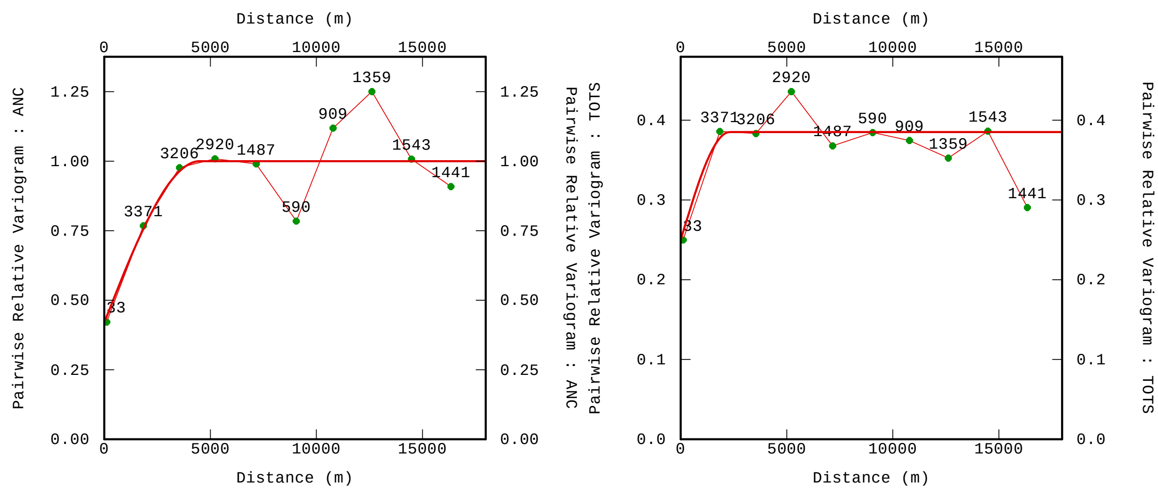


Figure 1-6: Experimental and model variograms for ANC and Total S fresh REM group Alpha and Kevin's Corner combined

1.8 Conclusions and Recommendations

1.8.1 Total Sulphur mean values

For all groups except weathered coal, sufficient samples were assessed to be 95% confident that the mean sulphur content of each group is either below or above the 0.1% threshold.

In the weathered material there was 95% confidence that the mean total S content was less than 0.1 wt% for the following groups:

- clay and soil,
- sand and gravel, and
- REM (excluding the 2.36 wt% S sample).

For the weathered coal (and the REM including the 2.36 wt% sample) group the 0.1 wt% total S value was within the 95% confidence limits of the value of the mean total S content indicating that more samples are required to draw a 95% confidence conclusion on these groups.

No conclusion could be drawn for weathered carbonaceous material as no samples were available for testing.

In the fresh material there was 95% confidence that the mean total S content was greater than 0.1 wt% for the Carbonaceous and coal groups.

There was 95% confidence that the mean total S content was less than 0.1 wt% for the Fresh REM group.

The 0.2% and 0.3% total S thresholds for the Fresh Carbonaceous and Fresh Coal groups fall inside the 95 % confidence intervals and we therefore do not have sufficient confidence that their mean is above or below these thresholds.

Combining the Kevin's Corner and Alpha data for the Fresh Carbonaceous group and calculating the 95% confidence interval on the mean gives an interval from 0.153 to 0.304 % total S. The 0.2 % and 0.3% thresholds are within this interval.

More sampling of the Fresh Carbonaceous group, is required if 0.2% or 0.3% total S become the critical thresholds of interest.

1.8.2 Sample spacing

The combined Alpha and Kevin's Corner data indicate that sample spacing of 1000 m x 1000 m is adequate for interpolation and extrapolation of total S and ANC for Kevin's Corner for all lithology groups and for the coal seams.

In the eastern half of the proposed open pit the sampled drillhole locations were approximately on a 1000 m x 1000 m grid and were therefore adequately spaced. Toward the western end of the proposed open pit the samples were collected from drillholes spaced at greater than 1000 m x 1000 m. Thus, in this region there is less confidence in the expected distribution of total sulphur grade. However, drill spacing in this area does not exceed approximately 2000 m and therefore based on variography at Alpha and KC the overall distribution of holes at Kevins Corner is considered adequate.

Thus, in this region there is less confidence in the expected distribution of total sulphur grade. Additional drilling and total sulphur analysis as mining progresses would improve the estimate of the total sulphur distribution.

1.8.3 Probabilities of exceeding Total S thresholds

For groups where the mean total S value of analysed samples is below the threshold of interest there is still a chance that some areas/tonnages within each group will have total S values higher than values that may be considered low risk on the basis of the sulphur content. The probability of a 100 m x 100 m x 2 m block, which is the likely scale of selectively mining waste, of a particular group exceeding specific thresholds was reported in Table 1-4.

The probability of the total S content of fresh carbonaceous and coal group materials mined on a 100 m x 100 x 2 m block exceeding 0.1% was estimated to be 100%.

Small numbers of samples for some groups, such as the fresh Carbonaceous group, limit the accuracy and precision of the estimated overall proportions of a group above any given total S threshold. However the similarity between the of the statistical distributions of total sulphur content at Kevin's Corner and the Alpha projects give added confidence to the global statistics.

1.8.4 Mining selectivity

Aside from coal, the carbonaceous units contain the highest total S values but form a relatively small proportion, approximately 4%, of the fresh waste. A better understanding of the spatial locations and thickness of the various carbonaceous units is required to understand if they are likely to be mined in significant volumes and separately or will be mixed in with the majority of waste material. SRK understands that HCPL have committed to selective mining of potentially problematic units if they can be visually identified.

In some areas the carbonaceous material may be thick enough to mine separately as it is likely to be a distinctly different colour to other groups and visual selection may be possible. In other areas the occurrences will be too thin to mine selectively.The resource drilling database for Kevin's Corner shows that over the entire the drill hole length:

- 75% of Carbonaceous group material exists as downhole intervals > 0.5 m long
- 60% as intervals >1 m long
- 40% > 2 m long

1.8.5 Recommendations

Additional drilling and total sulphur analysis should be conducted to improve the estimate of the total sulphur distribution in the western region of the Kevin's Corner pit.

Appendices

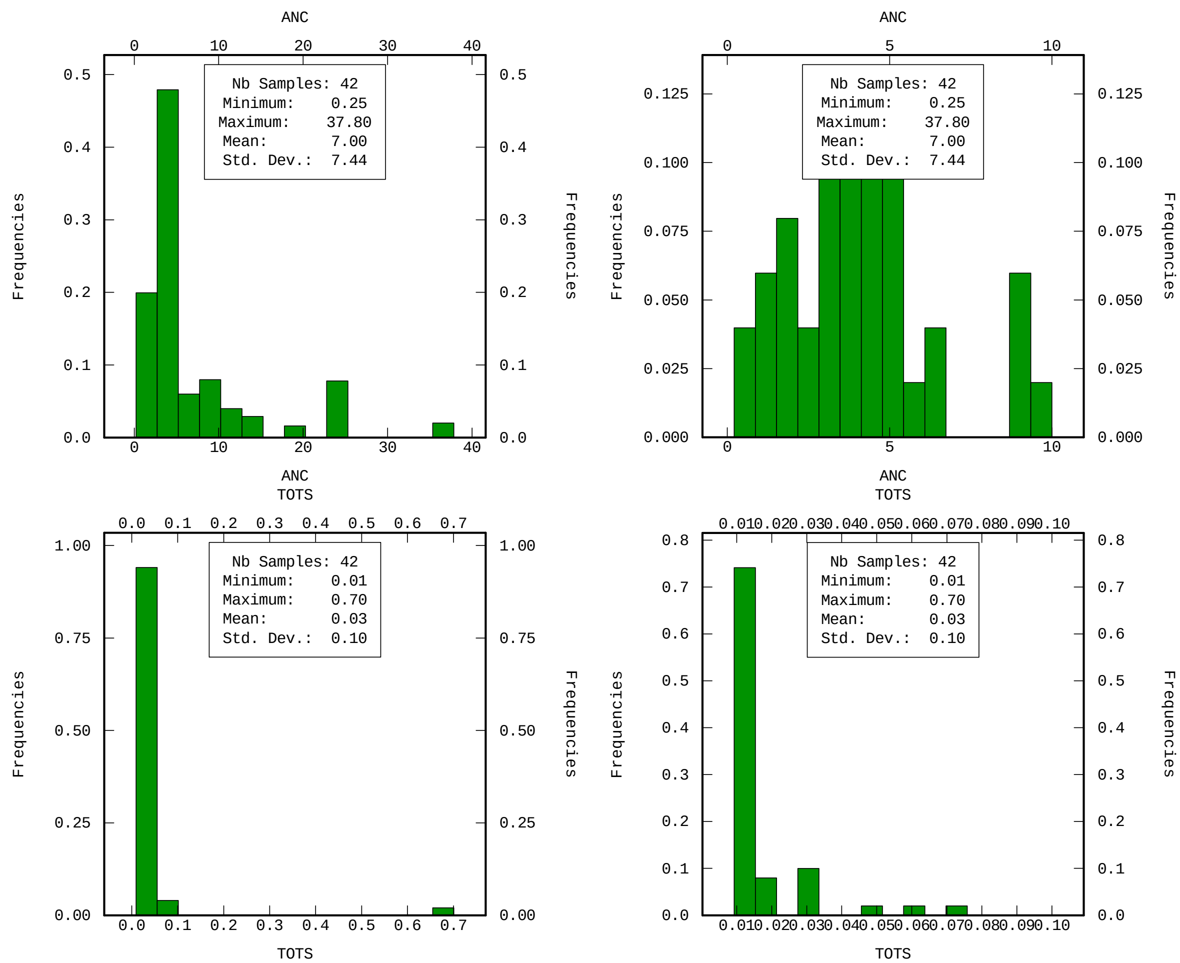
Appendix A- SRK Groupings

Lithology Code	Description	SRK Group
CM	Carbonaceous mudstone	Carbonaceous
XA	Carbonaceous sand	Carbonaceous
XC	Carbonaceous claystone	Carbonaceous
XE	Carbonaceous lamelle	Carbonaceous
XH	Carbonaceous shale	Carbonaceous
XM	Carbonaceous mudstone	Carbonaceous
XS	Carbonaceous sandstone	Carbonaceous
XT	Carbonaceous siltstone	Carbonaceous
XX	Carbonaceous siltstone	Carbonaceous
XY	Carbonaceous clay	Carbonaceous
BT	Bentonite	Clay and soil
CL	Clay	Clay and soil
MU	Mud	Clay and soil
SO	Soil	Clay and soil
C1	Coal, >90% bright	Coal
C2	Coal, 60-90% bright	Coal
C3	Coal, 40-60% bright	Coal
C4	Coal 10-40% bright	Coal
C5	Coal, <10% bright	Coal
C6	Coal, dull <1% bright	Coal
C7	Coal, dull, conchoidal	Coal
C9	Coal, weathered	Coal
CF	Fusainous coal	Coal
CN	Stony coal	Coal
CO	Coal, undifferentiated	Coal
CP	Coal sapropelic	Coal
CR	Coal fibrous	Coal
CU	Coal undifferentiated	Coal
CW	Coal weathered	Coal
CY	Sooty coal	Coal
CZ	Coaly shale	Coal
DC	Dirty coal	Coal
IC	Inferior coal	Coal
SU	Soot	Coal
ZC	Coaly claystone	Coal
ZH	Coaly shale	Coal
ZM	Coaly mudstone	Coal
ZS	Coaly siltstone	Coal
AA	As above	Non rock
KL	Core loss	Non rock
LC	Core lost	Non rock
NL	Not logged	Non rock

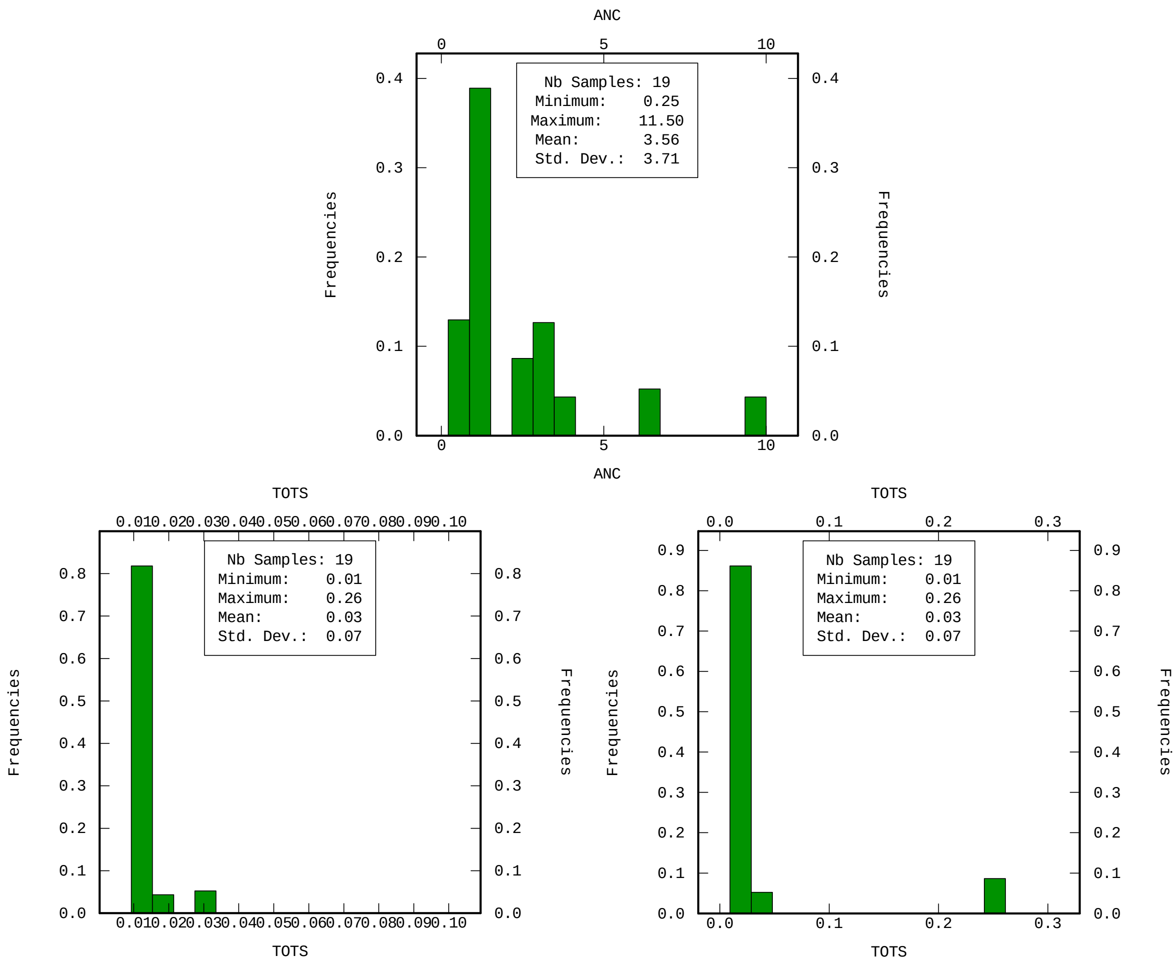
Lithology Code	Description	SRK Group
NS	No sample	Non rock
CA	Calcite	Potential an
CB	Carbonate	Potential an
CK	Calcrete	Potential an
LS	Limestone	Potential an
AK	Arkose	Remaining
AL	Alluvium	Remaining
BA	Basalt	Remaining
BY	Billy	Remaining
CC	Cobble conglomerate	Remaining
CG	Conglomerate	Remaining
CH	Chert	Remaining
CS	Claystone	Remaining
CX	Sooty clay	Remaining
FK	Ferricrete	Remaining
GC	Granule conglomerate	Remaining
GR	Granules	Remaining
GW	Greywacke	Remaining
GY	Gypsum	Remaining
IG	Igneous rock	Remaining
IS	Ironstone	Remaining
JA	Jasperlite	Remaining
LM	Limonite	Remaining
LT	Laterite	Remaining
MS	Mudstone	Remaining
PB	Pebbles	Remaining
PC	Pebble conglomerate	Remaining
QZ	Quartz	Remaining
S1	Sandstone very fine grained	Remaining
SC	Schist	Remaining
SD	Siderite	Remaining
SH	Shale	Remaining
SI	Silt	Remaining
SK	Silcrete	Remaining
SL	Siltstone	Remaining
SS	Sandstone	Remaining
TF	Tuff	Remaining
TO	Tonstein	Remaining
UD	Undifferentiated rock type	Remaining
GV	Gravel	Sand and gravel
SA	Sand	Sand and gravel
PY	Pyrite	Sulfide

Appendix B-Histograms

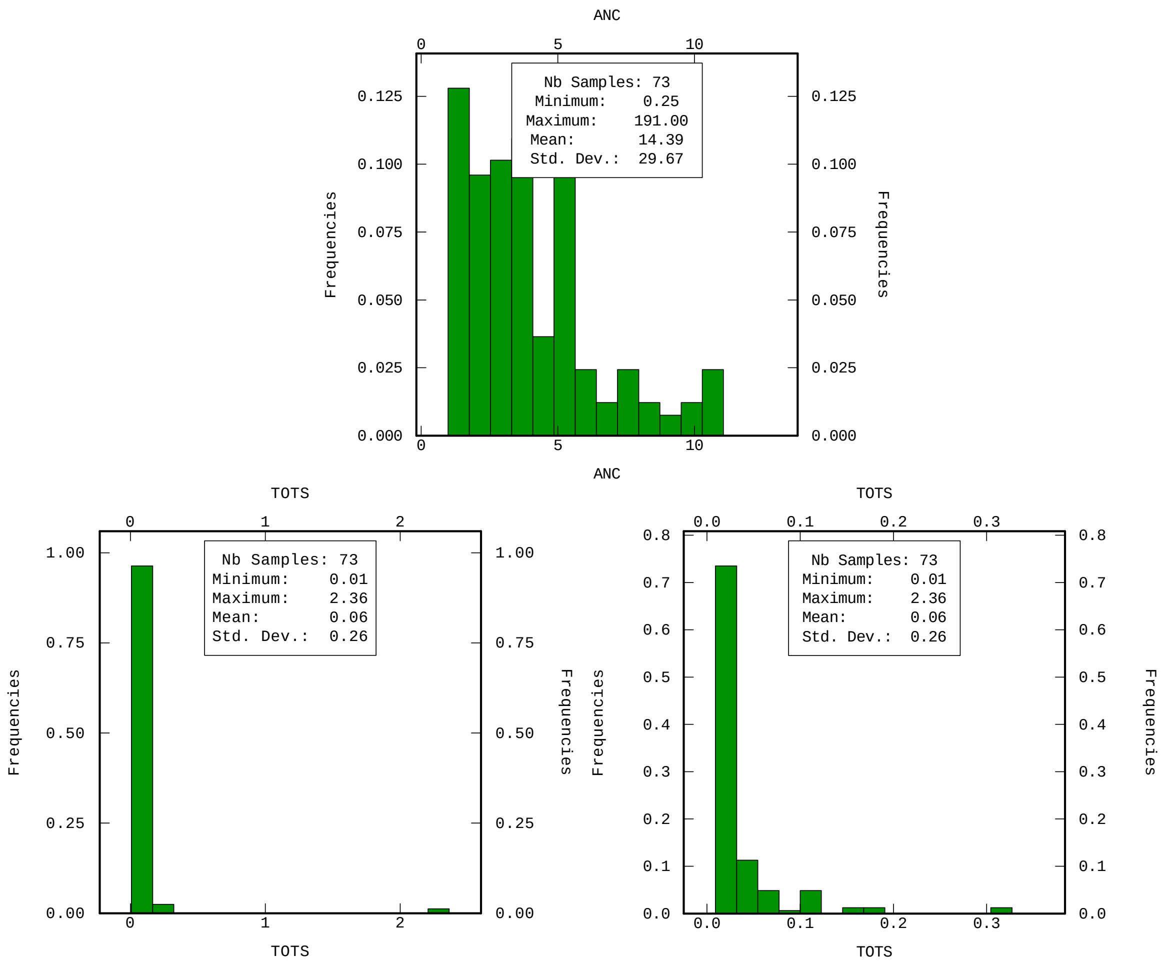
The figures in this section typically show two sets of histograms for each group. The right hand set have a higher resolution on the x axis to show detail of the lower value cluster. Number of samples, minimum, maximum, mean and standard deviation are shown on each histogram.



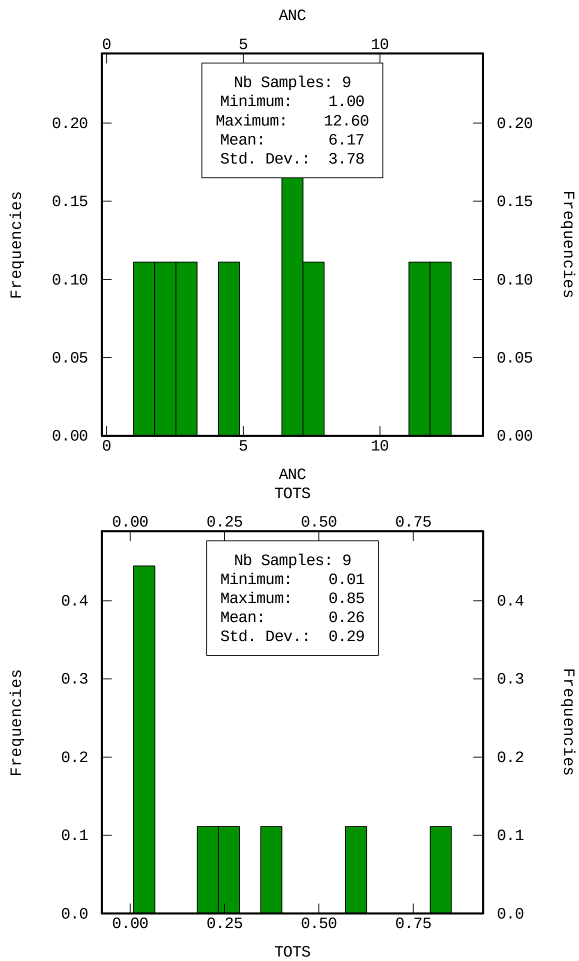
Appendix Figure 1: Histograms for weathered Clay and Soil



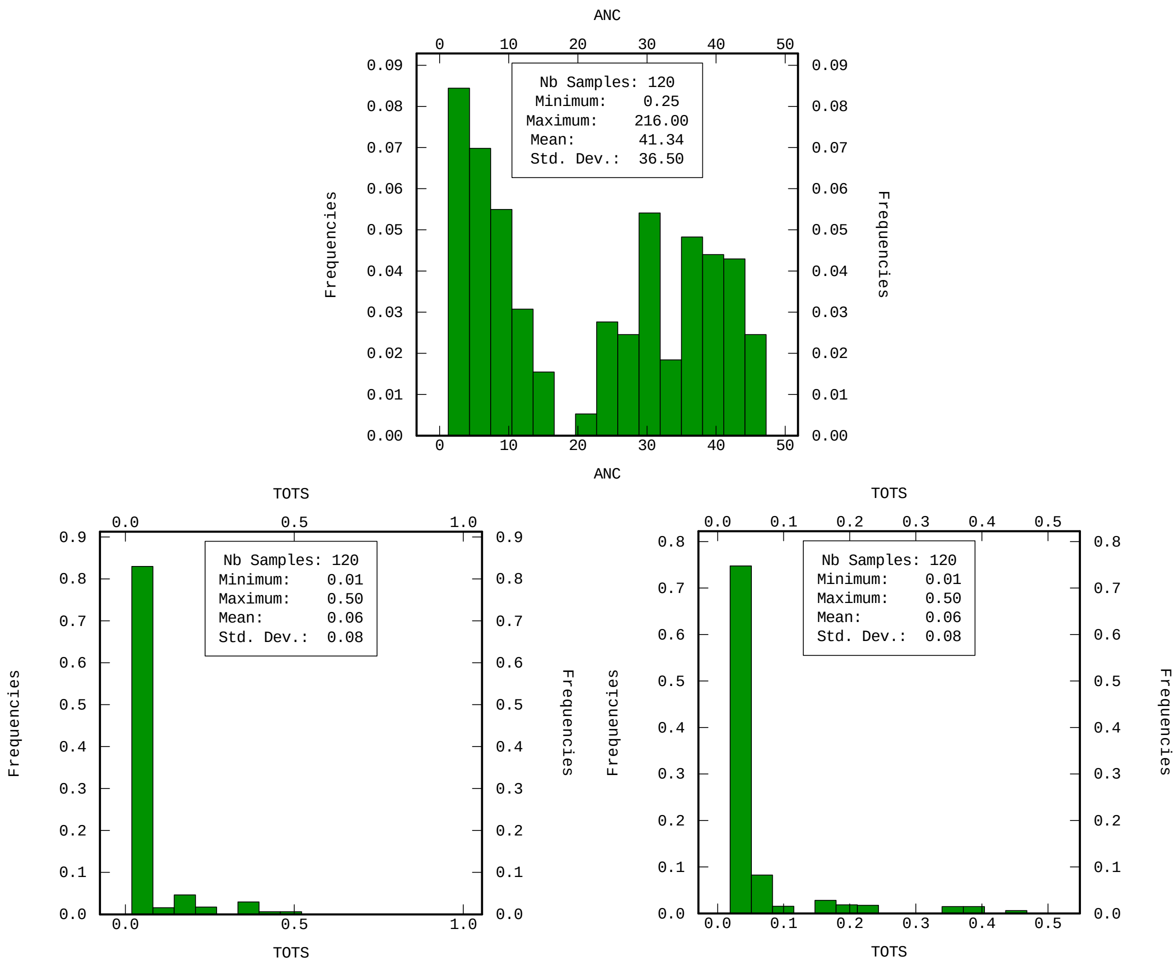
Appendix Figure 2: Histograms for weathered Sand and Gravel



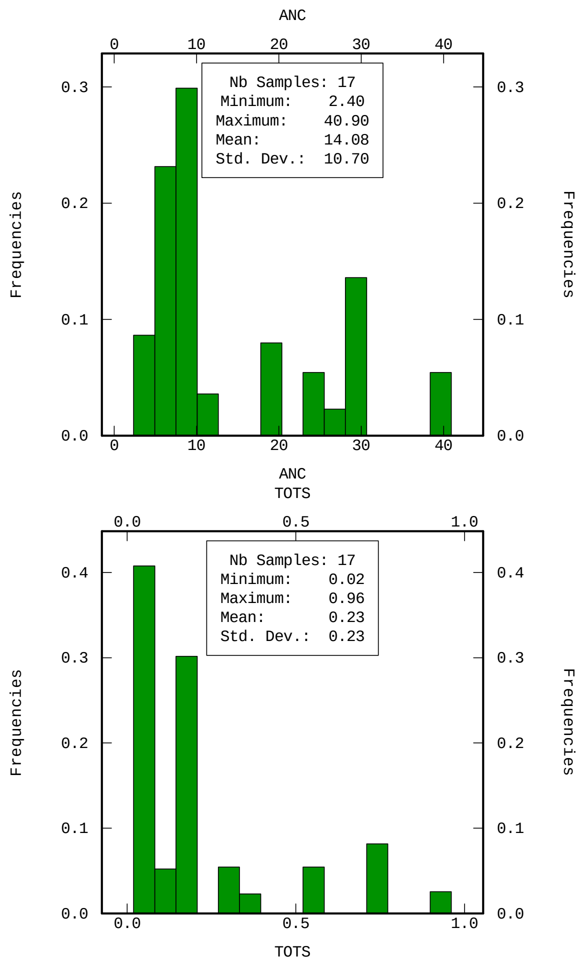
Appendix Figure 3: Histograms for weathered REM



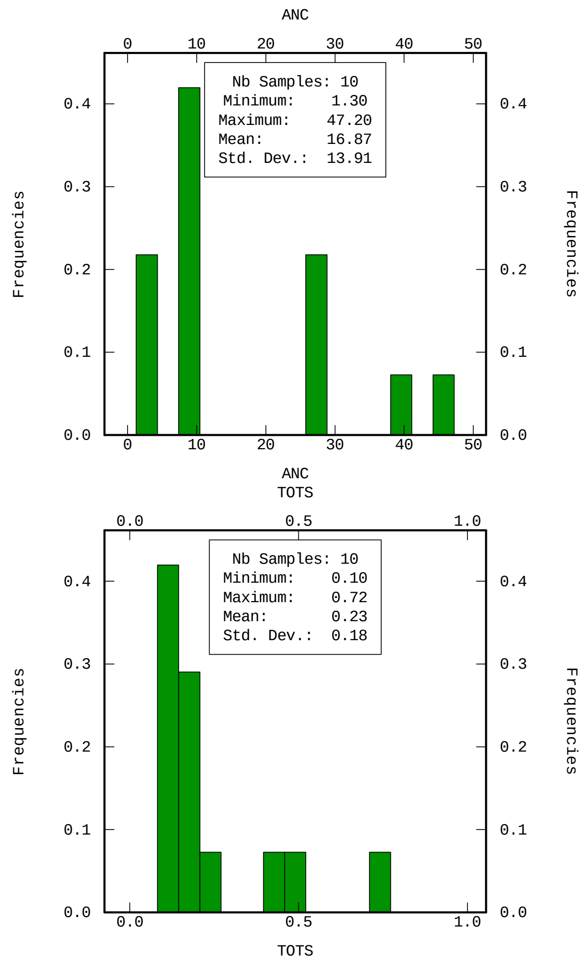
Appendix Figure 4: Histograms for weathered coal



Appendix Figure 5: Histograms for Fresh REM



Appendix Figure 6: Histograms for Fresh Carbonaceous



Appendix Figure 7: Histograms for fresh coal

Appendix C- Variograms and spatial variability – Technical notes

The average value and variance of a population can often be confidently estimated GLOBALLY from a relatively small number of samples. Confidence in a global average is not always sufficient and knowledge of the localised values of a parameter and its local variability are often required for waste characterisation purposes and mine planning.

A general outcome of the in-homogeneity of geological conditions across a project region is variation of the geological properties that potentially cause the formation of AMD. Geostatistics provides means of:

1 Estimating the spatial correlation and variability of AMD related geological properties in a project region.
2 Characterising the representativeness of tested samples of AMD related properties across the region.
3 Estimating (kriging) property values at unmeasured locations (local values).

Geostatistical methods are best applied to ‘domains’ that have a single statistical population with a single mode. These domains are typically defined by geological units each formed under a particular set of circumstances therefore potentially having a range of quality values distinctly different to other units.

The initial task in any geostatistical analysis is to group the available data into domains that have a logical rationale for containing similar values (eg. lithology). If sufficient data is available, each potential domain is then analysed statistically (summary statistics, histogram, probability plot etc.) to determine if the potential domain contains a ‘natural’ single population or if further classification is required. Also, domains are examined to see if they have similar enough statistics to be combined. For example two or more geologically different lithologies may have similar AMD properties and could therefore be assigned to a single domain for geostatistical analysis.

The fundamental basis of most geostatistics is the experimental semi-variogram, $\tilde{\gamma}(\mathrm{h})$ (from here forward referred to as the variogram). The variogram is the basic diagnostic tool for spatially characterising a property (z) and measures the average dissimilarity between data separated by a distance, h. It is also central to geostatistical estimation or interpolation methods (Kriging) and the more advanced methods of conditional simulation.

An experimental variogram is computed as half the average squared difference between the components of every data pair. That is $\tilde{\gamma}(\mathrm{h})$ is gven by:

$$\tilde{\gamma}(\boldsymbol{h}) = \frac{1}{2N(h)} \sum_{\alpha=1}^{N(h)} [z(\boldsymbol{u}_\alpha) - z(\boldsymbol{u}_\alpha + \boldsymbol{h})]^2$$

Here $\mathrm{z}(\mathrm{u}_\alpha)$ and $\mathrm{z}(\mathrm{u}_\alpha + \mathrm{h})$ are the property values of the pair of points and the summation is over all N pairs separated by distance, (h). In general h is a vector, having both an amplitude and direction.

Another way of saying this is that the experimental variogram is the plot of the separation distance (h) of paired points against the variance of the property value for all pairs of samples separated by distance, h. An idealised variogram is shown in Appendix Figure 8:

Spatial correlation exists when the average variance of pairs of data at low separation distances (compared to the dimensions of the area sampled), is smaller than the variance of the entire population (In simple language, things close together tend to be similar, things far apart tend to be different.)

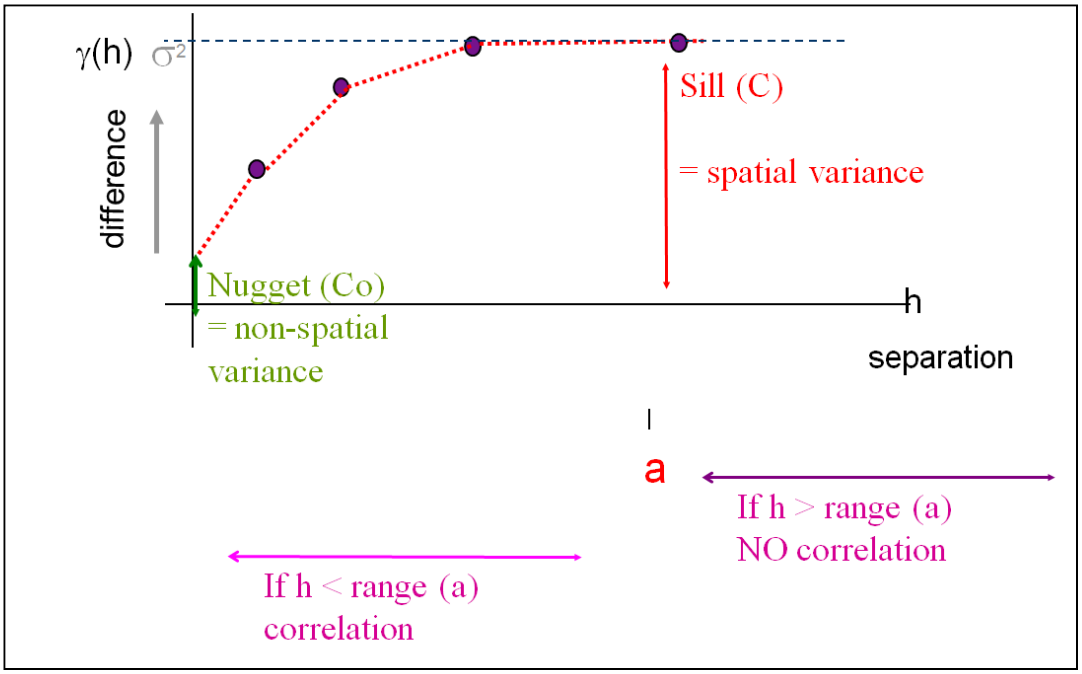
At some sufficiently large separation distance, known as the range (a), the average variance of the pairs will be approximately the same as that of the overall population σ^2 indicating that spatial correlation no longer exists beyond that distance.

For example coal resources typically have coal quality ranges in the order of hundreds to thousands of metres, Iron ore resource chemistry will typically have ranges in the order of tens to hundreds of metres and gold resources typically have gold content ranges in the order of metres to tens of metres.

These characteristic ranges are in line with our intuitive understanding of the continuity of geology and commodity content / quality distributions within various different resources. They also reflect the typical drill spacings of these various types of deposits.

A variogram that rises consistently from low separation distances and then flattens is a typical form of spatial correlation. A variogram that is flat or very irregular from low separation distances indicates lack of spatial correlation or insufficient data.

If experimental variography does not show any structure or ranges beyond the smallest sample spacing then no spatial correlation exists between samples at or above the smallest sample spacing. This means that values of parameters at unknown locations cannot be interpolated or extrapolated with any confidence and the mean of all of the samples in the domain is the best estimate at any unknown location.



Appendix Figure 8: Variogram components

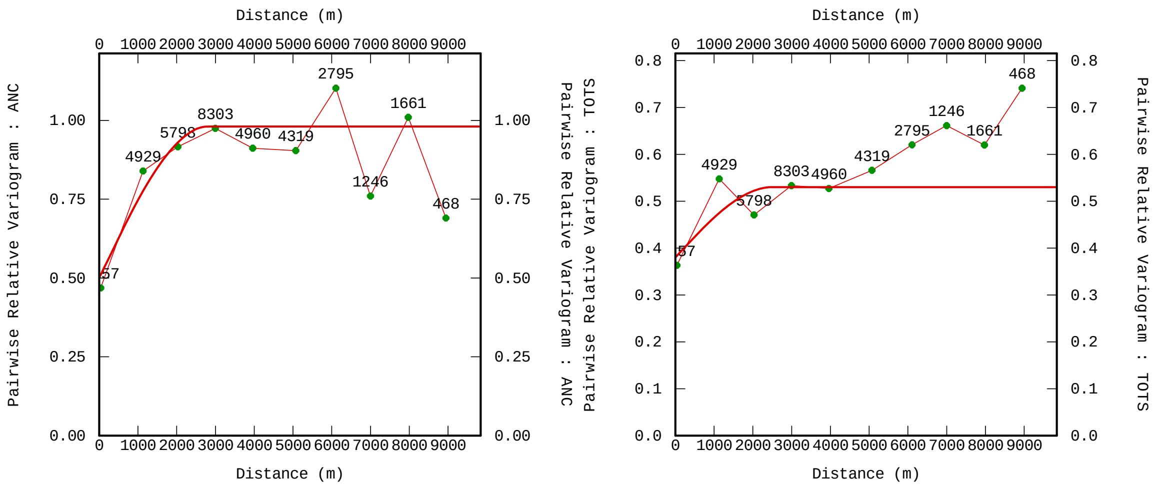
The ANC and Total S variograms are shown utilising a pairwise relative transform that was used to reduce some of the noise in the data. The pairwise relative variogram where the value at separation distance, h is:

$$\tilde{\gamma}_{PR}(\boldsymbol{h}) = \frac{1}{2N(h)} \sum_{\alpha=1}^{N(h)} \frac{[z(\boldsymbol{u}_\alpha) - z(\boldsymbol{u}_\alpha + \boldsymbol{h})]^2}{[z(\boldsymbol{u}_\alpha) + z(\boldsymbol{u}_\alpha + \boldsymbol{h})]^2}$$

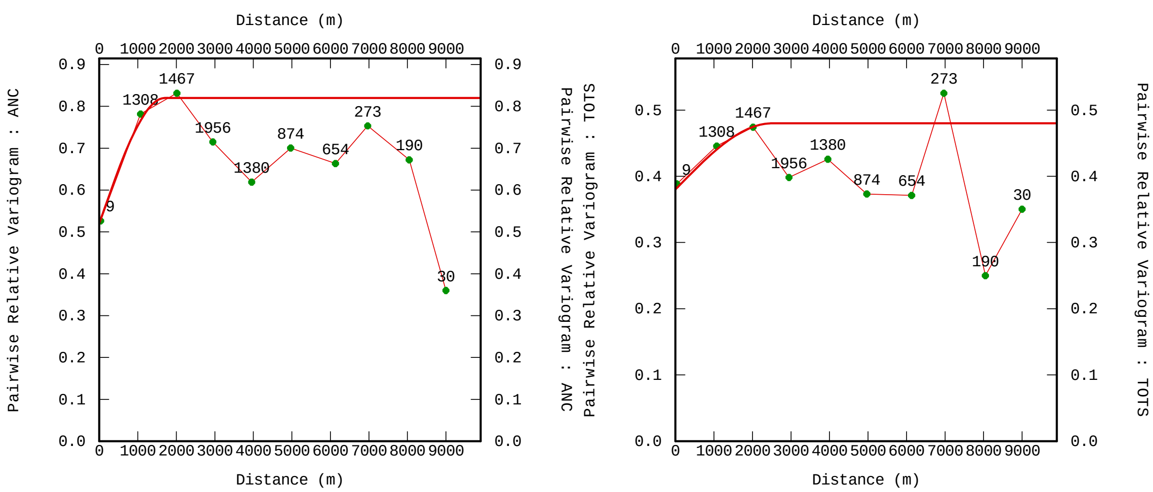
Pairwise relative variograms are useful as a quick filter for determining ranges but cannot be used nugget or sill determinations or for geostatistical estimation. If pairwise relative variograms are found to be useful and estimation (interpolation and extrapolation) are required there are further more complex techniques for transforming the data that will yield correct ranges sills and nuggets from noisy data. The main one of these techniques is based on Gaussian transforms as associated back transforms.

The Gaussian transform, together with a variogram model, is also the basis of the change of support calculations.

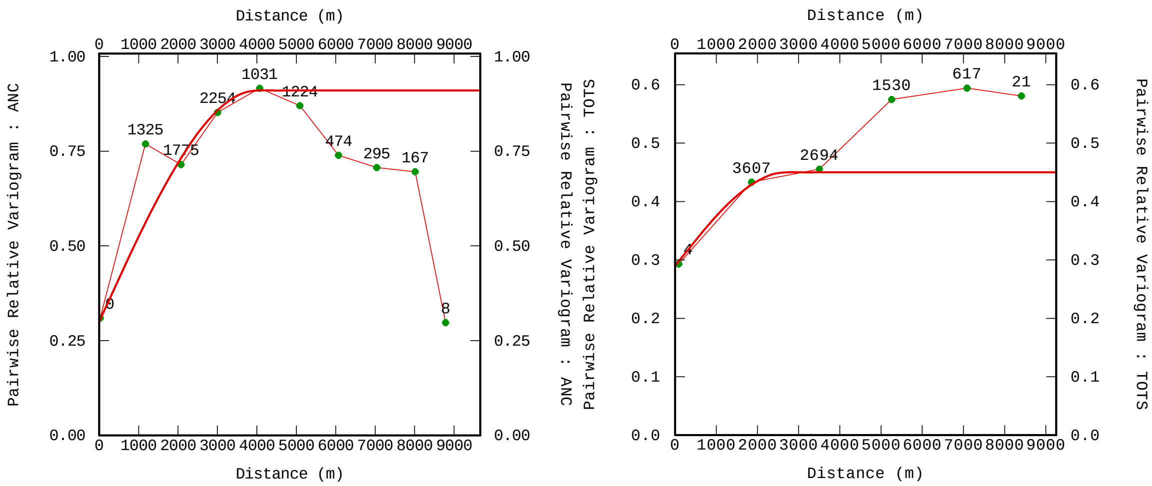
Appendix D-Variography Figures



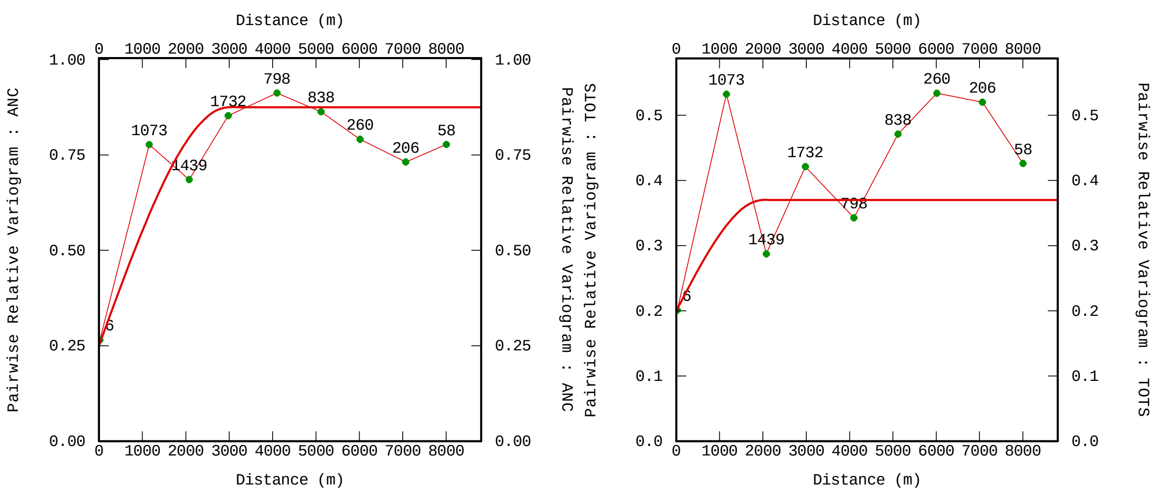
Appendix Figure 9: Experimental and model variograms for ANC and Total S all material excluding coal



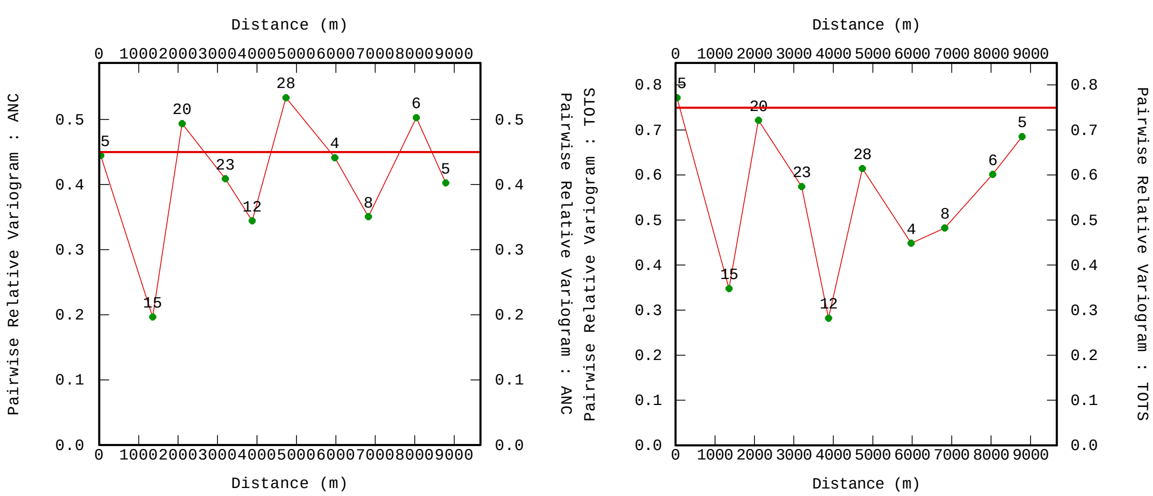
Appendix Figure 10: Experimental and model variograms for ANC and Total S weathered material excluding coal



Appendix Figure 11: Experimental and model variograms for ANC and Total S fresh material excluding coal



Appendix Figure 12: Experimental and model variograms for ANC and Total S fresh REM group



Appendix Figure 13: Experimental and model variograms for ANC and Total S fresh carbonaceous group

Appendix E- Non Additive variables

The NAPP and NPR not assessed geostatistically as they are calculated values that rely on the underlying Total S and ANC measurements. Decisions on the adequacy of the drill spacing are based on the estimated ranges of the Total S and ANC experimental variograms. It is not valid to calculate variograms on parameters that are non-additive such as PH and NPR. NAPP is an additive variable.

For example take two 1 m long samples one of which has a PH of 7 and the other has a PH of 3. If you physically combine the two samples the resultant PH will not be”

$$(7 + 3) / 2 = 5$$

But, because PH measurements come from a log scale, is in fact [in terms of hydrogen ion concentration H+]

$$(0.0000001 + 0.001)/2 = 0.00050005 \text{ which equates to a PH of } 3.5$$

Another example of a non-additive is the addition of NPR values. NPR is a ratio and summing or averaging ratios does not give a correct total ratio unless appropriate weights are applied. Again take two 1 m long samples, one has an ANC of 27 and a Total S of 0.2 and the other has ANC of 87 and Total S of 0.03. Using:

$$NPR = ANC / Total\ S * 30.6$$

gives NPRs of 4.41 and 94.77 respectively. Averaging these gives 45.59

However if the two samples are physically combined then the ANC is:

$$(27+87) / 2 = 57 \text{ and the Total S is } (0.2+0.03) / 2 = 0.115$$

The NPR then becomes (57 / 0.115*30.6) = 16.19

Appendix F- Graphical Logs

The following graphical logs show, from left to right:

- SRK group (black text)
- Total sulphur value (red number)
- ANC value (green number)
- Lithology colour (as per Appendix Figure 14:)
- Lithology code (as per Appendix Figure 14:)
- Weathering code
  - CW = completely weathered
  - HW = highly weathered
  - WE = weathered
  - MW = moderately weathered
  - SW = slightly weathered
  - FR = Fresh

The grid squares on the log plots are 50 m by 50 m.

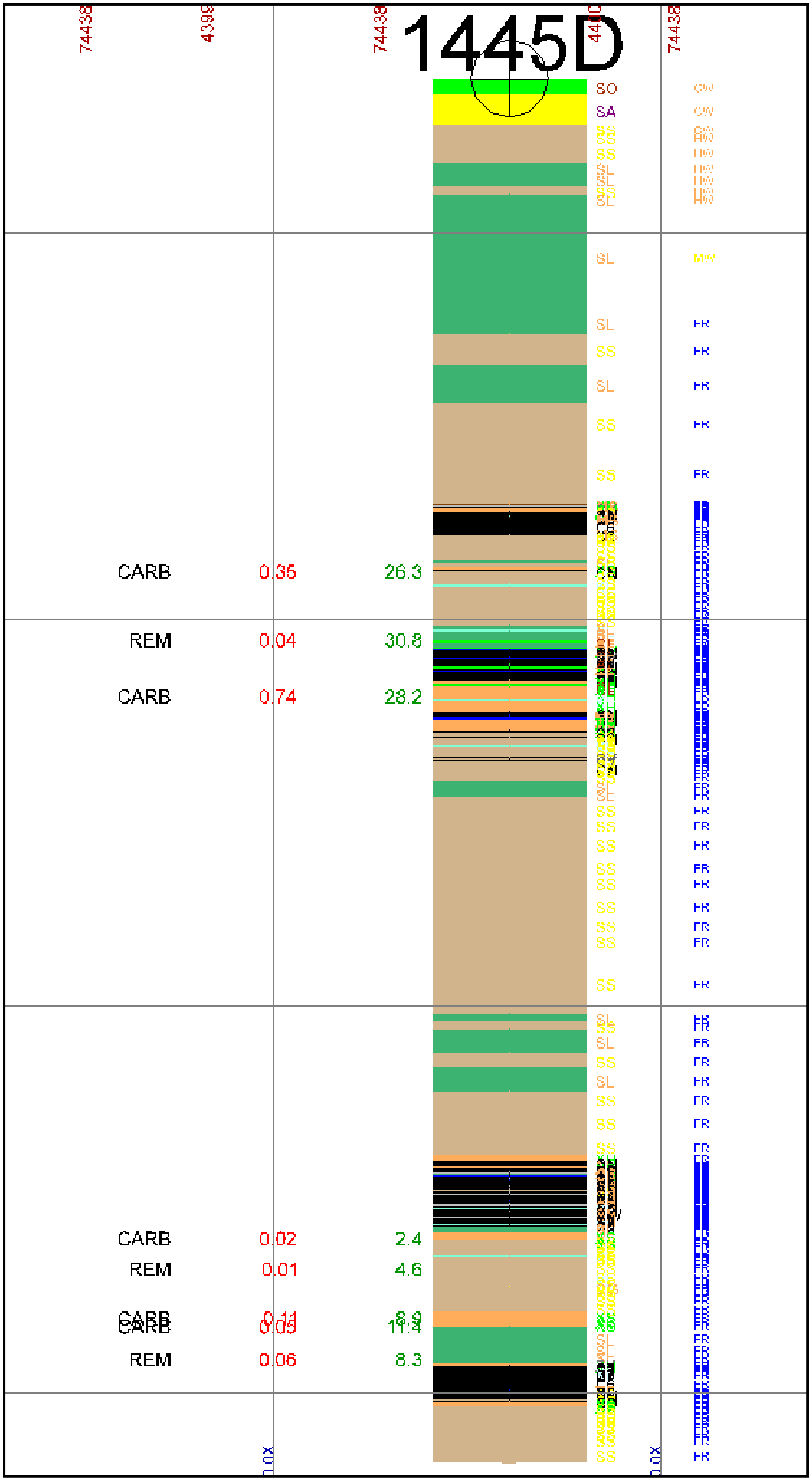
Note that the carbonaceous group units do not occur as a uniform layer across the area of the deposit. They often occur just above the uppermost coal seam but are highly variable in thickness, number of beds, and may occur anywhere in the sequence or be absent altogether.

Some holes contain up to 40 m of clay and soil from surface whereas others may be sandstone, siltstone and claystone from surface.

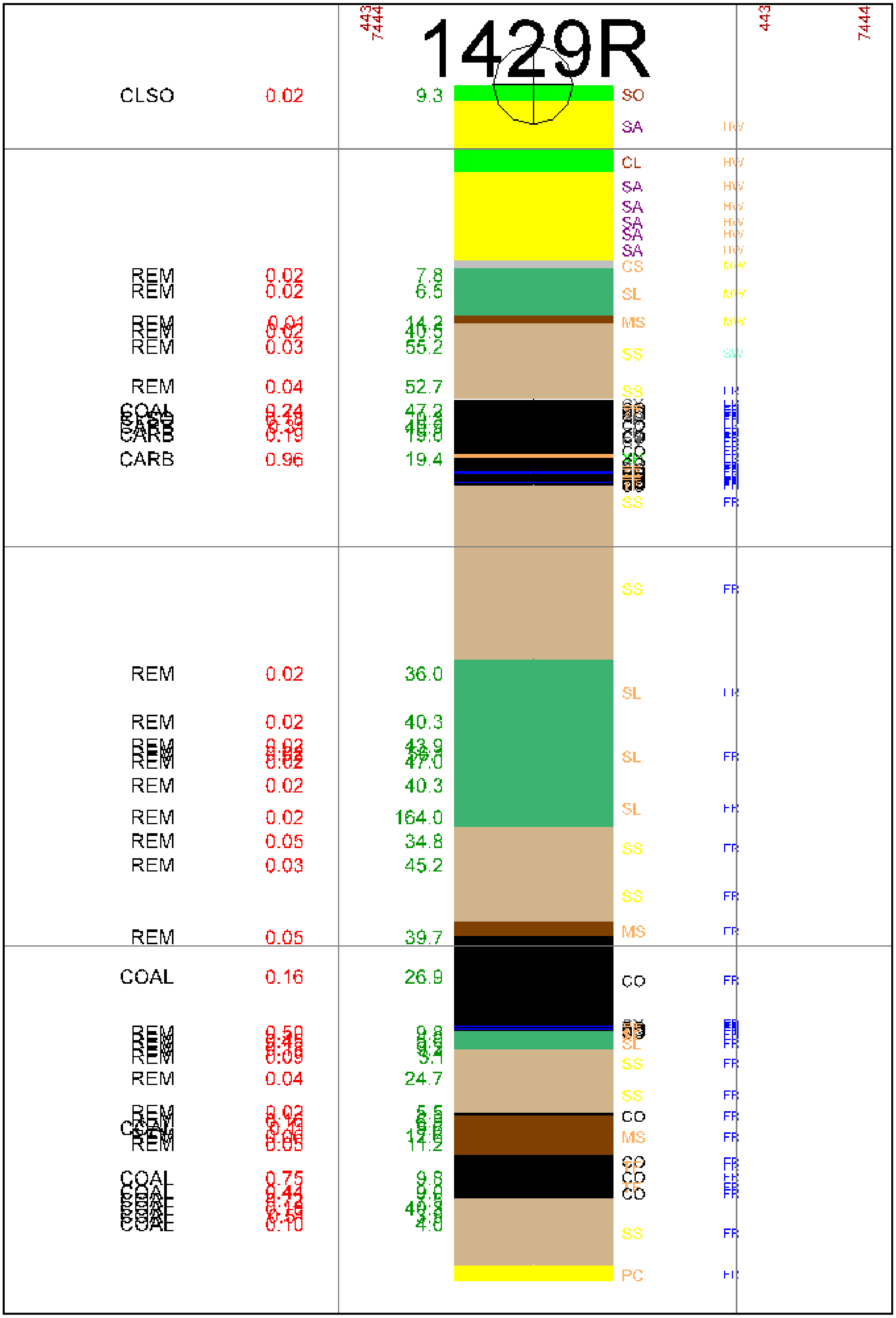
Five holes do not penetrate into the fresh material and test only the weathered material.

	COAL GROUP		**CARBONACEOUS GROUP**
C1	COAL, >90% bright	CM	CARBONACEOUS MUDSTONE
C2	COAL, 60-90% bright	XA	CARBONACEOUS SAND
C3	COAL, 40-60% bright	XC	CARBONACEOUS CLAYSTONE
C4	COAL 10-40% bright	XE	CARBONACEOUS LAMELLE
C5	COAL, <10% bright	XH	CARBONACEOUS SHALE
C6	COAL, dull <1% bright	XM	CARBONACEOUS MUDSTONE
C7	COAL, dull, conchoidal	XS	CARBONACEOUS SANDSTONE
C8	COAL, fibrous	XT	CARBONACEOUS SILTSTONE
C9	COAL, weathered	XY	CARBONACEOUS CLAY
CI	COAL, mid lustrous		
CN	STONY COAL		**CLAY & SOIL GROUP**
CO	COAL, undifferentiated	CL	CLAY
CP	COAL SAPROPELIC	DT	DIRT
CR	COAL FIBROUS	SO	SOIL
CU	COAL UNDIFFERENTIATED	MU	MUD
CW	COAL WEATHERED	MV	MUD
CY	SOOTY COAL	MZ	MUD
CZ	COALY SHALE		
DC	DIRTY COAL		**REMAINING GROUP**
ZC	COALY CLAYSTONE	CS	CLAYSTONE
ZH	COALY SHALE	MS	MUDSTONE
ZM	COALY MUDSTONE	SC	SCHIST
ZS	COALY SILTSTONE	SK	SILCRETE
		SL	SILTSTONE
	NON ROCK GROUP	SS	SANDSTONE
KL	CORE LOSS	TF	TUFF
LC	CORE LOST	IS	IRONSTONE
NK	NOT CORED	LA	LATERITE
NL	NOT LOGGED	LT	LATERITE
NO	NO SAMPLE RETURN		
NS	NO SAMPLE		**SAND & GRAVEL GROUP**
		CG	CONGLOMERATE
		GV	GRAVEL
		PC	PEBBLE CONGLOMERATE
		SA	SAND

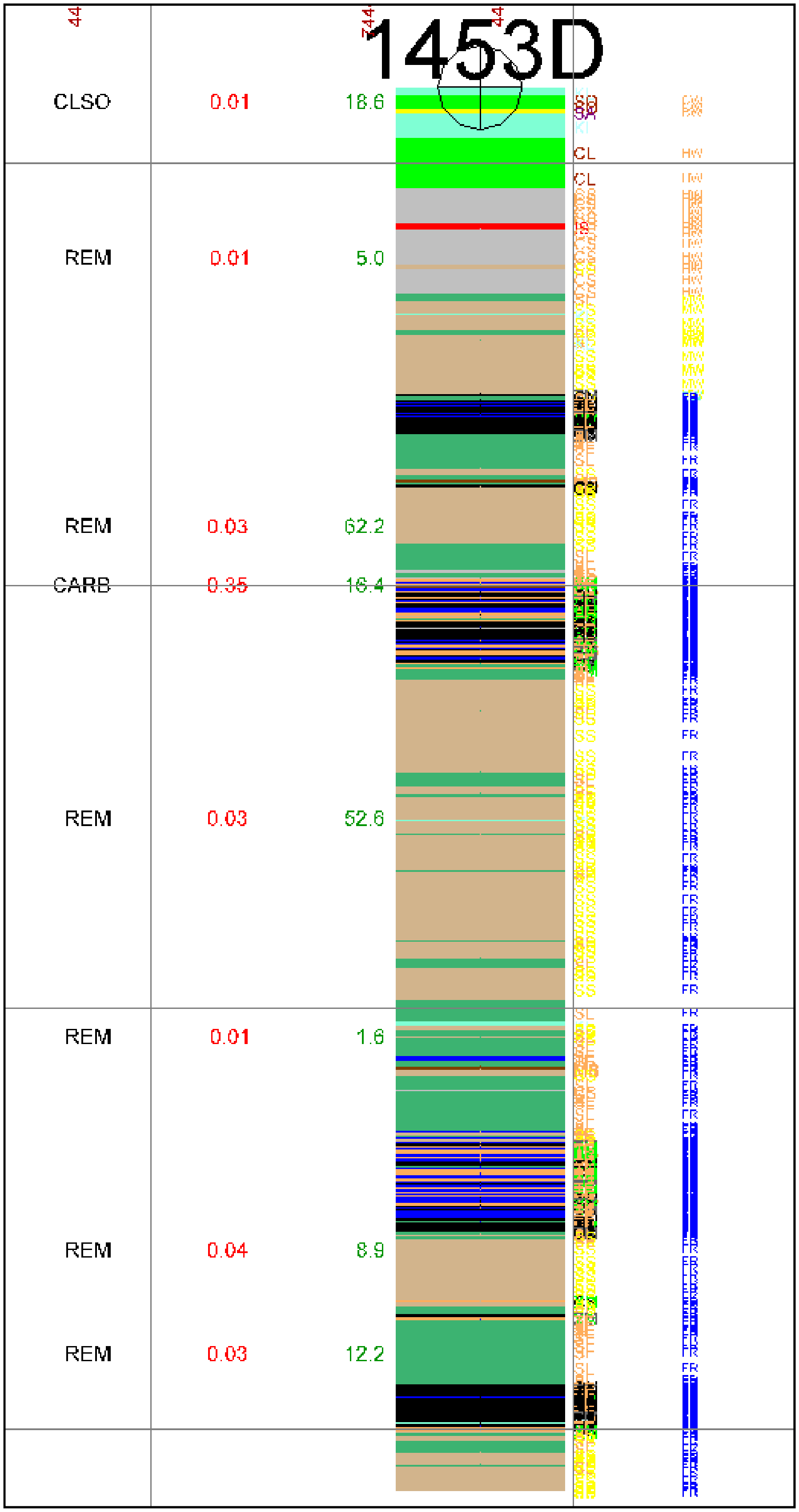
Appendix Figure 14: Lithology codes and grouping legend for graphical logs



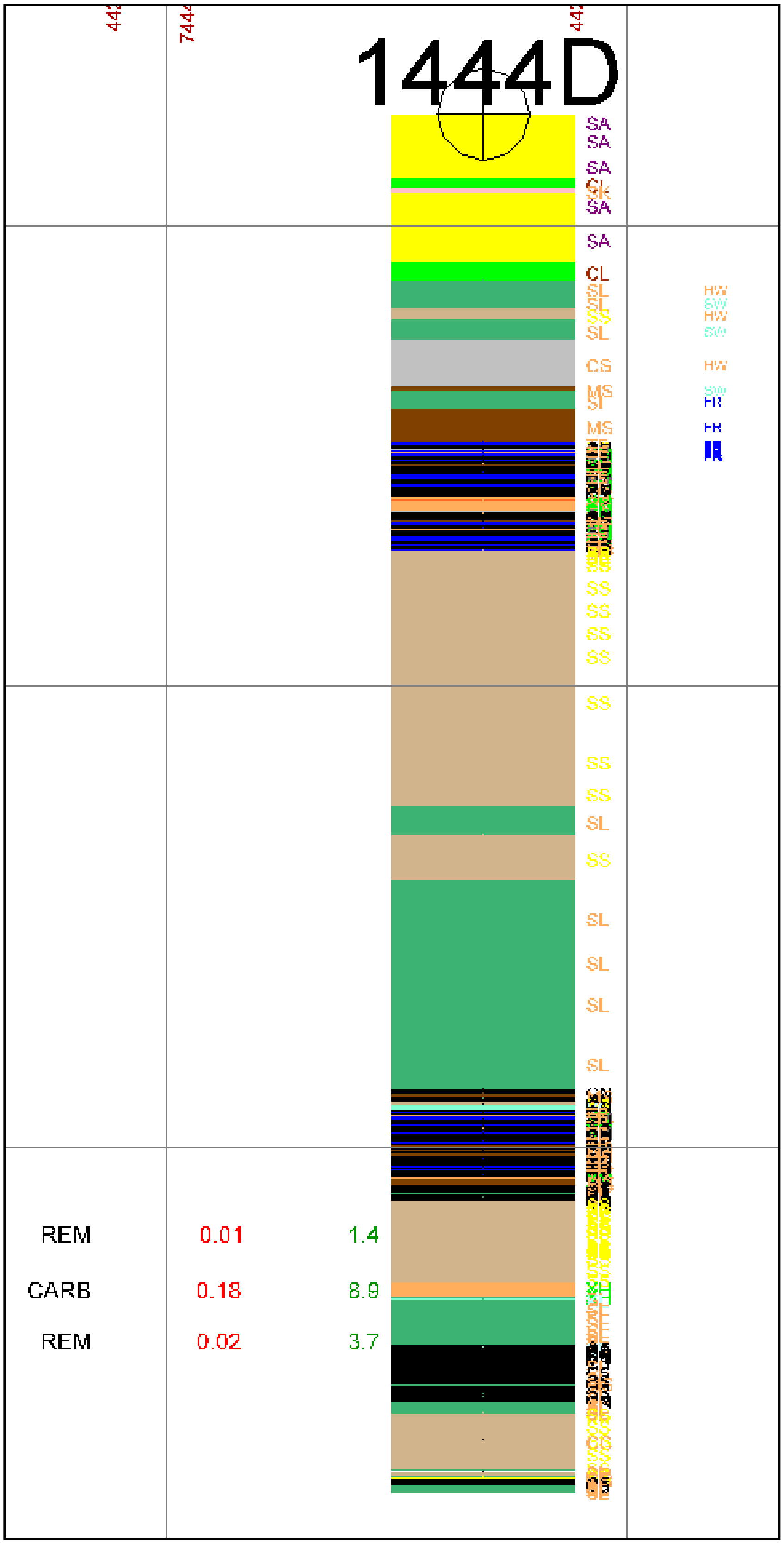
Appendix Figure 15:



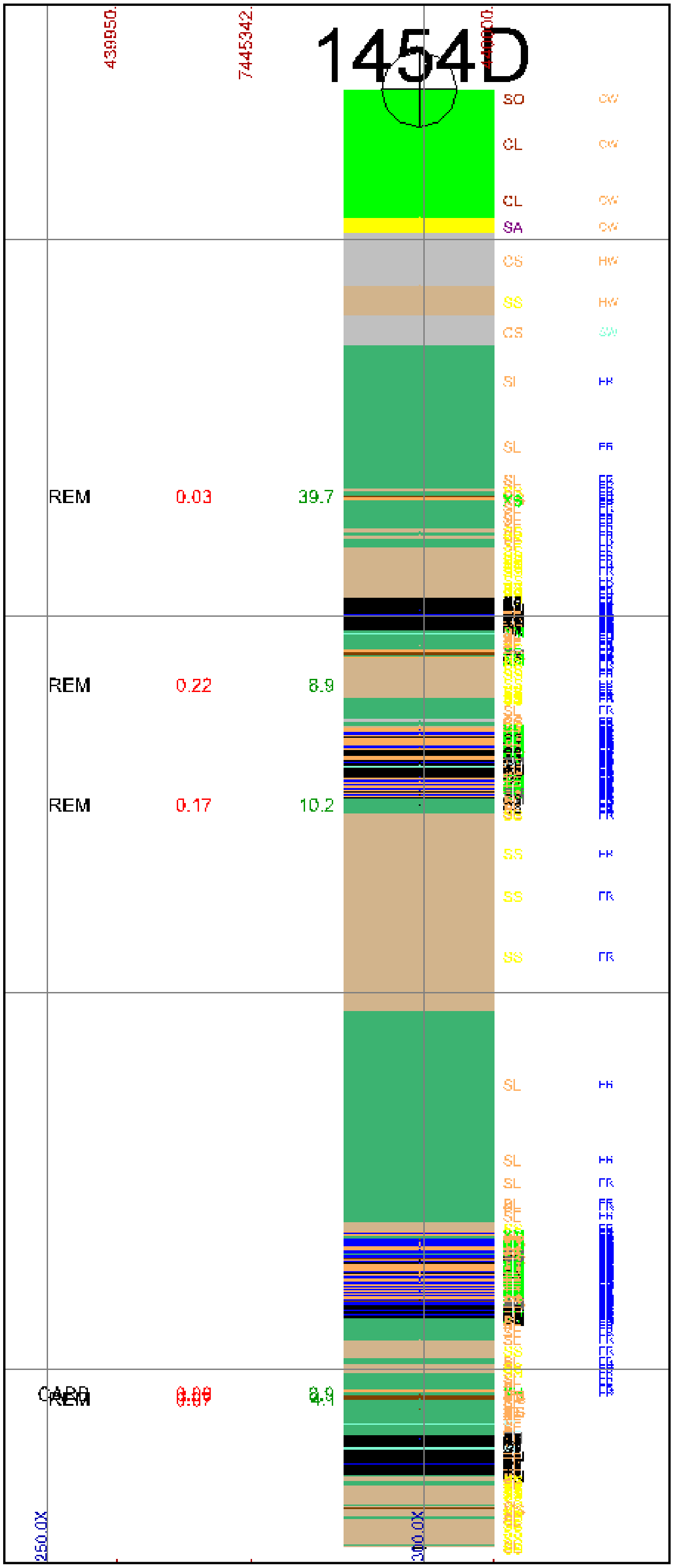
Appendix Figure 16:



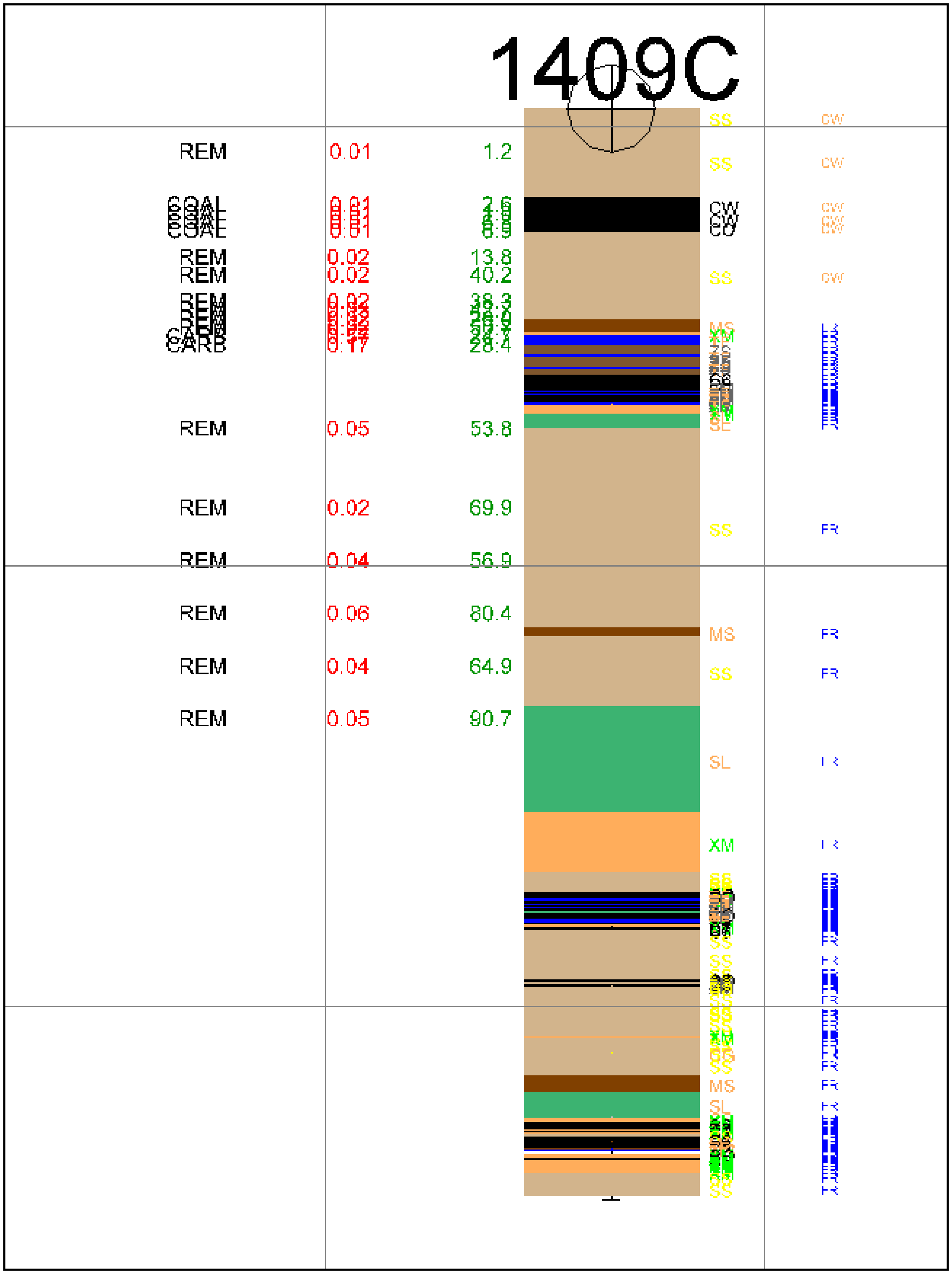
Appendix Figure 17:



Appendix Figure 18:

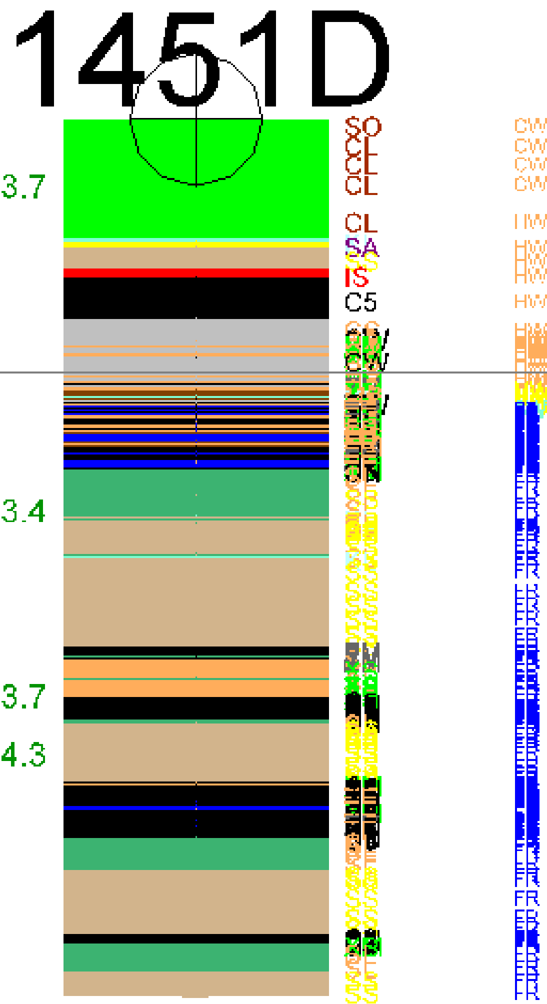


Appendix Figure 19:

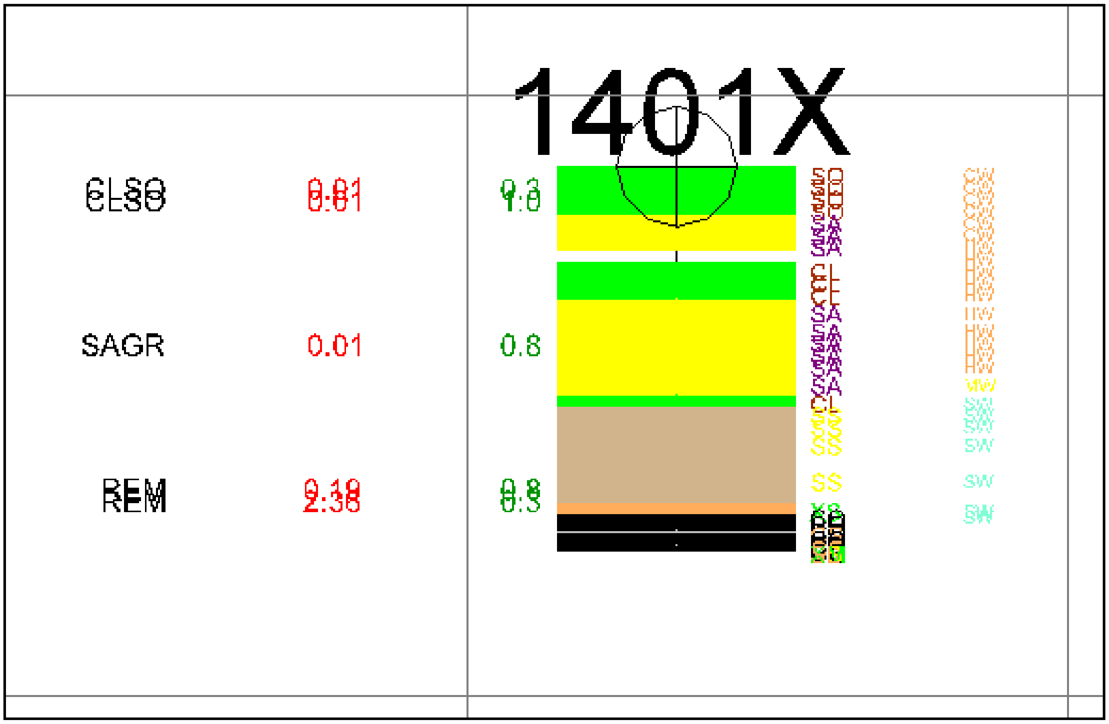


Appendix Figure 20:

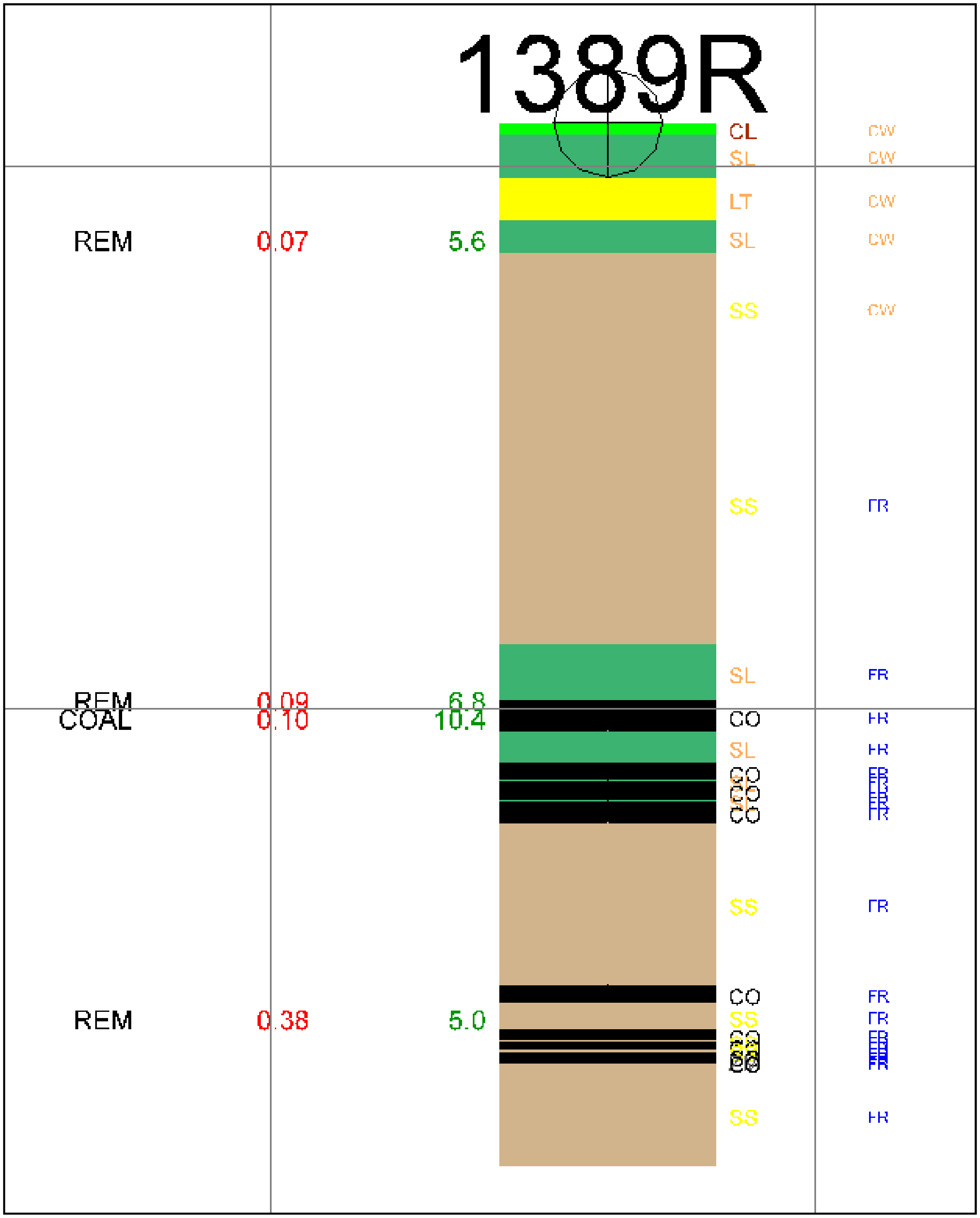
CLSO	0.01	3.7	
REM	0.03	3.4	
CARB	0.06	3.7	
REM	0.24	4.3	



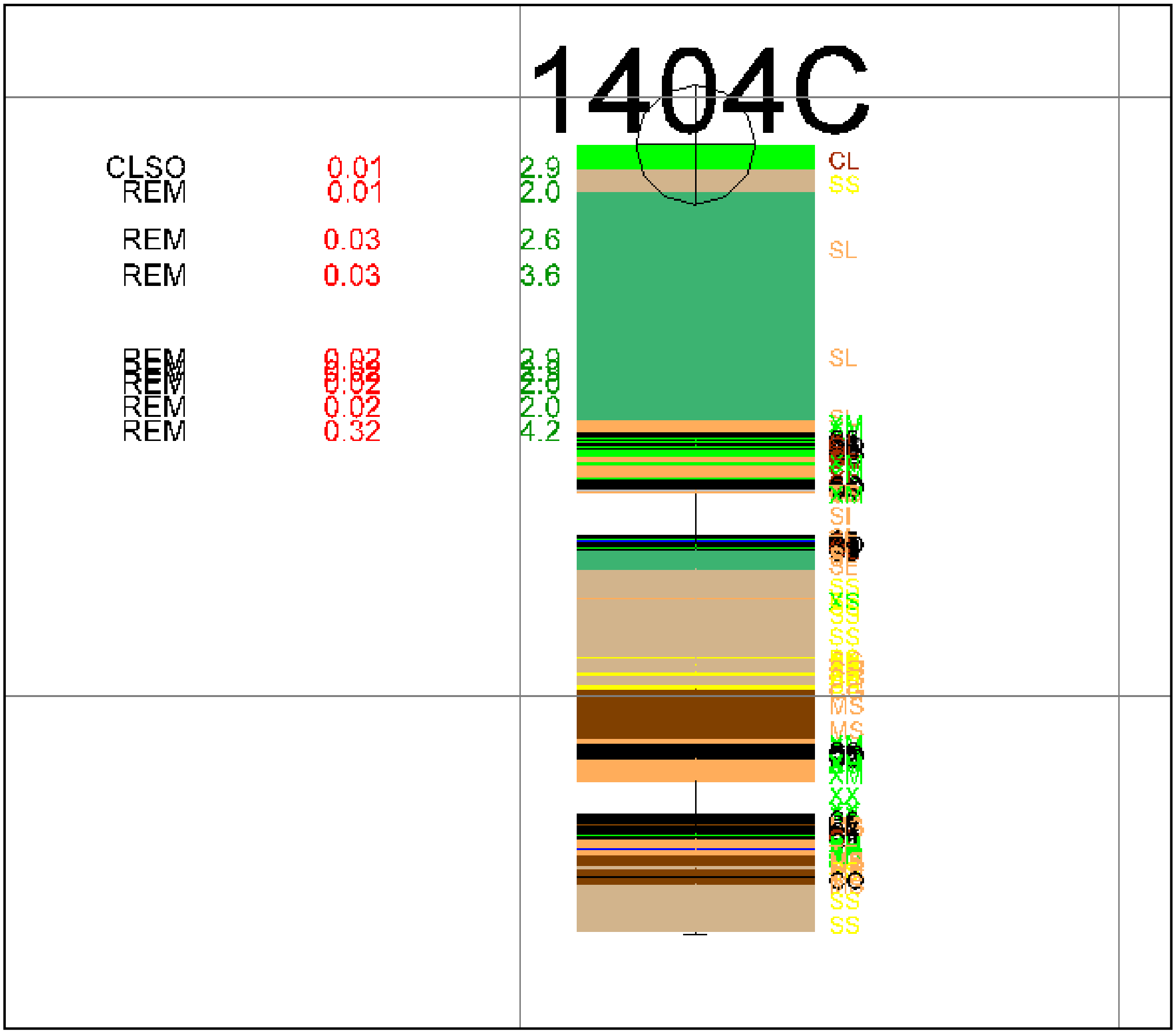
Appendix Figure 21:



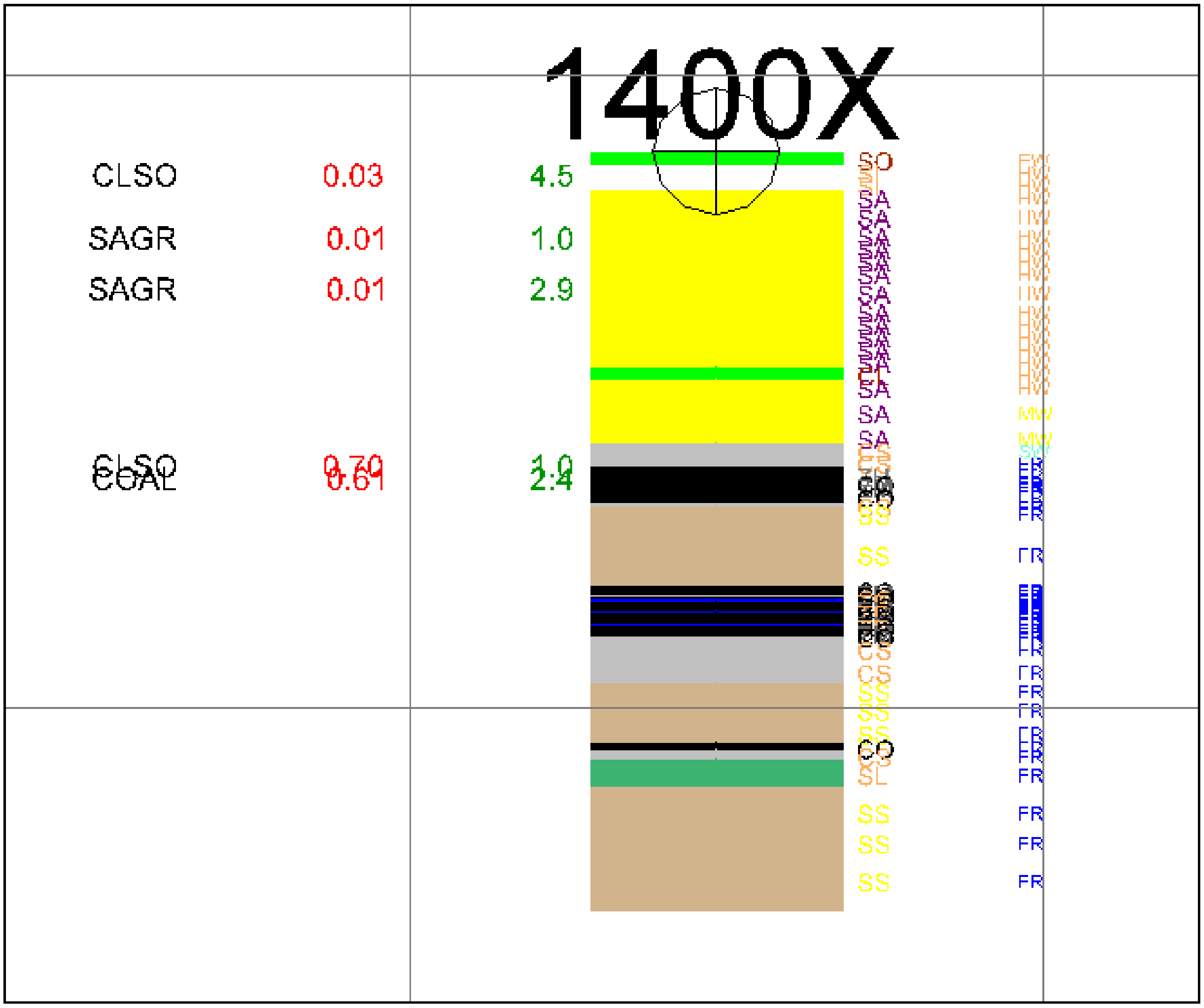
Appendix Figure 22:



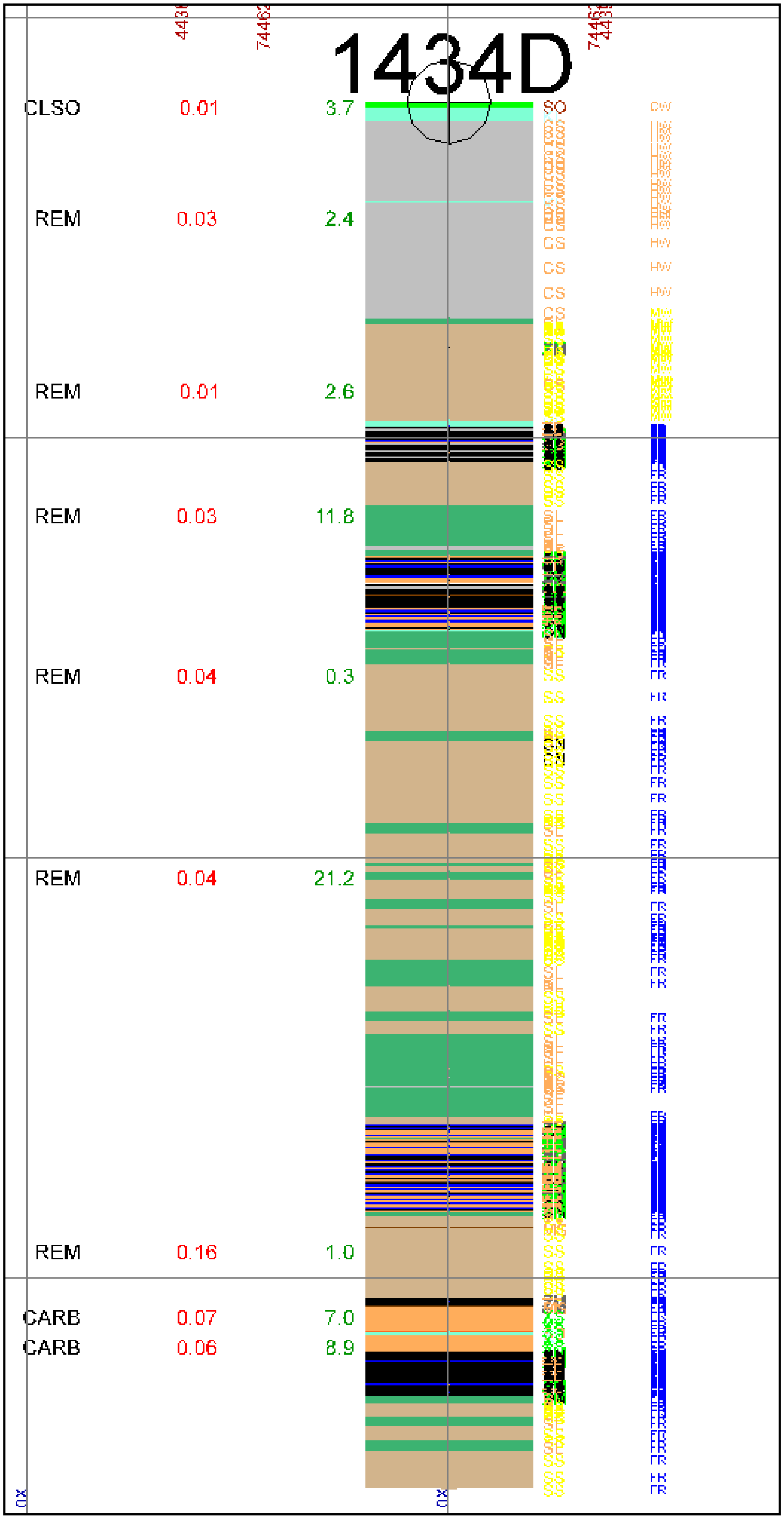
Appendix Figure 23:



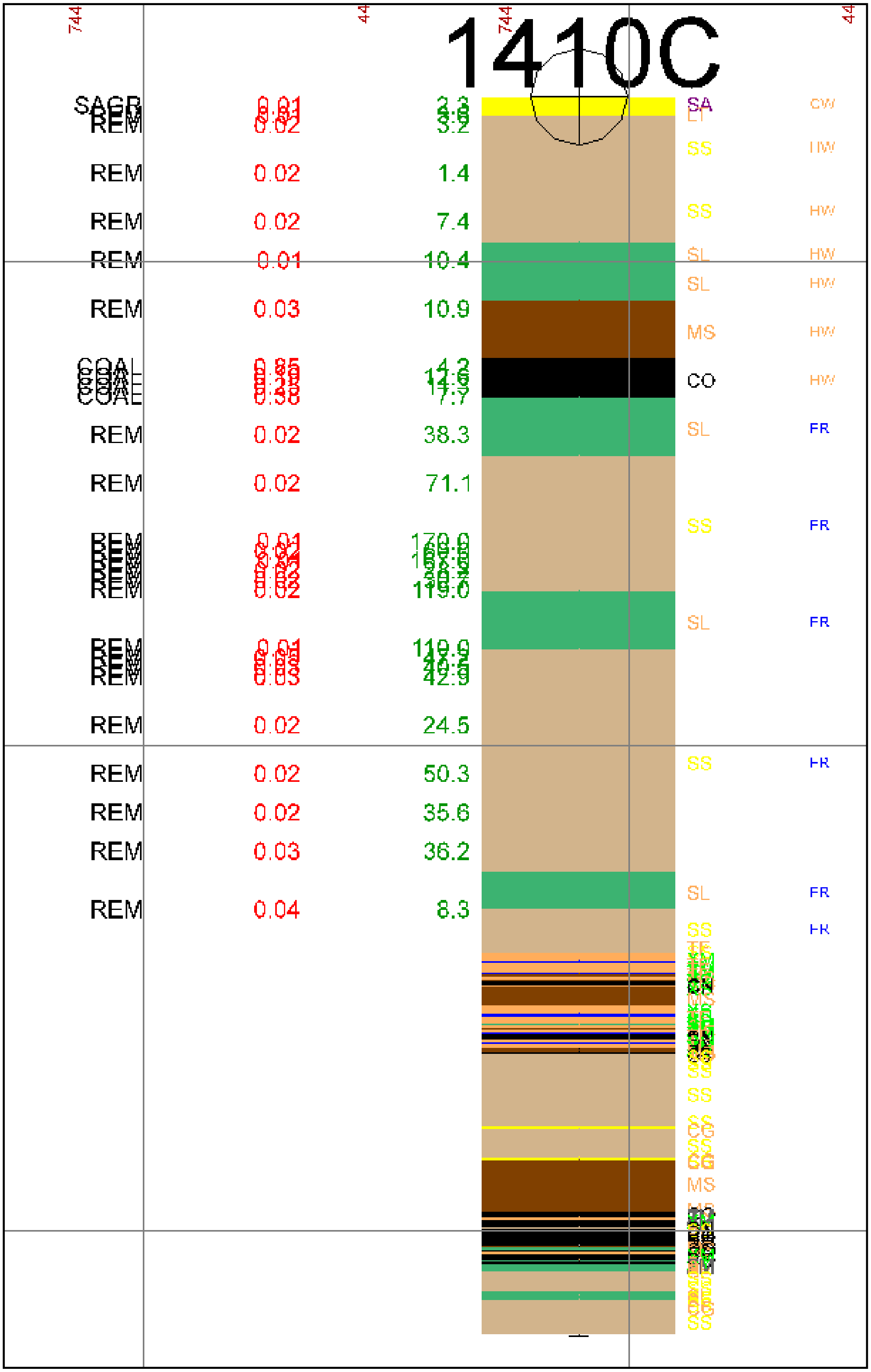
Appendix Figure 24:



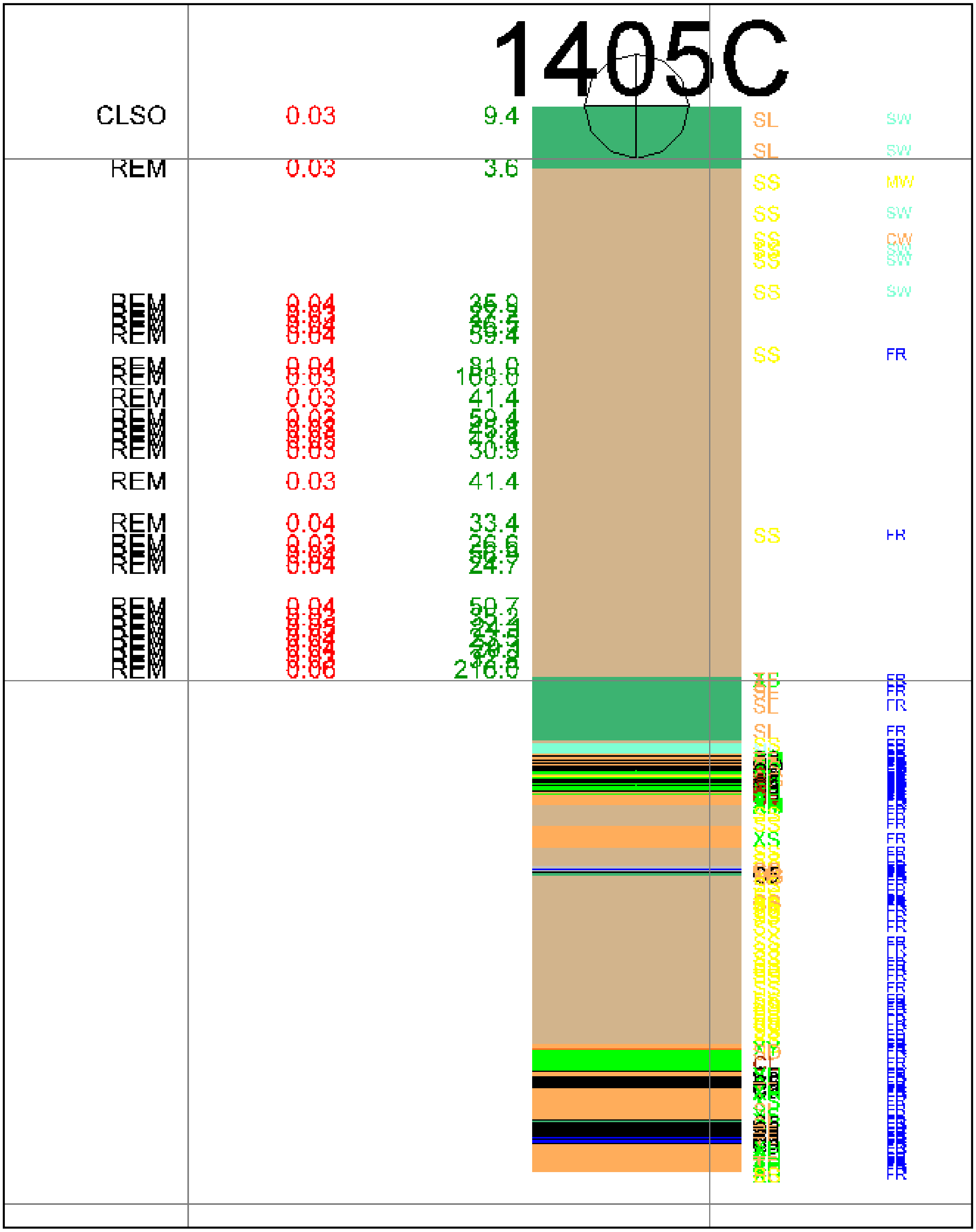
Appendix Figure 25:



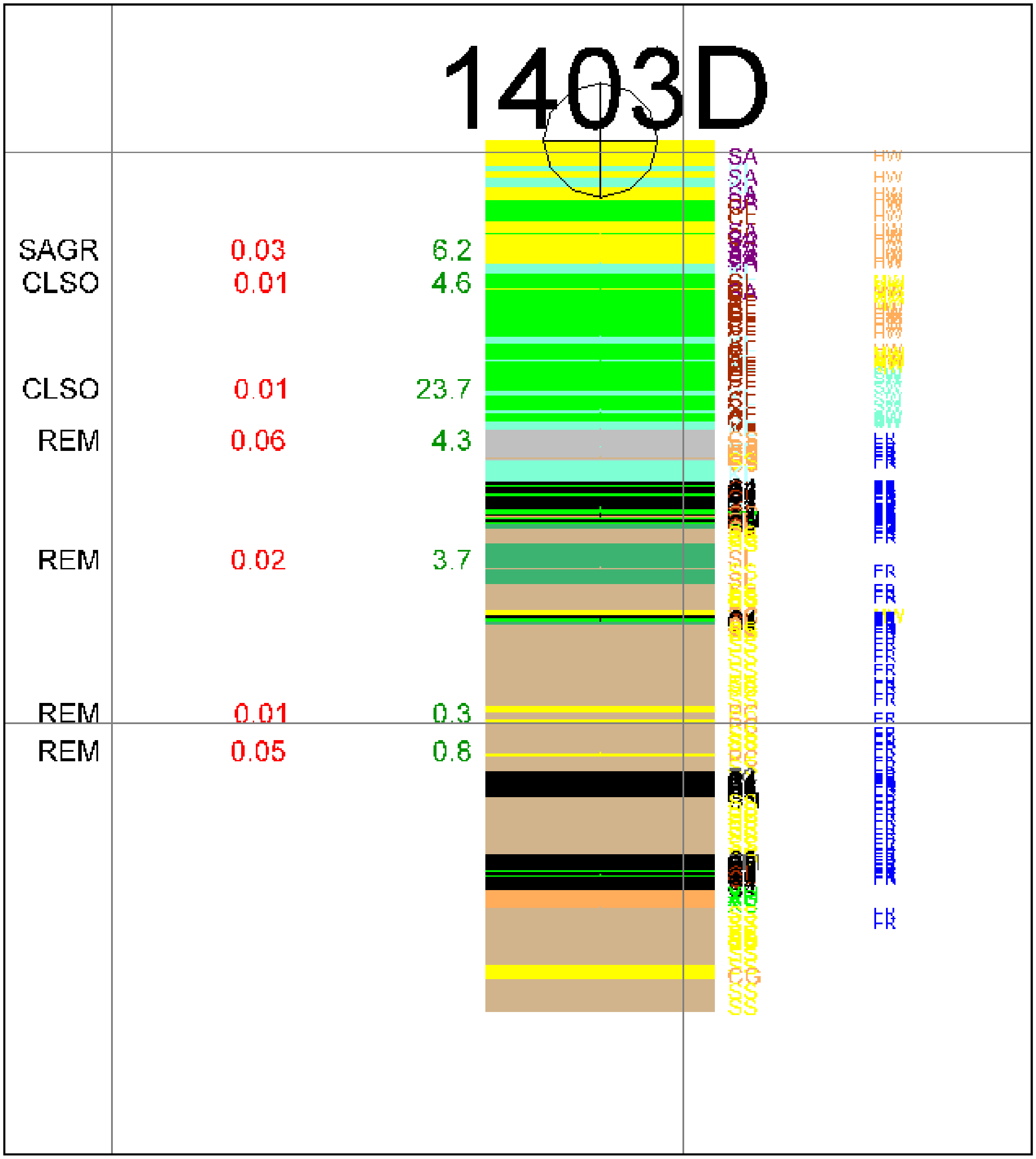
Appendix Figure 26:



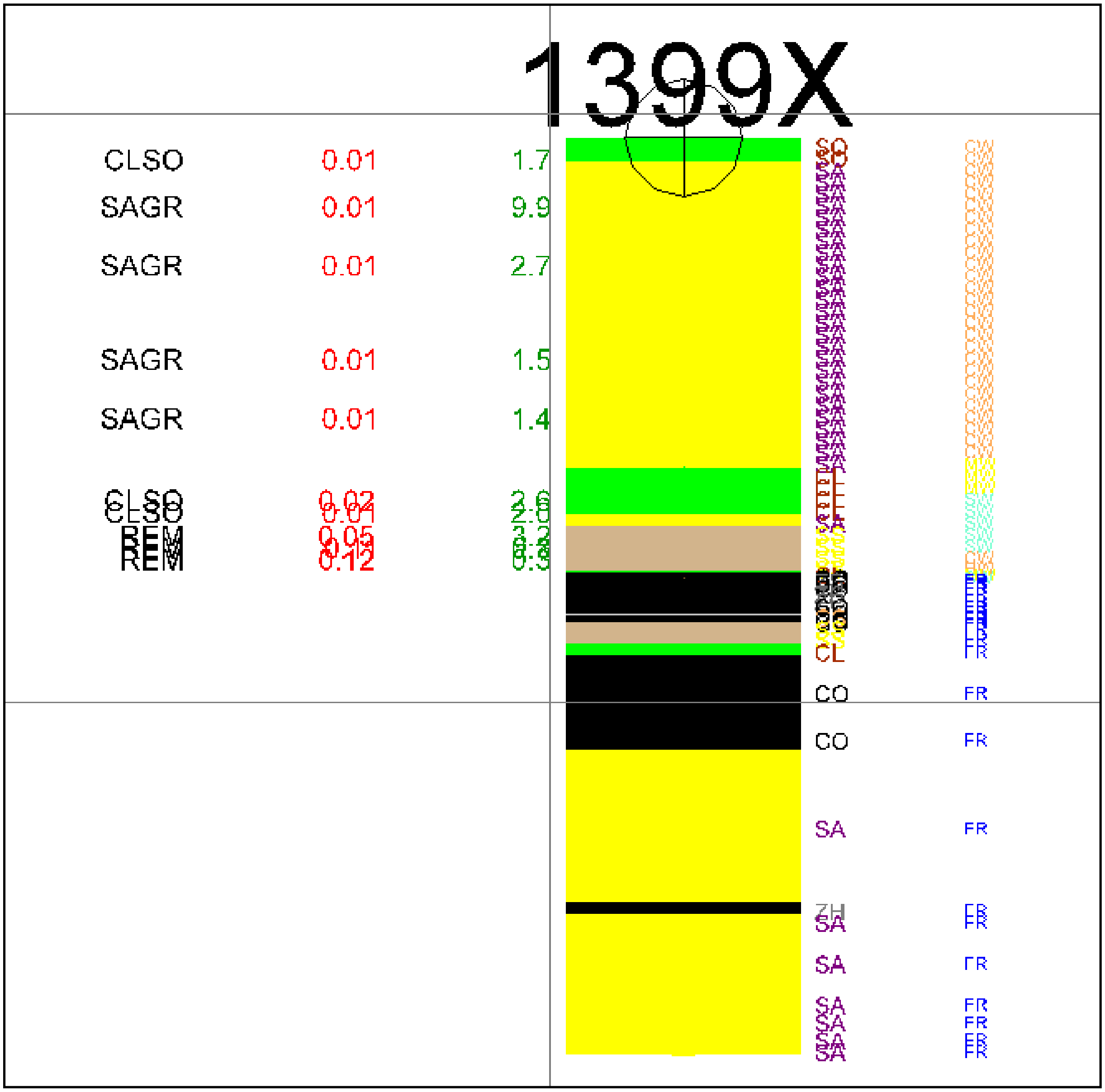
Appendix Figure 27:



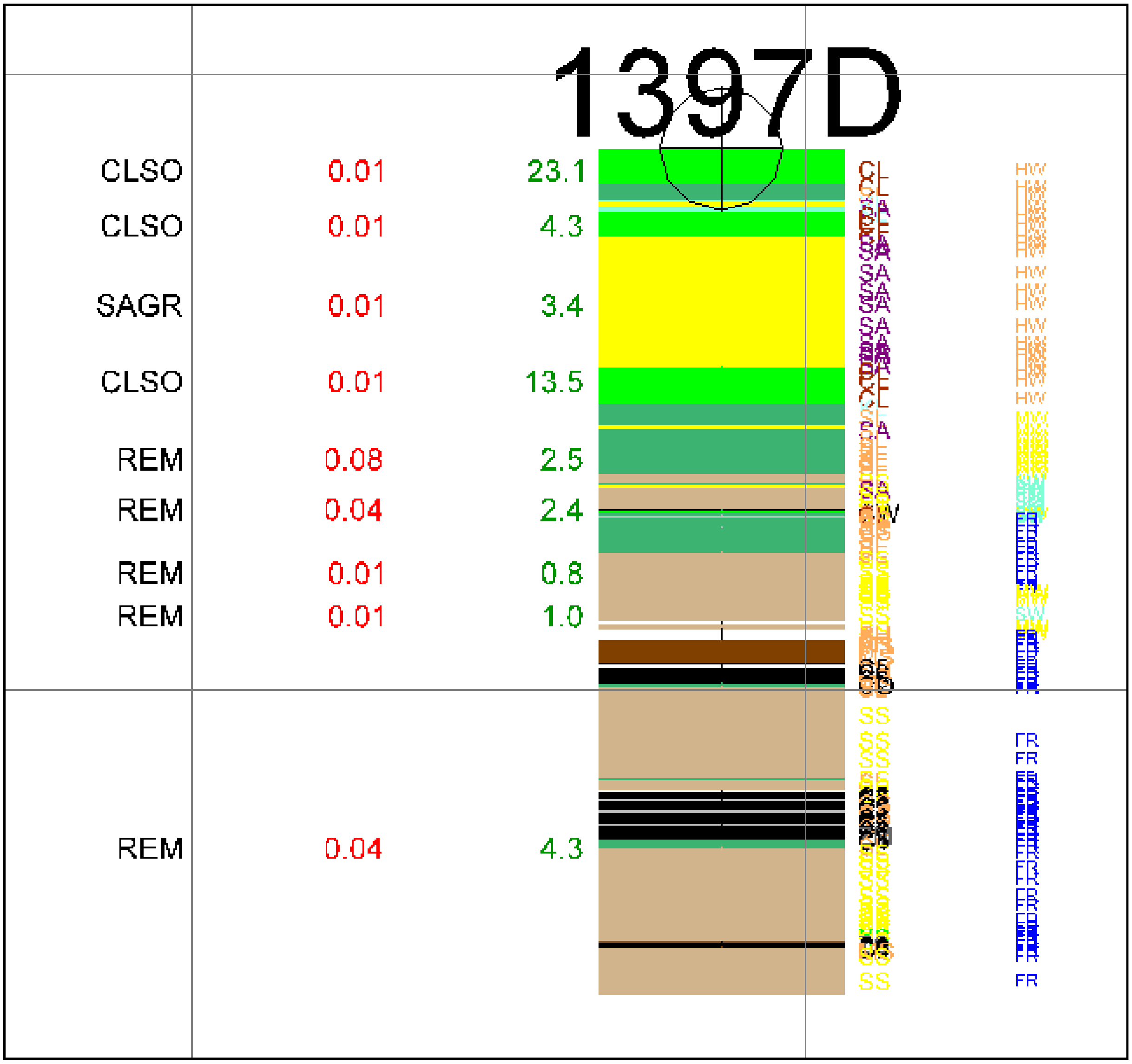
Appendix Figure 28:



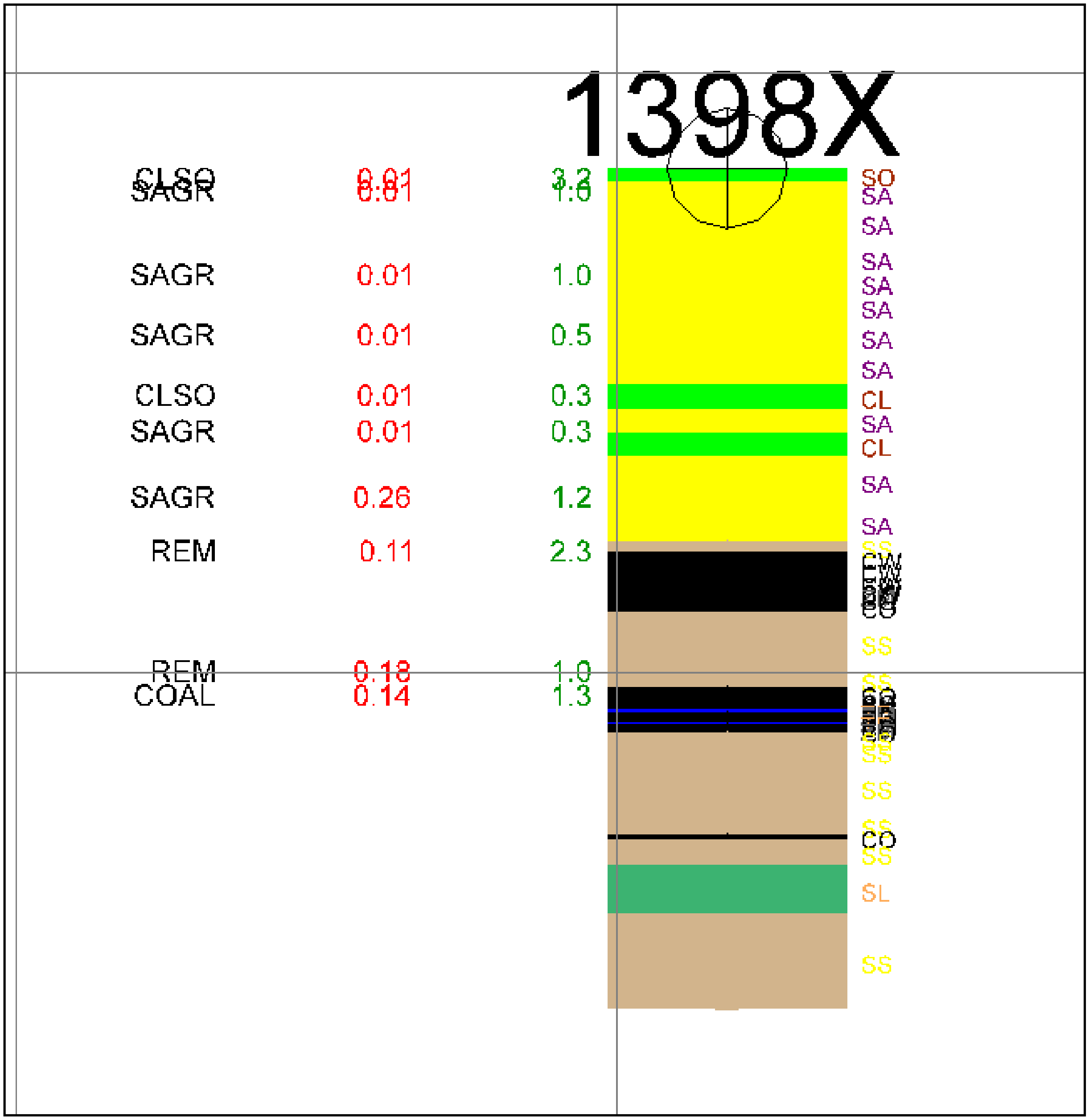
Appendix Figure 29:



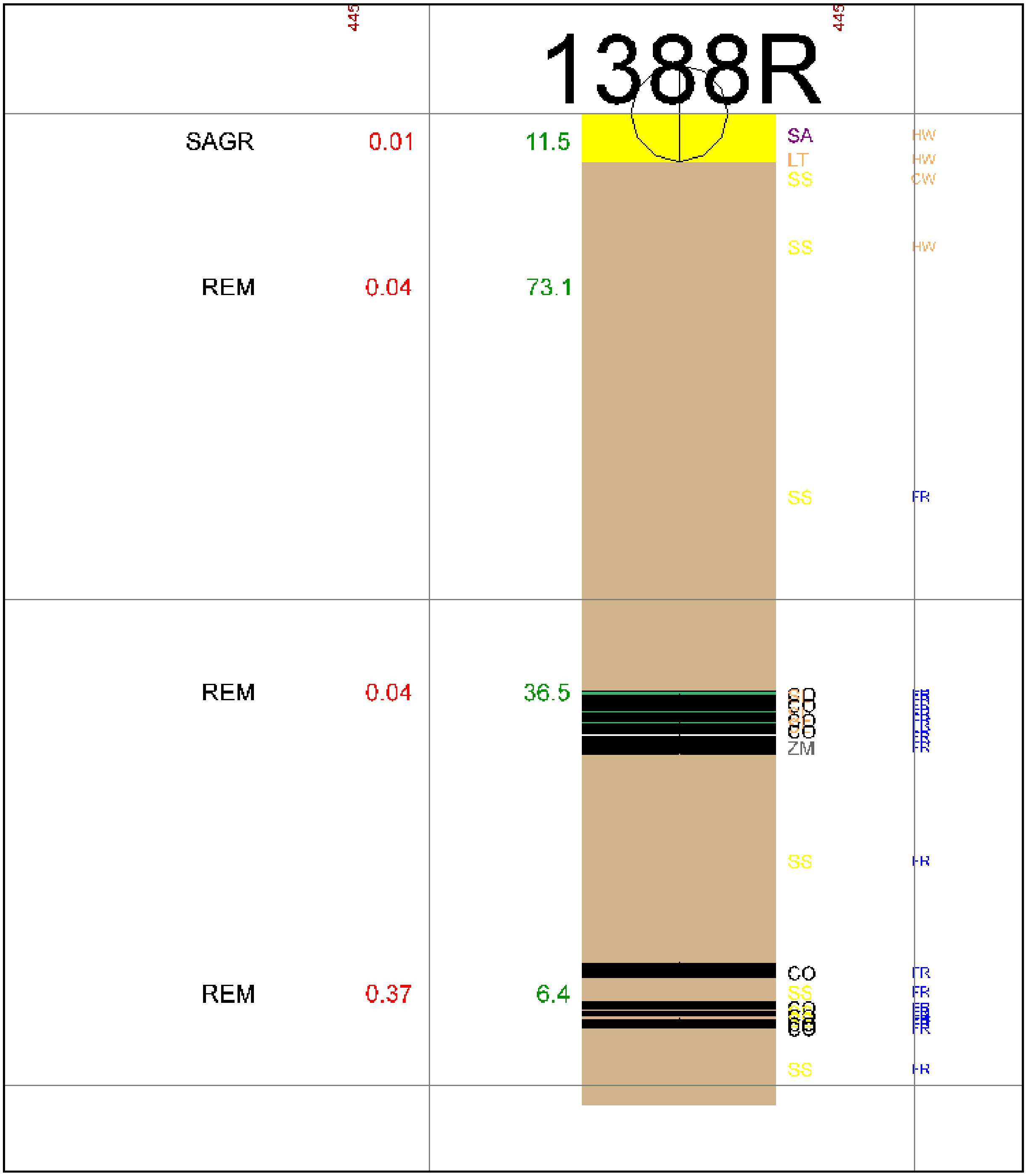
Appendix Figure 30:



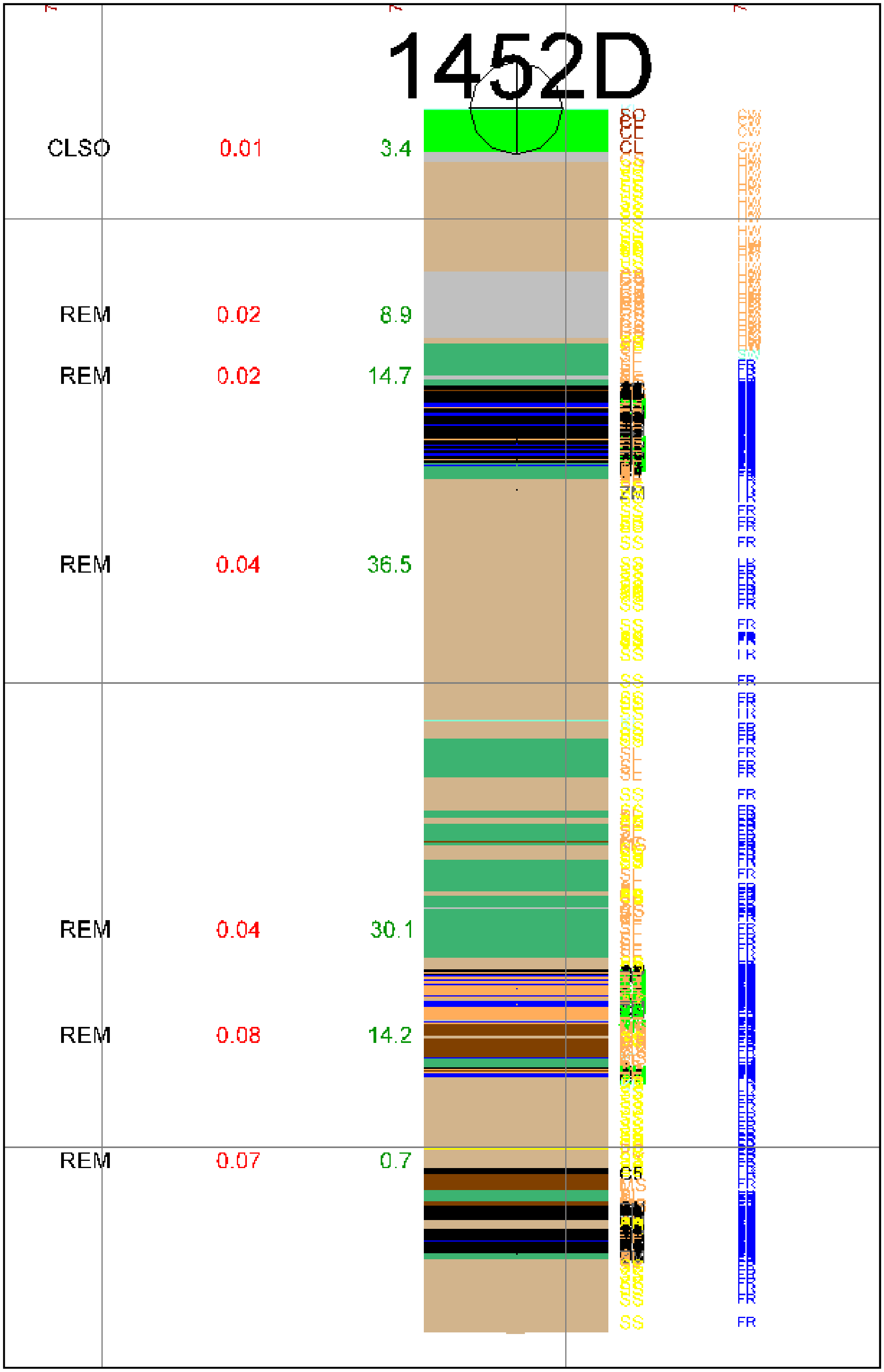
Appendix Figure 31:



Appendix Figure 32:



Appendix Figure 33:



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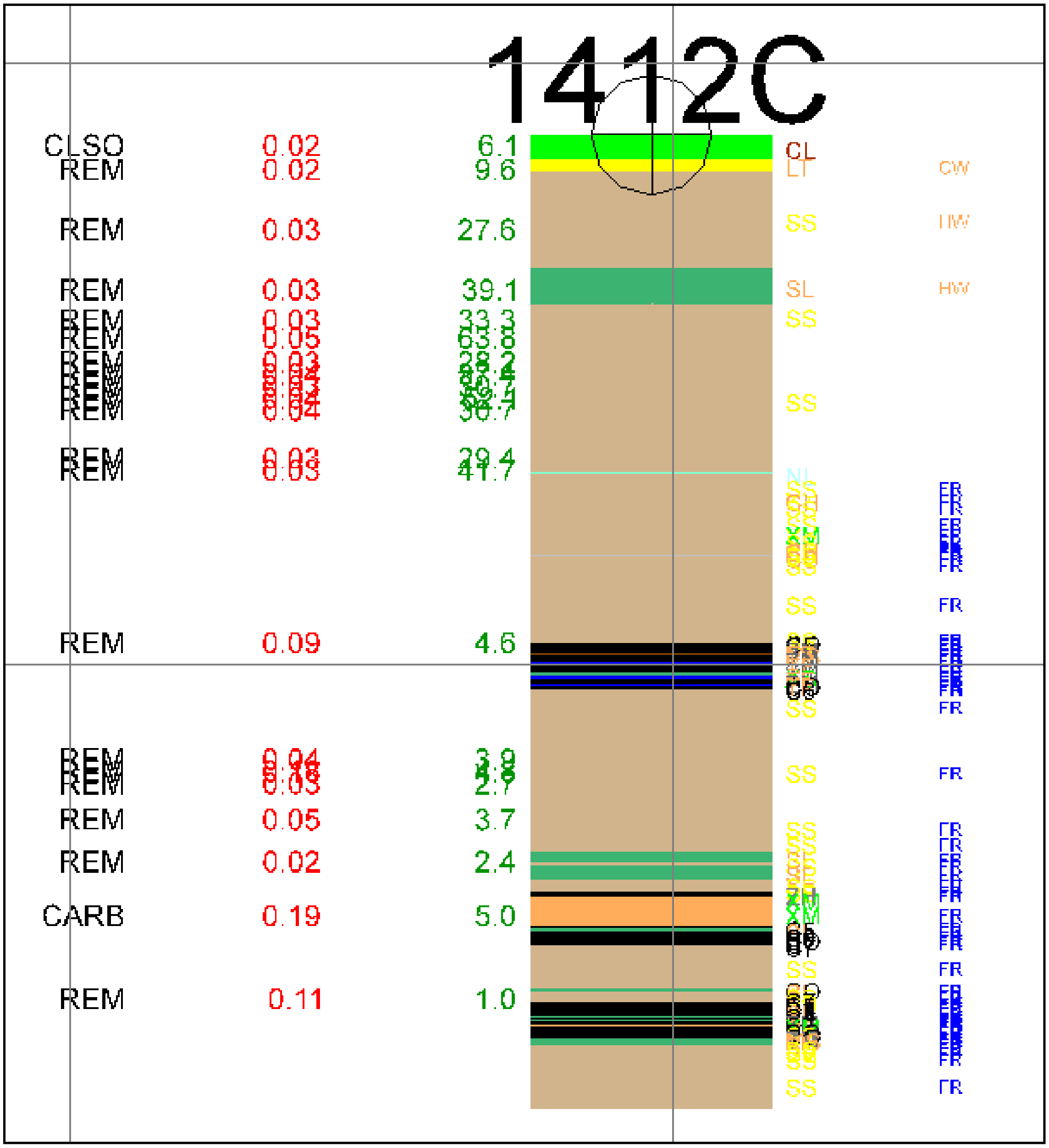
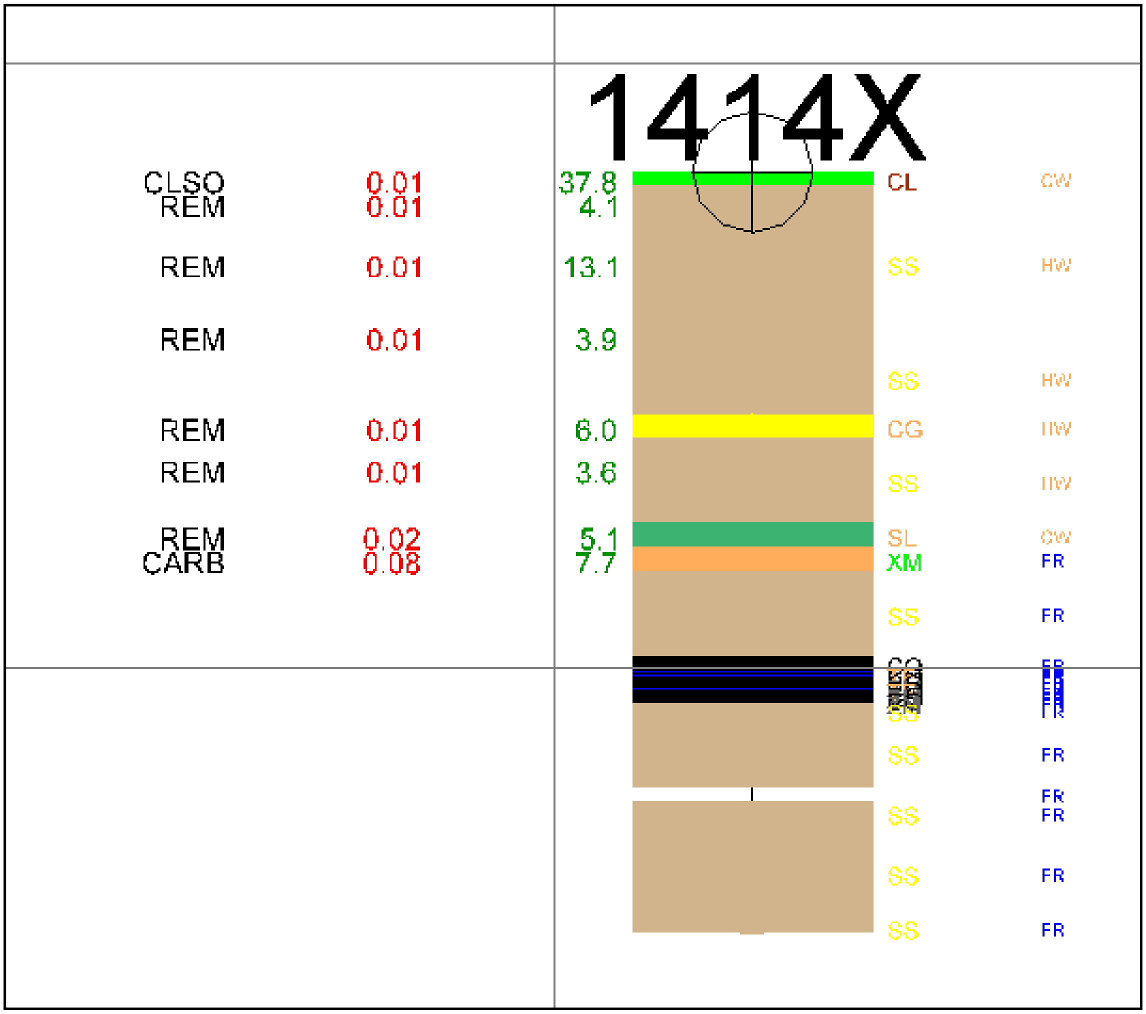
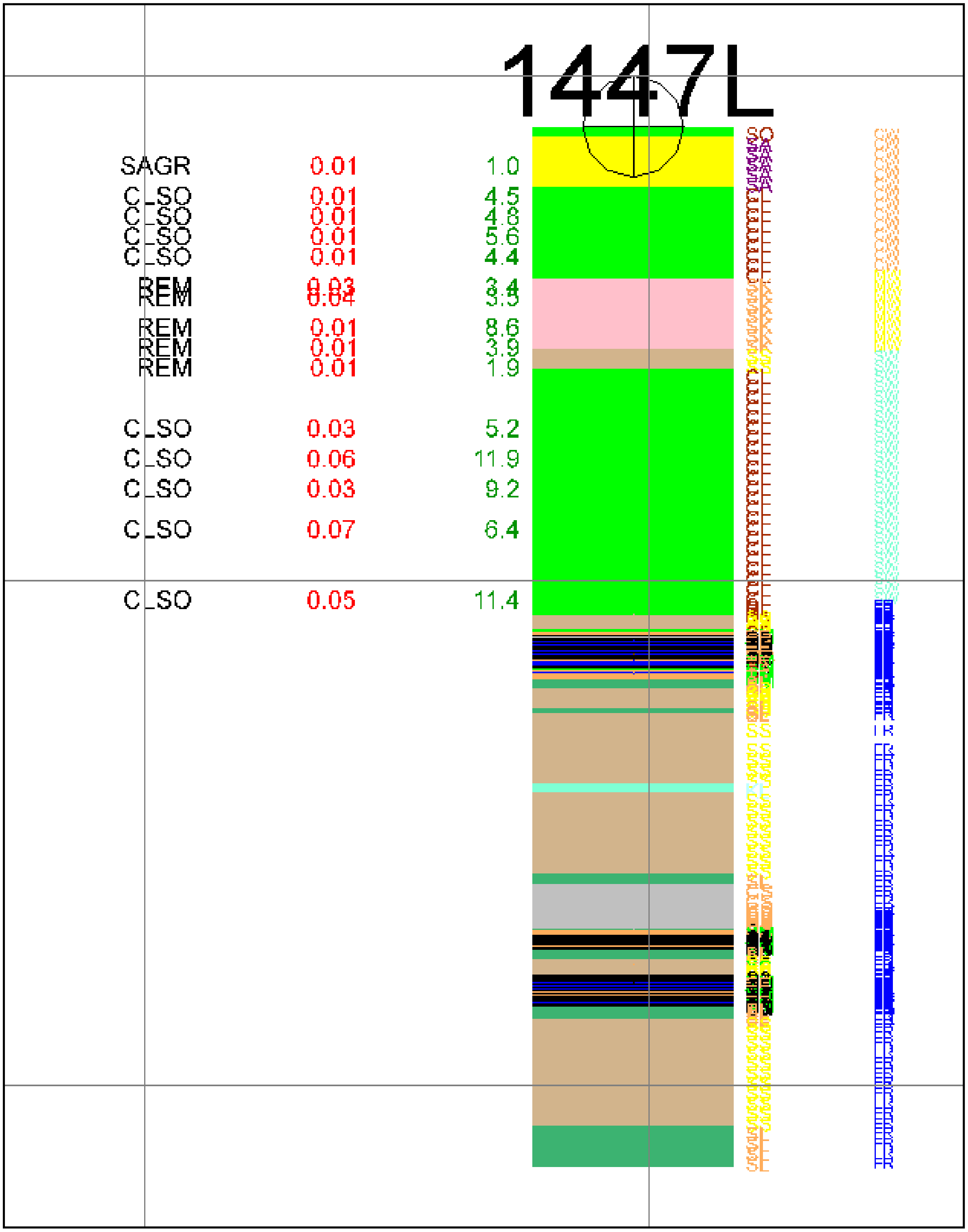


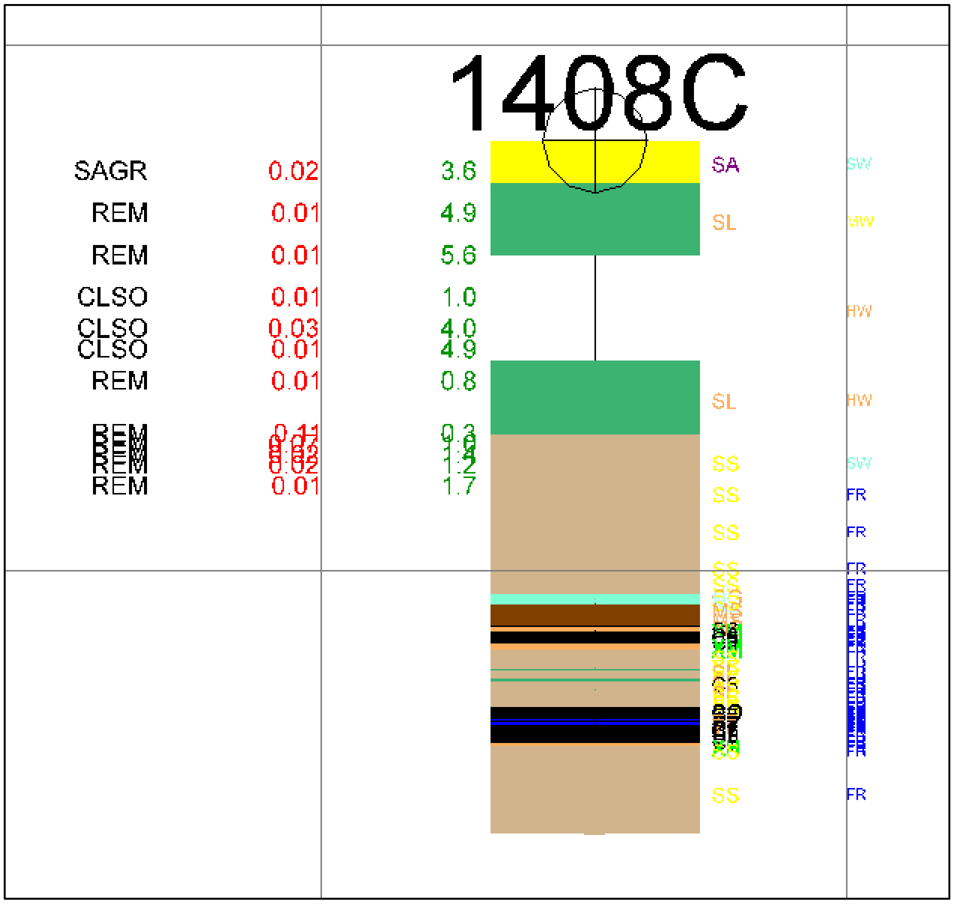
Appendix Figure 35:



Appendix Figure 36:



Appendix Figure 37:



Appendix Figure 38:

Appendix 3: Acid Base Account

Client Sample ID	Lithology	Paste pH	Paste EC	Total S	SO_4	CRS[1]	ANC	Total C	TIC	NAGpH	NAGpH4.5	NAGpH7	NAGpH	pH -2 (ext)	NAG Acidity[2]	CarbNP	MPA	NAPP	NPR	Class (NPR)	Combined AMIRA & X-boil NAG classification
		pH Unit	µS/cm	%	mg/kg	%	kgH_2SO_4/t	%	%	pH Unit	kgH_2SO_4/t	kgH_2SO_4/t	pH unit	pH unit	kgH_2SO_4/t	kgH2SO4/t				Price, 1997	
		0.1	1	0.01	100	0.005	0.5	0.02	0.02	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	ANC/MPA	ANC/MPA	
1388R_95	SAND	8.6	261	<0.01			11.5										0.2	-11.3	75	NAF	
1388R_96	SANDSTONE	9	2000	0.04			73.1	0.93	0.84				9.9			68.6	1.2	-71.9	60	NAF	NAF
1388R_97	SANDSTONE	9.4	1040	0.04			36.5	2.1	1.22				8.7			99.6	1.2	-35.3	30	NAF	NAF
1388R_100	SANDSTONE	7	991	0.37	1800	0.221	6.4						4.1	3.7	5.52		6.8	0.4	0.95	PAF	PAF
1389R_102	SILTSTONE	5.4	399	0.07	490	<0.005	5.6						6.4				0.1	-5.5	73	NAF	NAF
1389R_103	SILTSTONE	7.9	889	0.09	770	0.034	6.8	3.64	0.16				6.4			13.1	1.0	-5.8	6.5	NAF	NAF
1389R_104/105/106	COAL, undifferentiated	8.7	317	0.1			10.4	5.8	0.14				6.2			11.4	3.1	-7.3	3.4	NAF	NAF
1389R_107	SANDSTONE	7.3	1040	0.38	1660	0.244	5						4.1	3.6	6.27		7.5	2.5	0.67	PAF	PAF
1397D_134	CLAY	8.8	939	<0.01			23.1	0.21	0.15							12.2	0.2	-22.9	151	NAF	
1397D_135	CLAY	7.2	860	<0.01			4.3										0.2	-4.1	28	NAF	
1397D_136	SAND	7.7	1960	<0.01			3.4										0.2	-3.2	22	NAF	
1397D_137	CLAY	8.1	1580	0.01			13.5										0.3	-13.2	44	NAF	
1397D_138	SILTSTONE	7.1	744	0.08	760	0.053	2.5						3.8	3.9	0.99		1.6	-0.9	1.5	NAF	NAF
1397D_139	SANDSTONE	7.1	372	0.04			2.4						4.8				1.2	-1.2	2.0	NAF	NAF
1397D_140	SANDSTONE	8	246	0.01			0.8						6.4				0.3	-0.5	2.6	NAF	NAF
1397D_141	SANDSTONE	8.3	183	<0.01			1										0.2	-0.8	6.5	NAF	
1397D_146	SILTSTONE	8.4	198	0.04			4.3						6.6				1.2	-3.1	3.5	NAF	NAF
1402C_151	SOIL	6.5	26	<0.01			1.6										0.2	-1.4	10	NAF	
1402C_152	CLAY	6.9	91	<0.01			5	0.02	<0.02				6.6			0.8	0.2	-4.8	33	NAF	NAF
1402C_153	SILTSTONE	9.2	1140	0.04			191	2.26	2.21				9			180.4	1.2	-189.8	156	NAF	NAF
1403D_159	SAND	4.8	1560	0.03			6.2						6.4				0.9	-5.3	6.8	NAF	NAF
1403D_160	CLAY	5	3010	0.01			4.6										0.3	-4.3	15	NAF	
1403D_161	CLAY	5.5	1500	0.01			23.7										0.3	-23.4	77	NAF	
1403D_162	CLAYSTONE	7.1	1610	0.06	460	0.026	4.3	2.04	0.11				6.3			9.0	0.8	-3.5	5.4	NAF	NAF
1403D_163	SILTSTONE	7.5	261	0.02			3.7										0.6	-3.1	6.0	NAF	
1403D_164	PEBBLE CONGLOMERATE	7.7	171	<0.01			<0.5										0.2	-0.1	1.6	NAF	
1403D_165	SANDSTONE	6.5	583	0.05			0.8	1.22	0.15				6.8			12.2	1.5	0.7	0.5	NAF	NAF
1412C_166	LATERITE	6.1	3690	0.02			9.6										0.6	-9.0	16	NAF	
1412C_167	SILTSTONE	8.4	4880	0.03			39.1	0.59	0.35							28.6	0.9	-38.2	43	NAF	
1412C_168	SANDSTONE	8.5	3760	0.03			33.3						9.4				0.9	-32.4	36	NAF	NAF
1412C_169	SANDSTONE	7.5	1580	0.09	1250	0.057	4.6	1.72	0.1				6.3			8.2	1.7	-2.9	2.6	NAF	NAF
1412C_170	SILTSTONE	7.5	154	0.02			2.4										0.6	-1.8	3.9	NAF	
1412C_171	CARBONACEOUS MUDSTONE	4.9	989	0.19	2010	0.051	5						4.4	5.8	-0.19		1.6	-3.4	3.2	NAF	NAF
1412C_173	SANDSTONE	5.3	568	0.11	920	0.064	1	5.18	0.39				5.3			31.8	2.0	1.0	0.5	NAF	NAF
1414X_175	CLAY	8	1380	0.01			37.8										0.3	-37.5	124	NAF	
1414X_176	CONGLOMERATE	7.8	2030	<0.01			6	0.08	0.04							3.3	0.2	-5.8	39	NAF	
1414X_177	SILTSTONE	7	3750	0.02			5.1										0.6	-4.5	8.3	NAF	
1414X_178	CARBONACEOUS MUDSTONE	6.3	3970	0.08			7.7	4.14	0.25				8.4			20.4	2.4	-5.3	3.1	NAF	NAF
1429R_190	SOIL	6.8	2570	0.02			9.3										0.6	-8.7	15	NAF	
1429R_191	MUDSTONE	9.2	2240	0.01			14.2	0.19	0.02							1.6	0.3	-13.9	46	NAF	
1429R_192	CARBONACEOUS SHALE	7.1	4340	0.96	4300	0.404	19.4			3.3	11.8	35					12.4	-7.0	1.6	UC	UC(PAF)
1429R_193	MUDSTONE	8.8	1620	0.05			39.7	2.14	0.65				9.5			53.1	1.5	-38.2	26	NAF	NAF
1429R_194	COAL, undifferentiated	8.6	1320	0.16	790	0.056	26.9						5.7				1.7	-25.2	16	NAF	NAF
1429R_195	SANDSTONE	9.2	408	0.04			24.7	1.07	0.32				9.6			26.1	1.2	-23.5	20	NAF	NAF
1429R_196	COAL, undifferentiated	8	336	0.75	520	0.359	9.8			3.8	7.5	42.8					11.0	1.2	0.9	PAF	UC(PAF - high TOC)
1434D_205	SOIL	7	193	<0.01			3.7	0.26	0.04				6.7			3.3	0.2	-3.5	24	NAF	NAF
1434D_206	CLAYSTONE	4.8	1780	0.03			2.4										0.9	-1.5	2.6	NAF	
1434D_207	SANDSTONE	6.6	558	<0.01			2.6										0.2	-2.4	17	NAF	
1434D_208	SILTSTONE	9.6	521	0.03			11.8	0.34	0.18							14.7	0.9	-10.9	13	NAF	
1434D_209	SANDSTONE	9.8	574	0.04			<0.5						9.8				1.2	1.0	0.2	NAF	NAF

Notes: [1] CRS - Chromium Reducible Sulphur; [2] Calculated from ext boil solution composition

Client Sample ID	Lithology	Paste pH	Paste EC	Total S	SO_4	CRS[1]	ANC	Total C	TIC	NAGpH	NAGpH4.5	NAGpH7	NAGpH	pH -2 (ext)	NAG Acidity[2]	CarbNP	MPA	NAPP	NPR	Class (NPR)	Combined AMIRA & X-boil NAG classification
		pH Unit	µS/cm	%	mg/kg	%	kgH_2SO_4/t	%	%	pH Unit	kgH_2SO_4/t	kgH_2SO_4/t	pH unit	pH unit	kgH_2SO_4/t	kgH2SO4/t				Price, 1997	
		0.1	1	0.01	100	0.005	0.5	0.02	0.02	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	ANC/MPA	ANC/MPA	
1434D_210	SILTSTONE	9.4	601	0.04			21.2	2.56	0.93				8.8			75.9	1.2	-20	17	NAF	NAF
1434D_211	SANDSTONE	7.9	178	0.16	430	0.16	1						2.9	3.22	6.46		4.9	3.9	0.2	PAF	PAF
1434D_212	CARBONACEOUS SANDSTONE	8.1	267	0.07			7	4.58	1.04							84.9	2.1	-4.9	3.3	NAF	
1434D_213	CARBONACEOUS SANDSTONE	8.7	285	0.06			8.9						6.6				1.8	-7.1	4.8	NAF	NAF
1444D_227	SANDSTONE	8	139	0.01			1.4										0.3	-1.1	4.6	NAF	
1444D_228	CARBONACEOUS SHALE	8	622	0.18	820	0.058	8.9	8.15	0.16				4.2	7	-1.93	13.1	1.8	-7.1	5.0	NAF	NAF
1444D_229	SILTSTONE	8.3	142	0.02			3.7										0.6	-3.1	6.0	NAF	
1445D_233	CARBONACEOUS SANDSTONE	8.2	1640	0.35	2180	0.188	26.3	7.88	0.59				4.2	7.7	-5.19	48.2	5.8	-20.5	4.6	NAF	NAF
1445D_234	SILTSTONE	9.9	1740	0.04			30.8										1.2	-29.6	25	NAF	
1445D_235	CARBONACEOUS SHALE	9.1	800	0.74	690	0.184	28.2	28.6	0.71	4.7	<0.1	12.5				58.0	5.6	-22.6	5.0	NAF	NAF(2)
1445D_237	CARBONACEOUS SANDSTONE	9	193	0.02			2.4						6.7				0.6	-1.8	3.9	NAF	NAF
1445D_238	SANDSTONE	8	321	<0.01			4.6	0.3	<0.02				6.1			0.8	0.2	-4.4	30	NAF	NAF
1445D_239	CARBONACEOUS SANDSTONE	9.2	456	0.11	540	0.074	8.9						6.6				2.3	-6.6	3.9	NAF	NAF
1445D_240	CARBONACEOUS SANDSTONE	9.1	204	0.05			11.4						7.2				1.5	-9.9	7.5	NAF	NAF
1445D_241	SILTSTONE	8.6	202	0.06			8.3	5.38	0.36				6.8			29.4	1.8	-6.5	4.5	NAF	NAF
1451D_264	CLAY	6	2510	<0.01			3.7										0.2	-3.5	24	NAF	
1451D_265	SILTSTONE	7.8	358	0.03			3.4										0.9	-2.5	3.7	NAF	
1451D_266	CARBONACEOUS SANDSTONE	7.4	417	0.06	240	0.016	3.7										0.5	-3.2	7.6	NAF	
1451D_267	SANDSTONE	4	1120	0.24	2790		4.3	2.29	0.3				3.2	3.5	5.04	24.5	7.3	3.0	0.6	PAF	PAF
1452D_268	CLAY	4.7	1840	0.01			3.4										0.3	-3.1	11	NAF	
1452D_269	CLAYSTONE	6.8	443	0.02			8.9										0.6	-8.3	15	NAF	
1452D_270	SILTSTONE	9.4	829	0.02			14.7	0.89	<0.02							0.8	0.6	-14.1	24	NAF	
1452D_271	SANDSTONE	7.6	638	0.04			36.5						8.8				1.2	-35.3	30	NAF	NAF
1452D_272	SILTSTONE	9.3	413	0.04			30.1	2.02	0.71				9.6			58.0	1.2	-28.9	25	NAF	NAF
1452D_273	MUDSTONE	9.8	752	0.08			14.2										2.4	-11.8	5.8	NAF	
1452D_274	SANDSTONE	5.4	437	0.07	350	0.067	0.7	0.89	0.14				3.7	6.9	1.11	11.4	2.1	1.4	0.3	NAF	NAF
1453D_275	SOIL	7.7	1900	0.01			18.6										0.3	-18.3	61	NAF	
1453D_276	CLAYSTONE	7.4	2650	0.01			5										0.3	-4.7	16	NAF	
1453D_277	SANDSTONE	9.6	2110	0.03			62.2	1.65	1.18							96.3	0.9	-61.3	68	NAF	
1453D_278	CARBONACEOUS MUDSTONE	9.4	1590	0.35	300	0.024	16.4						5				0.7	-15.7	22	NAF	NAF
1453D_279	CARBONACEOUS SANDSTONE	9.6	868	0.02			65.4	0.67	0.67							54.7	0.6	-64.8	107	NAF	
1453D_280	SANDSTONE	9.6	1170	0.03			52.6										0.9	-51.7	57	NAF	
1453D_281	SILTSTONE	8.7	207	0.01			1.6										0.3	-1.3	5.2	NAF	
1453D_282	SANDSTONE	9	161	0.04			8.9	2.97	0.13				6.8			10.6	1.2	-7.7	7.3	NAF	NAF
1454D_284	SILTSTONE	9.5	930	0.03			12.2										0.9	-11.3	13	NAF	
1454D_285	SILTSTONE	9.8	1020	0.03			39.7	1.69	0.78							63.7	0.9	-38.8	43	NAF	
1454D_286	SANDSTONE	8.9	777	0.22	260	0.02	8.9						5.5				0.6	-8.3	15	NAF	NAF
1454D_288	SILTSTONE	7.4	729	0.17	840	0.074	10.2	8.64	<0.02				4.2	4.3	-2.56	0.8	2.3	-7.9	4.5	NAF	NAF
1454D_289	CARBONACEOUS SHALE	8.8	305	0.08			8.9						6.2				2.4	-6.5	3.6	NAF	NAF
1454D_290	MUDSTONE	8.5	207	0.07	260	0.016	4.1	6.13	<0.02				6.6			0.8	0.5	-3.6	8.4	NAF	NAF
1398X_1	SOIL	6.8	56	<0.01			3.2										0.2	-3.0	21	NAF	
1398X_2	SAND	6.9	107	<0.01			1										0.2	-0.8	6.5	NAF	
1398X_9	SAND	6.6	498	<0.01			1										0.2	-0.8	6.5	NAF	
1398X_14	SAND	7.1	1350	<0.01			0.5										0.2	-0.3	3.3	NAF	
1398X_19	CLAY	6.8	1670	<0.01			<0.5										0.2	-0.1	1.6	NAF	
1398X_22	SAND	6.9	2280	<0.01			<0.5										0.2	-0.1	1.6	NAF	
1398X_28	SAND	5.7	1120	0.26	1340	0.138	1.2			2.7	7.8	11.7					4.2	3.0	0.3	PAF	PAF
1398X_5032	SANDSTONE	6.7	540	0.11	320	0.048	2.3										1.5	-0.8	1.6	NAF	
1398X_33	SANDSTONE	5.1	1380	0.18	1060	0.1	1						3.5	5	0.97		3.1	2.1	0.3	PAF	PAF
1398X_34	COAL, undifferentiated	5.7	1460	0.14	1080	<0.005	1.3			2.8	6.6	11.4					0.1	-1.2	17	NAF	NAF(1)-Barren

Notes: [1] CRS - Chromium Reducible Sulphur; [2] Calculated from ext boil solution composition

Client Sample ID	Lithology	Paste pH	Paste EC	Total S	SO_4	CRS[1]	ANC	Total C	TIC	NAGpH	NAGpH4.5	NAGpH7	NAGpH	pH -2 (ext)	NAG Acidity[2]	CarbNP	MPA	NAPP	NPR	Class (NPR)	Combined AMIRA & X-boil NAG classification
		pH Unit	µS/cm	%	mg/kg	%	kgH_2SO_4/t	%	%	pH Unit	kgH_2SO_4/t	kgH_2SO_4/t	pH unit	pH unit	kgH_2SO_4/t	kgH2SO4/t				Price, 1997	
		0.1	1	0.01	100	0.005	0.5	0.02	0.02	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	ANC/MPA	ANC/MPA	
1399X_2	SOIL	6.7	165	<0.01			1.7										0.2	-1.5	11	NAF	
1399X_6	SAND	8.5	1060	<0.01			9.9										0.2	-9.7	65	NAF	
1399X_11	SAND	7.5	892	<0.01			2.7										0.2	-2.5	18	NAF	
1399X_19	SAND	7.6	692	<0.01			1.5										0.2	-1.3	9.8	NAF	
1399X_24	SAND	8.1	425	<0.01			1.4										0.2	-1.2	9.2	NAF	
1399X_31	CLAY	7.6	2080	0.02			2.6										0.6	-2.0	4.2	NAF	
1399X_32	CLAY	7.5	1970	<0.01			2										0.2	-1.8	13	NAF	
1399X_34	SANDSTONE	6.9	866	0.05			3.2										1.5	-1.7	2.1	NAF	
1399X_35	SANDSTONE	4.4	1590	0.11	1900	<0.005	<0.5			2.7	4.4	9.8					0.1	-0.2	3.3	NAF	NAF(1)-Barren
1399X_36	SANDSTONE	4.7	1080	0.12	1820	<0.005	<0.5			2.7	5.6	10.6					0.1	-0.2	3.3	NAF	NAF(1)-Barren
1400X_2	SOIL	7.8	1570	0.03			4.5						7.9	7.8	-1.95		0.9	-3.6	4.9	NAF	NAF
1400X_7	SAND	6.5	1080	<0.01			1										0.2	-0.8	6.5	NAF	
1400X_11	SAND	7.4	1120	<0.01			2.9										0.2	-2.7	19	NAF	
1400X_25	CLAY	6	3150	0.7	1220		1										21.4	20.4	0.05	PAF	
1400X_26	COALY SHALE	6	2480	0.61	980	0.154	2.4	10.4	0.54				2.9	3.4	10.82	44	4.7	2.3	0.5	PAF	PAF
1401X_2	SOIL	6.5	96	<0.01			<0.5										0.2	-0.1	1.6	NAF	
1401X_3	SOIL	6.8	58	<0.01			1										0.2	-0.8	6.5	NAF	
1401X_15	SAND	7.3	502	<0.01			0.8										0.2	-0.6	5.2	NAF	
1401X_27	SANDSTONE	4.5	726	0.19	1900	0.028	0.8			3.4	1.5	4.7					0.9	0.1	0.9	NAF	NAF(1)-Barren
1401X_28	SANDSTONE	3.4	1600	2.36	8800	1.78	<0.5			3	51.8	64.8					54.5	54.2	0.005	PAF	UC(PAF - high TOC)
1404C_2	CLAY	6	1890	<0.01			2.9										0.2	-2.7	19	NAF	
1404C_4	SANDSTONE	6.1	1020	0.01			2										0.3	-1.7	6.5	NAF	
1404C_8	SILTSTONE	6.5	3510	0.03			2.6										0.9	-1.7	2.8	NAF	
1404C_11	SILTSTONE	6.5	28	0.03			3.6										0.9	-2.7	3.9	NAF	
1404C_18	SILTSTONE	6.5	3280	0.02			2.9			6.1	<0.1	1					0.6	-2.3	4.7	NAF	NAF(1)-Barren
1404C_19	SILTSTONE	6.4	3140	0.02			2.9										0.6	-2.3	4.7	NAF	
1404C_20	SILTSTONE	6.3	3640	0.02			2										0.6	-1.4	3.3	NAF	
1404C_22	SILTSTONE	6.6	3030	0.02			2										0.6	-1.4	3.3	NAF	
1404C_24	SILTSTONE	5.9	4730	0.32	2060	0.057	4.2			4.4	<0.1	7.1					1.7	-2.5	2.4	NAF	NAF(1)-Barren
1405C_1	CLAY	8	590	0.03			9.4			7.4	<0.1	<0.1					0.9	-8.5	10.2	NAF	NAF(1)
1405C_6	SILTSTONE	4.5	1210	0.03			3.6										0.9	-2.7	3.9	NAF	
1405C_19	SANDSTONE	8.3	1110	0.04			35.9										1.2	-34.7	29	NAF	
1405C_20	SANDSTONE	8.3	1030	0.03			27.2										0.9	-26.3	30	NAF	
1405C_21	SANDSTONE	8.2	1400	0.04			36.5										1.2	-35.3	30	NAF	
1405C_22	SANDSTONE	8.2	1320	0.04			59.4										1.2	-58.2	49	NAF	
1405C_25	SANDSTONE	8.4	1210	0.04			81										1.2	-79.8	66	NAF	
1405C_26	SANDSTONE	8.6	872	0.03			168										0.9	-167.1	183	NAF	
1405C_28	SANDSTONE	8.8	510	0.03			41.4										0.9	-40.5	45	NAF	
1405C_30	SANDSTONE	8.6	693	0.03			59.4										0.9	-58.5	65	NAF	
1405C_31	SANDSTONE	8.3	1030	0.03			45.8										0.9	-44.9	50	NAF	
1405C_32	SANDSTONE	8.4	1020	0.05			41.4			8.7	<0.1	<0.1					1.5	-39.9	27	NAF	NAF(1)
1405C_33	SANDSTONE	8.3	1020	0.03			30.9										0.9	-30.0	34	NAF	
1405C_36	SANDSTONE	8.6	770	0.03			41.4										0.9	-40.5	45	NAF	
1405C_40	SANDSTONE	8.4	1010	0.04			33.4										1.2	-32.2	27	NAF	
1405C_42	SANDSTONE	8.7	557	0.03			26.6										0.9	-25.7	29	NAF	
1405C_43	SANDSTONE	8.6	601	0.04			56.9										1.2	-55.7	46	NAF	
1405C_44	SANDSTONE	8.5	790	0.04			24.7										1.2	-23.5	20	NAF	
1405C_48	SANDSTONE	8.5	723	0.04			50.7										1.2	-49.5	41	NAF	
1405C_49	SANDSTONE	8.7	74	0.03			35.2										0.9	-34.3	38	NAF	
1405C_50	SANDSTONE	8.6	778	0.05			24.1			8.7	<0.1	<0.1					1.5	-22.6	16	NAF	NAF(1)

Notes: [1] CRS - Chromium Reducible Sulphur; [2] Calculated from ext boil solution composition

Client Sample ID	Lithology	Paste pH	Paste EC	Total S	SO_4	CRS[1]	ANC	Total C	TIC	NAGpH	NAGpH4.5	NAGpH7	NAGpH	pH -2 (ext)	NAG Acidity[2]	CarbNP	MPA	NAPP	NPR	Class (NPR)	Combined AMIRA & X-boil NAG classification
		pH Unit	µS/cm	%	mg/kg	%	kgH_2SO_4/t	%	%	pH Unit	kgH_2SO_4/t	kgH_2SO_4/t	pH unit	pH unit	kgH_2SO_4/t	kgH_2SO_4/t				Price, 1997	
		0.1	1	0.01	100	0.005	0.5	0.02	0.02	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	ANC/MPA	ANC/MPA	
1405C_51	SANDSTONE	8.6	772	0.04			23.5										1.2	-22.3	19	NAF	
1405C_52	SANDSTONE	6.4	634	0.04			29.1										1.2	-27.9	24	NAF	
1405C_53	SANDSTONE	8.6	522	0.03			32.8										0.9	-31.9	36	NAF	
1405C_54	SANDSTONE	8.4	741	0.06			216			8.7	<0.1	<0.1					1.8	-214.2	118	NAF	NAF(1)
1407C_78603	SAND	6.9	823	<0.01			1.5										0.2	-1.3	9.8	NAF	
1407C_78606	SILTSTONE	6.8	438	<0.01			1.7										0.2	-1.5	11	NAF	
1407C_78610	SILTSTONE	6.7	450	<0.01			1.7										0.2	-1.5	11	NAF	
1407C_78611	SILTSTONE	7	233	0.01			4.2										0.3	-3.9	14	NAF	
1407C_78612	CLAY	6.9	290	<0.01			2.9										0.2	-2.7	19	NAF	
1407C_78614	CLAY	7.1	312	<0.01			4										0.2	-3.8	26	NAF	
1407C_78616	CLAY	7.2	272	<0.01			2.9										0.2	-2.7	19	NAF	
1407C_78619	CLAY	7.1	310	0.01			2.8										0.3	-2.5	9.2	NAF	
1407C_78621	CLAY	7.4	355	<0.01			3.6										0.2	-3.4	24	NAF	
1407C_78624	SILTSTONE	7.8	100	<0.01			3.3										0.2	-3.1	22	NAF	
1407C_78627	SILTSTONE	6.1	396	0.02			1.9										0.6	-1.3	3.1	NAF	
1407C_78628	SILTSTONE	3.9	684	0.15	2510	0.054	<0.5			3.4	1.9	5.6					1.7	1.4	0.2	NAF	NAF(1)-Barren
1407C_78630	SANDSTONE	7.7	163	<0.01			2.9										0.2	-2.7	19	NAF	
1407C_78631	SANDSTONE	7.8	81	0.02			3.6			6.3	<0.1	0.2					0.6	-3.0	5.9	NAF	NAF(1)-Barren
1407C_78632	SANDSTONE	7.7	98	<0.01			<0.5										0.2	-0.1	1.6	NAF	
1407C_78633	SANDSTONE	7.5	150	0.02			1.2										0.6	-0.6	2.0	NAF	
1408C_78650	SAND	6.4	561	0.02			3.6			5.9	<0.1	4					0.6	-3.0	5.9	NAF	NAF(1)-Barren
1408C_78704	SILTSTONE	6	418	<0.01			4.9										0.2	-4.7	32	NAF	
1408C_78708	SILTSTONE	5.9	440	<0.01			5.6										0.2	-5.4	37	NAF	
1408C_78712	CLAY	7	269	<0.01			1										0.2	-0.8	6.5	NAF	
1408C_78715	CLAY	6.7	620	0.03			4										0.9	-3.1	4.4	NAF	
1408C_78717	CLAY	7.2	436	<0.01			4.9										0.2	-4.7	32.03	NAF	
1408C_78720	SILTSTONE	7.6	108	<0.01			0.8										0.2	-0.6	5.2	NAF	
1408C_78725	SILTSTONE	4.5	729	0.11	1640		<0.5										3.4	3.1	0.1	PAF	
1408C_78726	SANDSTONE	6.1	176	0.07			1			3.9	1.1	2.1					2.1	1.1	0.5	NAF	NAF(1)-Barren
1408C_78727	SANDSTONE	6.6	221	0.02			1.4										0.6	-0.8	2.3	NAF	
1408C_78728	SANDSTONE	6.8	157	0.02			1.2										0.6	-0.6	2.0	NAF	
1408C_78730	SANDSTONE	6.7	109	<0.01			1.7										0.2	-1.5	11	NAF	
1409C_5	SANDSTONE	6	72	<0.01			1.2										0.2	-1.0	7.8	NAF	
1409C_11	COAL WEATHERED	5.9	79	<0.01			2.6										0.2	-2.4	17	NAF	
1409C_12	COAL WEATHERED	6.1	49	<0.01			1										0.2	-0.8	6.5	NAF	
1409C_13	COAL WEATHERED	5.8	131	0.01			6.8						8.1	8	-3.32		0.3	-6.5	22	NAF	NAF
1409C_14	COAL, undifferentiated	5.7	194	0.01			6.9										0.3	-6.6	23	NAF	
1409C_17	SANDSTONE	8.4	532	0.02			13.8										0.6	-13.2	23	NAF	
1409C_19	SANDSTONE	8.2	584	0.02			40.2										0.6	-39.6	66	NAF	
1409C_22	SANDSTONE	8.1	575	0.02			38.3										0.6	-37.7	63	NAF	
1409C_23	SANDSTONE	8.4	608	0.03			42.7			8.3	<0.1	<0.1					0.9	-41.8	47	NAF	NAF(1)
1409C_24	SANDSTONE	8.2	404	0.02			26										0.6	-25.4	42	NAF	
1409C_25	MUDSTONE	8.8	395	0.02			50.7	1.17	0.55							44.9	0.6	-50.1	83	NAF	
1409C_26	CARBONACEOUS MUDSTONE	8.1	1180	0.57	860	0.641	24.7						6.8	7.8	-3.56		19.6	-5.1	1.3	UC	NAF
1409C_27	CARBONACEOUS MUDSTONE	7.9	676	0.17	510	0.112	28.4	9.51	0.02							1.6	3.4	-25.0	8.3	NAF	
1409C_29	SANDSTONE	8.4	594	0.05			53.8			9.5	<0.1	<0.1					1.5	-52.3	35	NAF	NAF(1)
1409C_30	SANDSTONE	8.5	679	0.02			69.9										0.6	-69.3	114	NAF	
1409C_31	SANDSTONE	8.5	639	0.04			56.9										1.2	-55.7	46	NAF	
1409C_32	SANDSTONE	8.7	663	0.06			80.4			9.7	<0.1	<0.1					1.8	-78.6	44	NAF	NAF(1)
1409C_33	SANDSTONE	9	350	0.04			64.9			9.2	<0.1	<0.1					1.2	-63.7	53	NAF	NAF(1)

Notes: [1] CRS - Chromium Reducible Sulphur; [2] Calculated from ext boil solution composition

Client Sample ID	Lithology	Paste pH	Paste EC	Total S	SO_4	CRS[1]	ANC	Total C	TIC	NAGpH	NAGpH4.5	NAGpH7	NAGpH	pH -2 (ext)	NAG Acidity[2]	CarbNP	MPA	NAPP	NPR	Class (NPR)	Combined AMIRA & X-boil NAG classification
		pH Unit	µS/cm	%	mg/kg	%	kgH_2SO_4/t	%	%	pH Unit	kgH_2SO_4/t	kgH_2SO_4/t	pH unit	pH unit	kgH_2SO_4/t	kgH2SO4/t				Price, 1997	
		0.1	1	0.01	100	0.005	0.5	0.02	0.02	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	ANC/MPA	ANC/MPA	
1409C_34	SILTSTONE	8.7	522	0.05			90.7	2.58	1.39							113.5	1.5	-89.2	59	NAF	
1410C_1	SAND	7.2	144	<0.01			2.3										0.2	-2.1	15	NAF	
1410C_2	LATERITE	8.3	172	<0.01			3.6										0.2	-3.4	24	NAF	
1410C_3	SANDSTONE	6	216	0.02			3.2										0.6	-2.6	5.2	NAF	
1410C_8	SANDSTONE	5.4	961	0.02			1.4										0.6	-0.8	2.3	NAF	
1410C_13	SANDSTONE	5.8	988	0.02			7.4										0.6	-6.8	12	NAF	
1410C_17	SILTSTONE	6.4	769	<0.01			10.4										0.2	-10.2	68	NAF	
1410C_22	MUDSTONE	7	56	0.03			10.9						6.8	7.1	0.26		0.9	-10.0	12	NAF	NAF
1410C_28	COAL, undifferentiated	3.1	1250	0.85	5400	1.15	4.2						1.9	2.2	-1.67		35.2	31.0	0.1	PAF	PAF
1410C_29	COAL, undifferentiated	5.8	842	0.19	1360	0.1	12.6	23.6	1.31							106.9	3.1	-9.5	4.1	NAF	
1410C_30	COAL, undifferentiated	6.8	490	0.25	580	0.08	11.3										2.4	-8.9	4.6	NAF	
1410C_31	COAL, undifferentiated	5.5	526	0.38	1120	0.063	7.7						3.5	5.3	60.36		1.9	-5.8	4.0	NAF	NAF
1410C_35	SILTSTONE	8.4	556	0.02			38.3										0.6	-37.7	63	NAF	
1410C_40	SANDSTONE	9.1	252	0.02			71.1										0.6	-70.5	116	NAF	
1410C_46	SANDSTONE	9	369	0.01			170										0.3	-169.7	556	NAF	
1410C_47	SANDSTONE	8.8	378	0.02			60										0.6	-59.4	98	NAF	
1410C_48	SANDSTONE	9.1	342	0.01			167										0.3	-166.7	546	NAF	
1410C_49	SANDSTONE	8.9	307	0.02			28.2										0.6	-27.6	46	NAF	
1410C_50	SANDSTONE	9.1	522	0.02			30.7										0.6	-30.1	50	NAF	
1410C_51	SANDSTONE	9	357	0.02			119	2.11	1.93	10.2	<0.1	<0.1				157.5	0.6	-118.4	194	NAF	NAF(1)
1410C_57	SILTSTONE	8.8	415	0.01			110										0.3	-109.7	359	NAF	
1410C_58	SANDSTONE	8.9	369	0.05			47.2	1.06	0.72	9.7	<0.1	<0.1				58.8	1.5	-45.7	31	NAF	NAF(1)
1410C_59	SANDSTONE	8.9	357	0.03			40.5										0.9	-39.6	44	NAF	
1410C_60	SANDSTONE	8.8	545	0.03			42.9										0.9	-42.0	47	NAF	
1410C_65	SANDSTONE	8.6	553	0.02			24.5			9	<0.1	<0.1					0.6	-23.9	40	NAF	NAF(1)
1410C_70	SANDSTONE	8.6	573	0.02			50.3										0.6	-49.7	82	NAF	
1410C_74	SANDSTONE	8.6	631	0.02			35.6										0.6	-35.0	58	NAF	
1410C_78	SANDSTONE	8.7	590	0.03			36.2										0.9	-35.3	39	NAF	
1410C_84	SILTSTONE	8.4	542	0.04			8.3			8	<0.1	<0.1					1.2	-7.1	6.8	NAF	NAF(1)
1412C_1	CLAY	7.7	1700	0.02			6.1										0.6	-5.5	10.0	NAF	
1412C_8	SANDSTONE	9	1140	0.03			27.6										0.9	-26.7	30	NAF	
1412C_17	SANDSTONE	8	1690	0.05			63.8			9	<0.1	<0.1					1.5	-62.3	42	NAF	NAF(1)
1412C_19	SANDSTONE	8.5	1080	0.03			28.2										0.9	-27.3	31	NAF	
1412C_20	SANDSTONE	8.4	2500	0.04			37.4										1.2	-36.2	31	NAF	
1412C_21	SANDSTONE	8.4	2350	0.03			30.7										0.9	-29.8	33	NAF	
1412C_22	SANDSTONE	8.4	2280	0.04			52.1										1.2	-50.9	43	NAF	
1412C_23	SANDSTONE	8.2	1980	0.04			30.7										1.2	-29.5	25	NAF	
1412C_27	SANDSTONE	8.5	2040	0.03			29.4										0.9	-28.5	32	NAF	
1412C_28	SANDSTONE	9.1	1920	0.03			41.7										0.9	-40.8	45	NAF	
1412C_51	SANDSTONE	8.1	360	0.04			3.9										1.2	-2.7	3.2	NAF	
1412C_52	SANDSTONE	8.2	479	0.18	220	0.148	4.8	1.19	0.08	3.8	1	3.2				6.5	4.5	-0.3	1.1	UC	UC(PAF)
1412C_53	SANDSTONE	7.6	325	0.03			2.7										0.9	-1.8	2.9	NAF	
1412C_56	SANDSTONE	7.7	295	0.05			3.7			6.7	<0.1	0.4					1.5	-2.2	2.4	NAF	NAF(1)-Barren
1414X_3	SANDSTONE	6.1	1810	<0.01			4.1										0.2	-3.9	27	NAF	
1414X_8	SANDSTONE	8.5	2420	0.01			13.1										0.3	-12.8	43	NAF	
1414X_14	SANDSTONE	7.9	2700	<0.01			3.9										0.2	-3.7	25	NAF	
1414X_25	SANDSTONE	8.3	2120	<0.01			3.6										0.2	-3.4	24	NAF	
1429R_24	CLAYSTONE	7.5	2520	0.02			7.8										0.6	-7.2	13	NAF	
1429R_26	SILTSTONE	6.6	1670	0.02			6.5										0.6	-5.9	11	NAF	
1429R_31	MUDSTONE	9.3	2060	0.02			40.5										0.6	-39.9	66	NAF	

Notes: [1] CRS - Chromium Reducible Sulphur; [2] Calculated from ext boil solution composition

Client Sample ID	Lithology	Paste pH	Paste EC	Total S	SO_4	CRS[1]	ANC	Total C	TIC	NAGpH	NAGpH4.5	NAGpH7	NAGpH	pH -2 (ext)	NAG Acidity[2]	CarbNP	MPA	NAPP	NPR	Class (NPR)	Combined AMIRA & X-boil NAG classification
		pH Unit	µS/cm	%	mg/kg	%	kgH_2SO_4/t	%	%	pH Unit	kgH_2SO_4/t	kgH_2SO_4/t	pH unit	pH unit	kgH_2SO_4/t	kgH2SO4/t				Price, 1997	
		0.1	1	0.01	100	0.005	0.5	0.02	0.02	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	ANC/MPA	ANC/MPA	
1429R_33	SANDSTONE	9.3	2180	0.03			55.2										0.9	-54.3	60	NAF	
1429R_38	SANDSTONE	9.3	1620	0.04			52.7										1.2	-51.5	43	NAF	
1429R_41	COAL, undifferentiated	7.9	1810	0.24	400	0.06	47.2	24	1.45							118.4	1.8	-45.4	26	NAF	
1429R_42	CLAY	8.2	2040	0.18	250		<0.5										5.5	5.3	0.0	PAF	
1429R_43	CARBONACEOUS SHALE	8.4	2120	0.31	990	0.138	40.9	11.2	0.15				6.1	8.6	5.39	12.2	4.2	-36.7	9.7	NAF	NAF
1429R_44	CARBONACEOUS SHALE	8.3	2150	0.19	390	0.158	19	12.2	0.03				6.3	8.4	-6.76	2.4	4.8	-14.2	3.9	NAF	NAF
1429R_74	SILTSTONE	9.2	420	0.02			36										0.6	-35.4	59	NAF	
1429R_80	SILTSTONE	9.3	901	0.02			40.3										0.6	-39.7	66	NAF	
1429R_83	SILTSTONE	9.3	1040	0.02			43.9										0.6	-43.3	72	NAF	
1429R_84	SILTSTONE	9.3	846	0.02			56.1										0.6	-55.5	92	NAF	
1429R_85	SILTSTONE	9.1	1220	0.02			47										0.6	-46.4	77	NAF	
1429R_88	SILTSTONE	8.9	1330	0.02			40.3										0.6	-39.7	66	NAF	
1429R_92	SILTSTONE	9.2	1090	0.02			164										0.6	-163.4	268	NAF	
1429R_95	SANDSTONE	8.6	1040	0.05			34.8			9.3	<0.1	<0.1					1.5	-33.3	23	NAF	NAF(1)
1429R_98	SANDSTONE	9	1080	0.03			45.2										0.9	-44.3	49	NAF	
1429R_119	SILTSTONE	6.5	1150	0.5	1760	0.407	9.8			3.2	6.3	25					12.5	2.7	0.8	PAF	UC(PAF - high TOC)
1429R_120	SILTSTONE	7.4	782	0.45	960	0.441	5	3.18	0.16	2.9	6.7	15				13.1	13.5	8.5	0.4	PAF	PAF
1429R_121	SILTSTONE	7.4	941	0.18	520	0.118	9.2			3.9	1.2	10					3.6	-5.6	2.5	UC	UC(PAF)
1429R_122	SILTSTONE	8.1	872	0.09			3.1										2.8	-0.3	1.1	NAF	
1429R_129	SANDSTONE	8.4	359	0.02			5.5										0.6	-4.9	9.0	NAF	
1429R_130	SANDSTONE	7.7	545	0.16	310	0.044	6.9						4.8	5.6	-8.37		1.3	-5.6	5.1	NAF	NAF
1429R_131	COAL, undifferentiated	7.4	737	0.11	670	0.026	9.6			6.6	<0.1	0.7					0.8	-8.8	12.1	NAF	NAF(1)
1429R_132	MUDSTONE	8	474	0.06			12.6	4.27	0.09	6.7	<0.1	0.3				7.3	1.8	-10.8	6.9	NAF	NAF(1)
1429R_133	MUDSTONE	7.8	626	0.05			11.2			6.8	<0.1	0.2					1.5	-9.7	7.3	NAF	NAF(1)
1429R_139	COAL, undifferentiated	6.7	622	0.44	670	0.152	9	42.7	0.73				4	5.6	-1.42	59.6	4.7	-4.3	1.9	UC	NAF
1429R_140	COAL, undifferentiated	6.8	244	0.72	530	0.403	7.5						2.6	4.8	4.74		12.3	4.8	0.6	PAF	PAF
1429R_141	COAL, undifferentiated	7.9	2140	0.18	460	0.108	40.3	17.7	0.68	5.8	<0.1	2.2				55.5	3.3	-37.0	12	NAF	NAF(2)
1429R_142	COAL, undifferentiated	5	535	0.51	1200	0.433	3.9						2.6	3	13.96		13.2	9.3	0.3	PAF	PAF
1429R_143	COAL, undifferentiated	7.4	285	0.1			4			4.6	<0.1	3.8					3.1	-0.9	1.3	UC	NAF(1)-Barren
1447L_34	SAND	7	32	<0.01			1										0.2	-0.8	6.5	NAF	
1447L_37	CLAY	6.2	1060	<0.01			4.5										0.2	-4.3	29	NAF	
1447L_39	CLAY	6.5	1240	<0.01			4.8										0.2	-4.6	31	NAF	
1447L_41	CLAY	6.6	1370	<0.01			5.6										0.2	-5.4	37	NAF	
1447L_43	CLAY	6.8	1120	<0.01			4.4										0.2	-4.2	29	NAF	
1447L_46	SILCRETE	6.8	518	0.03			3.4			5.7	<0.1	3					0.9	-2.5	3.7	NAF	NAF(1)-Barren
1447L_47	SILCRETE	6.4	979	0.04			3.5			5.5	<0.1	2.6					1.2	-2.3	2.9	NAF	NAF(1)-Barren
1447L_50	SILCRETE	6.5	999	0.01			8.6										0.3	-8.3	28	NAF	
1447L_52	SILCRETE	6.4	860	0.01			3.9										0.3	-3.6	13	NAF	
1447L_54	SANDSTONE	6.4	743	0.01			1.9										0.3	-1.6	6.2	NAF	
1447L_60	CLAY	6.5	2000	0.03			5.2										0.9	-4.3	5.7	NAF	
1447L_63	CLAY	8.3	1350	0.06			11.9			7.5	<0.1	<0.1					1.8	-10.1	6.5	NAF	NAF(1)
1447L_66	CLAY	8.1	1030	0.03			9.2										0.9	-8.3	10	NAF	
1447L_70	CLAY	8.1	1260	0.07			6.4			6.9	<0.1	<0.1					2.1	-4.3	3.0	NAF	NAF(1)
1447L_77	CLAY	7.9	736	0.05			11.4										1.5	-9.9	7.5	NAF	
Tailings - 250	Tailings - 250	6.4	356	0.59		0.257	6.2										7.9	1.7	0.8	PAF	
Rejects + 250	Rejects + 250	4.1	1950	2.2		2.02	0.5										61.8	61.3	0.01	PAF	
Product + 250	Product + 250	4.8	585	0.27		0.062	3.3										1.9	-1.4	1.7	NAF	

Notes: [1] CRS - Chromium Reducible Sulphur; [2] Calculated from ext boil solution composition

Appendix 4: Acid Buffering Characteristic Curves

Work Order :	EB1101036	Client ID:	URS AUSTRALIA PTY LTD (QLD)

	Sub Matrix			Soil
	Client Sample Identification 1			213_1434D
	Client Sample Identification 2			147.0-148.09
	Sample Date			21/01/2011
Method	Analyte	Units	LOR	
				1 EB1101036

EA046 - A Titration information

HCl Molarity:	**M**	**0.1**
Increments:	**mL**	**0.1**
Weight	**(g)**	**2**
ANC	**kgH2SO4/t**	**8.9**

EA046 -B - Curve information

Addition	mLs added (total)	kg H2SO4/t	pH	Addition	mLs added (total)	kg H2SO4/t	pH
0	0	0	7.14	36	3.6	8.82	2.76
1	0.1	0.245	6.65	37	3.7	9.065	2.74
2	0.2	0.49	5.54	38	3.8	9.31	2.73
3	0.3	0.735	4.83	39	3.9	9.555	2.72
4	0.4	0.98	4.45	40	4	9.8	2.71
5	0.5	1.225	4.15	41	4.1	10.045	2.69
6	0.6	1.47	3.94	42	4.2	10.29	2.68
7	0.7	1.715	3.8	43	4.3	10.535	2.67
8	0.8	1.96	3.67	44	4.4	10.78	2.66
9	0.9	2.205	3.57	45	4.5	11.025	2.66
10	1	2.45	3.49	46	4.6	11.27	2.65
11	1.1	2.695	3.42	47	4.7	11.515	2.65
12	1.2	2.94	3.37	48	4.8	11.76	2.65
13	1.3	3.185	3.28	49	4.9	12.005	2.64
14	1.4	3.43	3.25	50	5	12.25	2.63
15	1.5	3.675	3.2	51	5.1	12.495	2.59
16	1.6	3.92	3.19	52	5.2	12.74	2.57
17	1.7	4.165	3.18	53	5.3	12.985	2.56
18	1.8	4.41	3.11	54	5.4	13.23	2.55
19	1.9	4.655	3.08	55	5.5	13.475	2.53
20	2	4.9	3.08	56	5.6	13.72	2.52
21	2.1	5.145	3.04	57	5.7	13.965	2.48
22	2.2	5.39	3.04	58	5.8	14.21	2.47
23	2.3	5.635	3	59	5.9	14.455	2.46
24	2.4	5.88	2.98				
25	2.5	6.125	2.97				
26	2.6	6.37	2.96				
27	2.7	6.615	2.95				
28	2.8	6.86	2.93				
29	2.9	7.105	2.9				
30	3	7.35	2.89				
31	3.1	7.595	2.86				
32	3.2	7.84	2.85				
33	3.3	8.085	2.84				
34	3.4	8.33	2.83				
35	3.5	8.575	2.79				

Work Order :	EB1101036	Client ID:	URS AUSTRALIA PTY LTD (QLD)

	Sub Matrix			Soil
	Client Sample Identification 1			228_1444D
	Client Sample Identification 2			63.24-63.66
	Sample Date			21/01/2011
Method	Analyte	Units	LOR	
				2 EB1101036

EA046 - A Titration information

HCl Molarity:	**M**	**0.1**
Increments:	**mL**	**0.1**
Weight	**(g)**	**2**
ANC	**kgH2SO4/t**	**8.9**

EA046 -B - Curve information

Addition	mLs added (total)	kg H2SO4/t	pH	Addition	mLs added (total)	kg H2SO4/t	pH
0	0	0	5.88	36	3.6	8.82	2.9
1	0.1	0.245	5.61	37	3.7	9.065	2.9
2	0.2	0.49	5.1	38	3.8	9.31	2.91
3	0.3	0.735	4.66	39	3.9	9.555	2.9
4	0.4	0.98	4.29	40	4	9.8	2.9
5	0.5	1.225	4	41	4.1	10.045	2.89
6	0.6	1.47	4	42	4.2	10.29	2.88
7	0.7	1.715	3.84	43	4.3	10.535	2.88
8	0.8	1.96	3.74	44	4.4	10.78	2.85
9	0.9	2.205	3.56	45	4.5	11.025	2.88
10	1	2.45	3.55	46	4.6	11.27	2.87
11	1.1	2.695	3.53	47	4.7	11.515	2.86
12	1.2	2.94	3.46	48	4.8	11.76	2.86
13	1.3	3.185	3.44	49	4.9	12.005	2.85
14	1.4	3.43	3.37	50	5	12.25	2.83
15	1.5	3.675	3.32	51	5.1	12.495	2.81
16	1.6	3.92	3.27	52	5.2	12.74	2.8
17	1.7	4.165	3.26	53	5.3	12.985	2.8
18	1.8	4.41	3.2	54	5.4	13.23	2.8
19	1.9	4.655	3.18	55	5.5	13.475	2.78
20	2	4.9	3.16	56	5.6	13.72	2.76
21	2.1	5.145	3.11	57	5.7	13.965	2.78
22	2.2	5.39	3.08	58	5.8	14.21	2.75
23	2.3	5.635	3.06	59	5.9	14.455	2.75
24	2.4	5.88	3.06	60	6	14.7	2.76
25	2.5	6.125	3.05	61	6.1	14.945	2.76
26	2.6	6.37	3.03	62	6.2	15.19	2.74
27	2.7	6.615	3.02	63	6.3	15.435	2.75
28	2.8	6.86	3	64	6.4	15.68	2.75
29	2.9	7.105	2.99	65	6.5	15.925	2.73
30	3	7.35	2.98	66	6.6	16.17	2.72
31	3.1	7.595	2.97	67	6.7	16.415	2.71
32	3.2	7.84	2.96	68	6.8	16.66	2.7
33	3.3	8.085	2.95	69	6.9	16.905	2.69
34	3.4	8.33	2.95	70	7	17.15	2.68
35	3.5	8.575	2.91	71	7.1	17.395	2.68

Work Order :	EB1101036	Client ID:	URS AUSTRALIA PTY LTD (QLD)

	Sub Matrix			Soil
	Client Sample Identification 1			228_1444D
	Client Sample Identification 2			46.88-47.96
	Sample Date			21/01/2011
Method	Analyte	Units	LOR	
				2 CONTINUE
				EB1101036

EA046 - A Titration information

HCl Molarity:	**M**	**0.1**
Increments:	**mL**	**0.1**
Weight	**(g)**	**2**
ANC	**kgH2SO4/t**	**8.9**

EA046 -B - Curve information

Addition	mLs added (total)	kg H2SO4/t	pH	Addition	mLs added (total)	kg H2SO4/t	pH
72	7.2	17.64	2.67				
73	7.3	17.885	2.58				
74	7.4	18.13	2.58				
75	7.5	18.375	2.58				
76	7.6	18.62	2.58				
77	7.7	18.865	2.58				
78	7.8	19.11	2.57				
79	7.9	19.355	2.57				
80	8	19.6	2.57				
81	8.1	19.845	2.56				
82	8.2	20.09	2.55				
83	8.3	20.335	2.54				
84	8.4	20.58	2.64				
85	8.5	20.825	2.64				
86	8.6	21.07	2.64				
87	8.7	21.315	2.63				
88	8.8	21.56	2.59				
89	8.9	21.805	2.58				
90	9	22.05	2.58				
91	9.1	22.295	2.58				
92	9.2	22.54	2.58				
93	9.3	22.785	2.58				
94	9.4	23.03	2.58				
95	9.5	23.275	2.58				
96	9.6	23.52	2.58				
97	9.7	23.765	2.57				
98	9.8	24.01	2.55				
99	9.9	24.255	2.52				
100	10	24.5	2.51				
101	10.1	24.745	2.5				
102	10.2	24.99	2.51				
103	10.3	25.235	2.51				
104	10.4	25.48	2.49				
105	10.5	25.725	2.48				
106	10.6	25.97	2.48				

Work Order :	EB1101036	Client ID:	URS AUSTRALIA PTY LTD (QLD)

	Sub Matrix			Soil
	Client Sample Identification 1			267_1451D
	Client Sample Identification 2			63.24-63.66
	Sample Date			21/01/2011
Method	Analyte	Units	LOR	
				13 EB1101036

EA046 - A Titration information

HCl Molarity:	**M**	**0.1**
Increments:	**mL**	**0.1**
Weight	**(g)**	**2**
ANC	**kgH2SO4/t**	**4.3**

EA046 -B - Curve information

Addition	mLs added (total)	kg H2SO4/t	pH	Addition	mLs added (total)	kg H2SO4/t	pH
0	0	0	4.42	36	3.6	8.82	2.61
1	0.1	0.245	3.94	37	3.7	9.065	2.59
2	0.2	0.49	3.7	38	3.8	9.31	2.59
3	0.3	0.735	3.59	39	3.9	9.555	2.61
4	0.4	0.98	3.49	40	4	9.8	2.58
5	0.5	1.225	3.37	41	4.1	10.045	2.59
6	0.6	1.47	3.3	42	4.2	10.29	2.58
7	0.7	1.715	3.26	43	4.3	10.535	2.57
8	0.8	1.96	3.22	44	4.4	10.78	2.59
9	0.9	2.205	3.13	45	4.5	11.025	2.57
10	1	2.45	3.12	46	4.6	11.27	2.56
11	1.1	2.695	3.05	47	4.7	11.515	2.56
12	1.2	2.94	3.01	48	4.8	11.76	2.55
13	1.3	3.185	2.97	49	4.9	12.005	2.55
14	1.4	3.43	2.94	50	5	12.25	2.48
15	1.5	3.675	2.91	51	5.1	12.495	2.47
16	1.6	3.92	2.89	52	5.2	12.74	2.46
17	1.7	4.165	2.86				
18	1.8	4.41	2.84				
19	1.9	4.655	2.82				
20	2	4.9	2.81				
21	2.1	5.145	2.78				
22	2.2	5.39	2.76				
23	2.3	5.635	2.74				
24	2.4	5.88	2.71				
25	2.5	6.125	2.69				
26	2.6	6.37	2.66				
27	2.7	6.615	2.66				
28	2.8	6.86	2.65				
29	2.9	7.105	2.65				
30	3	7.35	2.62				
31	3.1	7.595	2.62				
32	3.2	7.84	2.6				
33	3.3	8.085	2.6				
34	3.4	8.33	2.62				
35	3.5	8.575	2.61				

Work Order :	EB1101036	Client ID:	URS AUSTRALIA PTY LTD (QLD)

	Sub Matrix			Soil
	Client Sample Identification 1			271_1452D
	Client Sample Identification 2			48.11-49.37
	Sample Date			21/01/2011
Method	Analyte	Units	LOR	
				16 EB1101036

EA046 - A Titration information

HCl Molarity:	**M**	**0.1**
Increments:	**mL**	**0.5**
Weight	**(g)**	**2**
ANC	**kgH2SO4/t**	**36.5**

EA046 -B - Curve information

Addition	mLs added (total)	kg H2SO4/t	pH	Addition	mLs added (total)	kg H2SO4/t	pH
0	0	0	9.94				
1	0.5	1.225	8.07				
2	1	2.45	7.04				
3	1.5	3.675	6.67				
4	2	4.9	5.87				
5	2.5	6.125	5.5				
6	3	7.35	5.13				
7	3.5	8.575	4.84				
8	4	9.8	4.34				
9	4.5	11.025	3.89				
10	5	12.25	3.85				
11	5.5	13.475	3.48				
12	6	14.7	3.26				
13	6.5	15.925	3.13				
14	7	17.15	3.03				
15	7.5	18.375	2.97				
16	8	19.6	2.89				
17	8.5	20.825	2.84				
18	9	22.05	2.78				
19	9.5	23.275	2.77				
20	10	24.5	2.76				
21	10.5	25.725	2.75				
22	11	26.95	2.71				
23	11.5	28.175	2.69				
24	12	29.4	2.63				
25	12.5	30.625	2.61				
26	13	31.85	2.6				
27	13.5	33.075	2.58				
28	14	34.3	2.55				
29	14.5	35.525	2.54				
30	15	36.75	2.53				
31	15.5	37.975	2.5				
32	16	39.2	2.49				
33	16.5	40.425	2.47				
34	17	41.65	2.45				

Work Order :	EB1101036	Client ID:	URS AUSTRALIA PTY LTD (QLD)

	Sub Matrix			Soil
	Client Sample Identification 1			277_1453D
	Client Sample Identification 2			50.98-52.2
	Sample Date			21/01/2011
Method	Analyte	Units	LOR	
				20 EB1101036

EA046 - A Titration information

HCl Molarity:	**M**	**0.5**
Increments:	**mL**	**0.2**
Weight	**(g)**	**2**
ANC	**kgH2SO4/t**	**62.2**

EA046 -B - Curve information

Addition	mLs added (total)	kg H2SO4/t	pH	Addition	mLs added (total)	kg H2SO4/t	pH
0	0	0	10.23				
1	0.2	2.45	8.46				
2	0.4	4.9	7.32				
3	0.6	7.35	6.01				
4	0.8	9.8	5.41				
5	1	12.25	4.87				
6	1.2	14.7	4.21				
7	1.4	17.15	3.94				
8	1.6	19.6	3.88				
9	1.8	22.05	3.79				
10	2	24.5	3.69				
11	2.2	26.95	3.5				
12	2.4	29.4	3.39				
13	2.6	31.85	3.23				
14	2.8	34.3	3.1				
15	3	36.75	3.06				
16	3.2	39.2	3.05				
17	3.4	41.65	2.9				
18	3.6	44.1	2.78				
19	3.8	46.55	2.74				
20	4	49	2.64				
21	4.2	51.45	2.55				
22	4.4	53.9	2.53				
23	4.6	56.35	2.46				
24	4.8	58.8	2.44				
25	5	61.25	2.4				

Work Order :	EB1101036	Client ID:	URS AUSTRALIA PTY LTD (QLD)

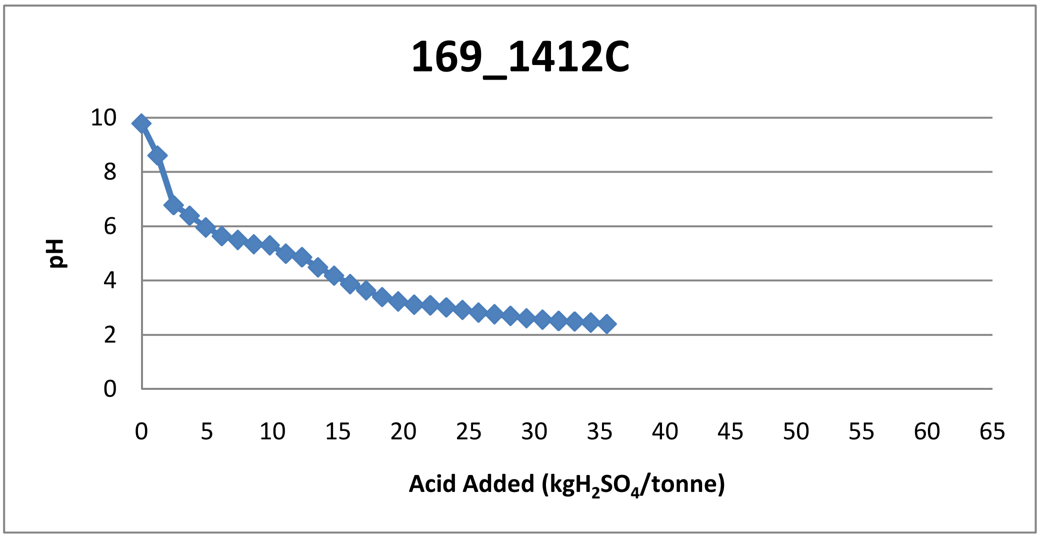
	Sub Matrix			Soil
	Client Sample Identification 1			279_1453D
	Client Sample Identification 2			85.53-86.8
	Sample Date			21/01/2011
Method	Analyte	Units	LOR	22 EB1101036

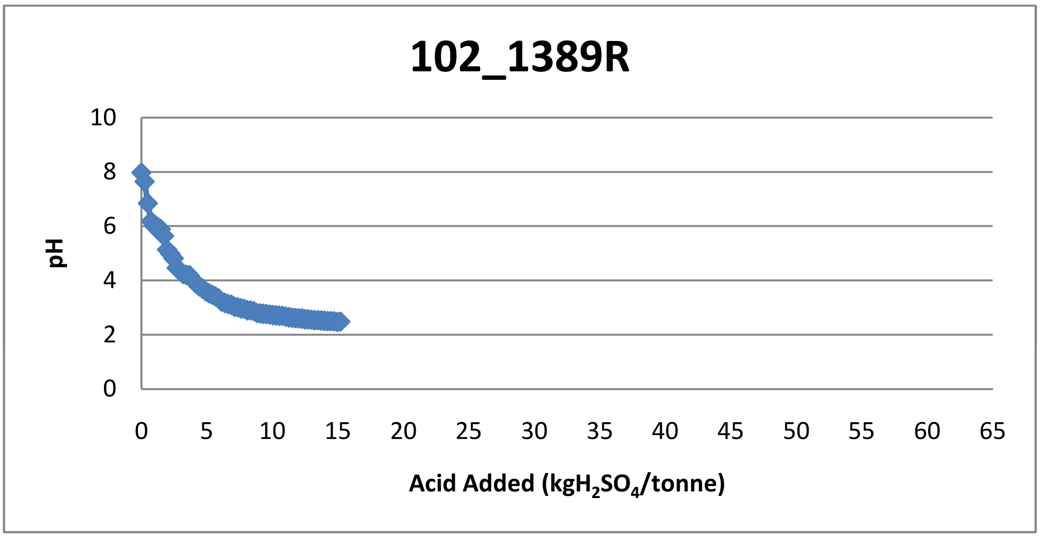
EA046 - A Titration information

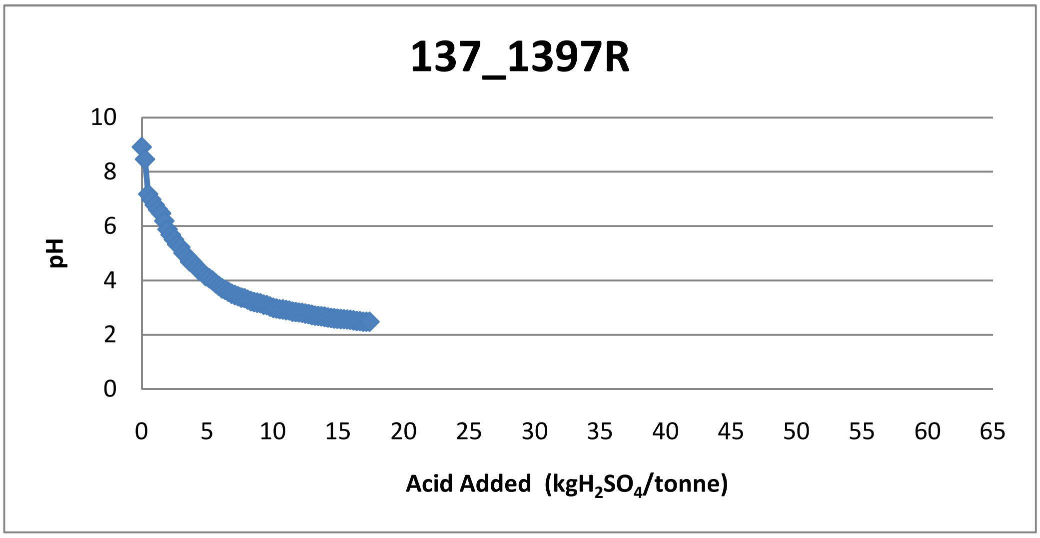
HCl Molarity:	**M**	**0.5**
Increments:	**mL**	**0.2**
Weight	**(g)**	**2**
ANC	**kgH2SO4/t**	**65.4**

EA046 -B - Curve information

Addition	mLs added (total)	kg H2SO4/t	pH	Addition	mLs added (total)	kg H2SO4/t	pH
0	0	0	10				
1	0.2	2.45	6.5				
2	0.4	4.9	5.8				
3	0.6	7.35	5.07				
4	0.8	9.8	4.72				
5	1	12.25	4.38				
6	1.2	14.7	4.36				
7	1.4	17.15	4.19				
8	1.6	19.6	3.7				
9	1.8	22.05	3.6				
10	2	24.5	3.09				
11	2.2	26.95	3.03				
12	2.4	29.4	2.92				
13	2.6	31.85	2.89				
14	2.8	34.3	2.86				
15	3	36.75	2.81				
16	3.2	39.2	2.65				
17	3.4	41.65	2.63				
18	3.6	44.1	2.61				
19	3.8	46.55	2.61				
20	4	49	2.6				
21	4.2	51.45	2.56				
22	4.4	53.9	2.51				
23	4.6	56.35	2.47				
24	4.8	58.8	2.43				
25	5	61.25	2.4				


169_1412C
pH
10
8
6
4
2
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65
Acid Added (kgH2SO4/tonne)


102_1389R
pH
10
8
6
4
2
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65
Acid Added (kgH2SO4/tonne)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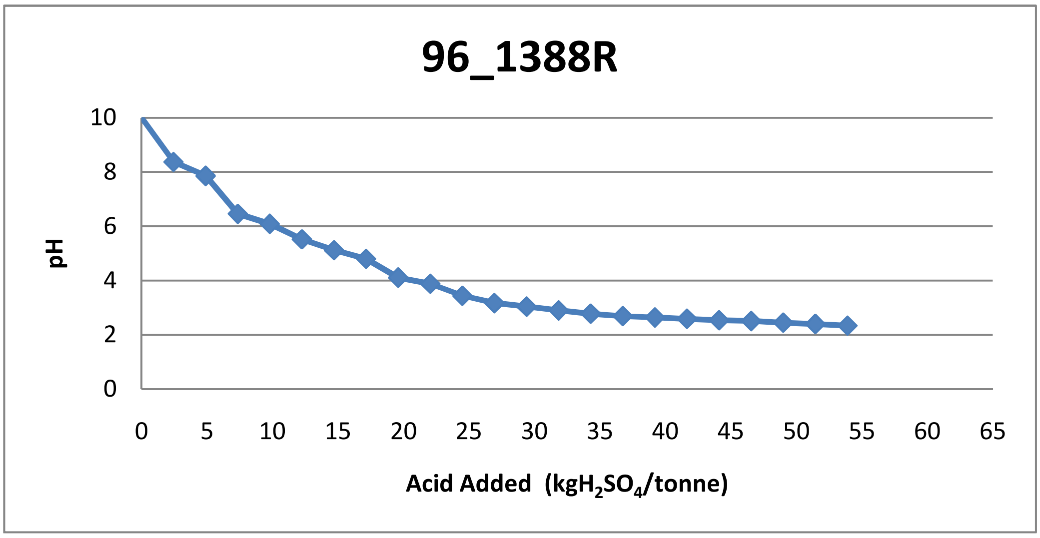
10
8
6
4
2
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65
Acid Added (kgH2SO4/tonne)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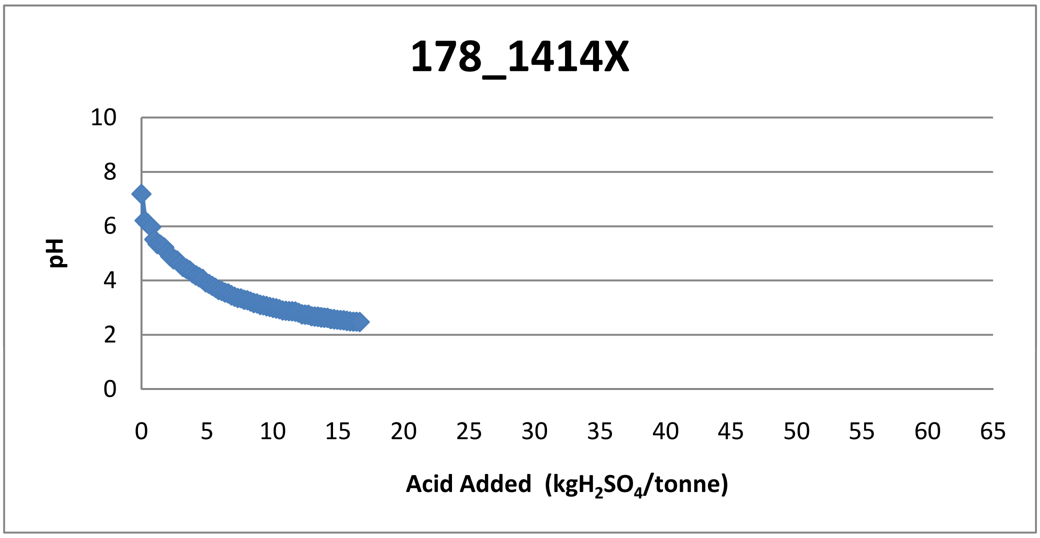
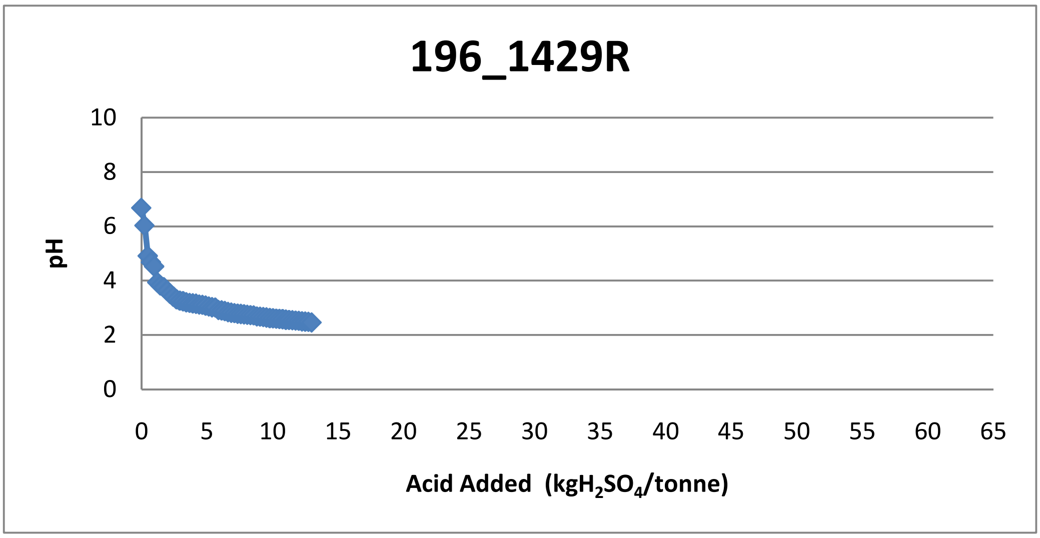
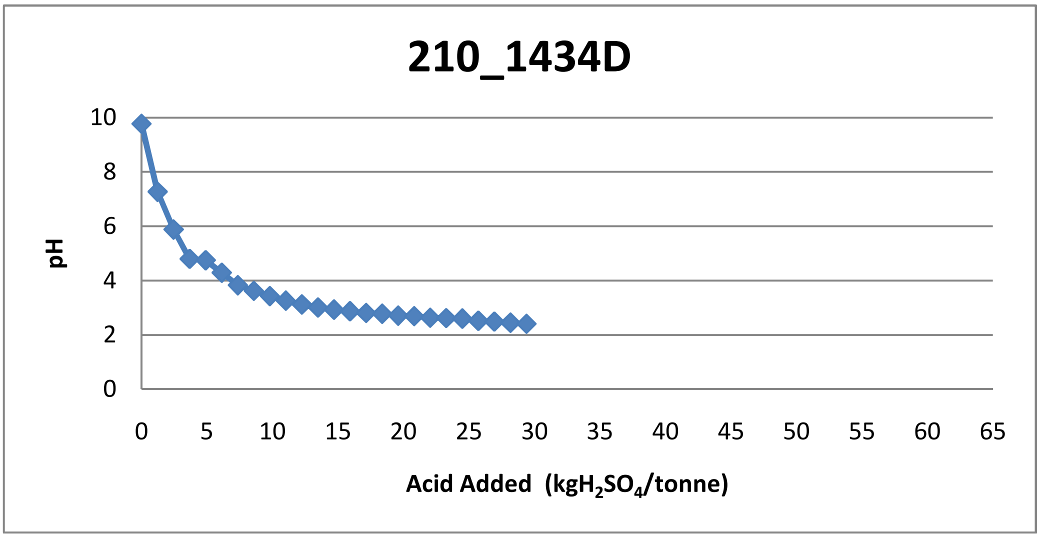
8
6
4
2
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65
Acid Added (kgH2SO4/tonne)


178_1414X
pH
10
8
6
4
2
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65
Acid Added (kgH2SO4/tonne)


196_1429R
pH
10
8
6
4
2
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65
Acid Added (kgH2SO4/tonne)


210_1434D
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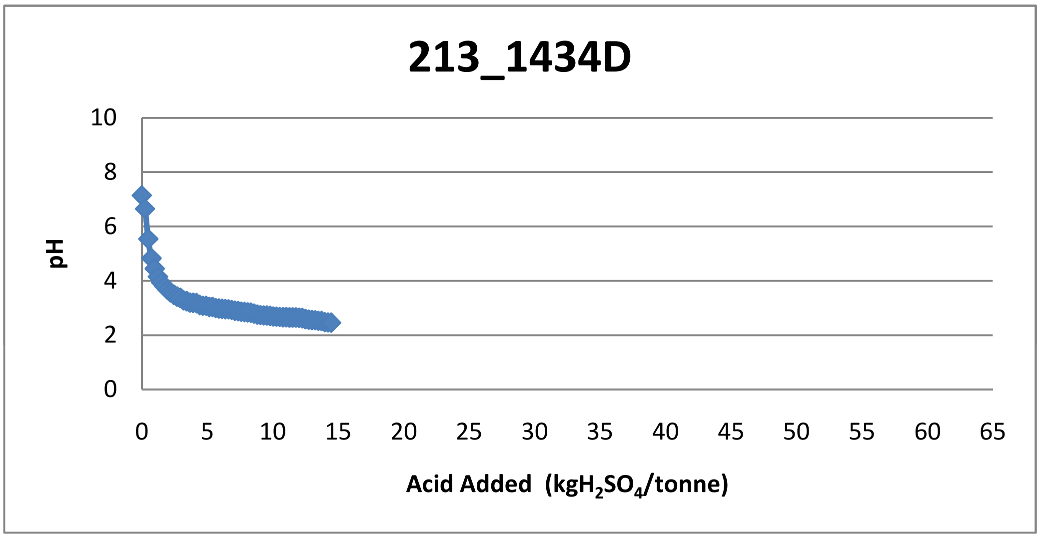
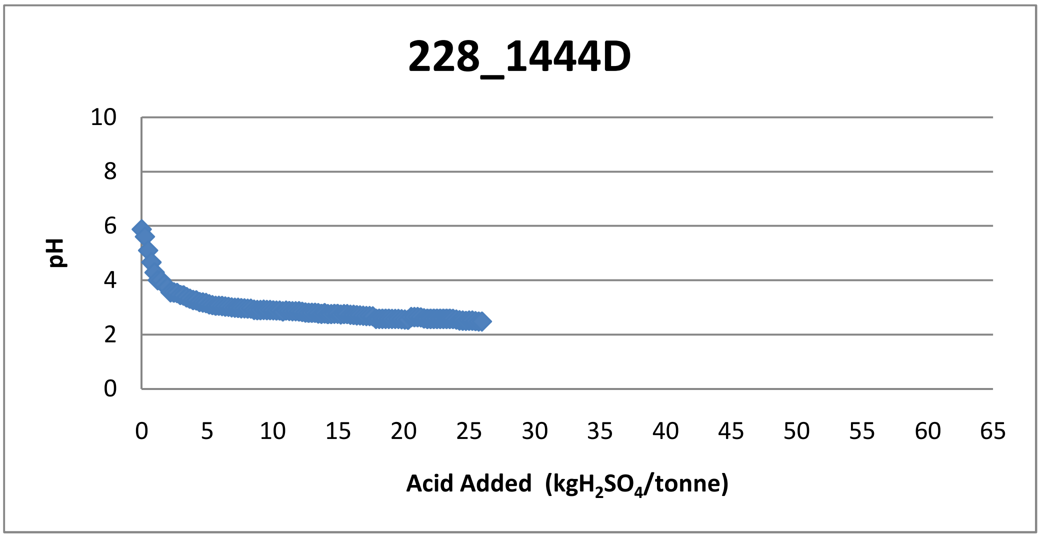
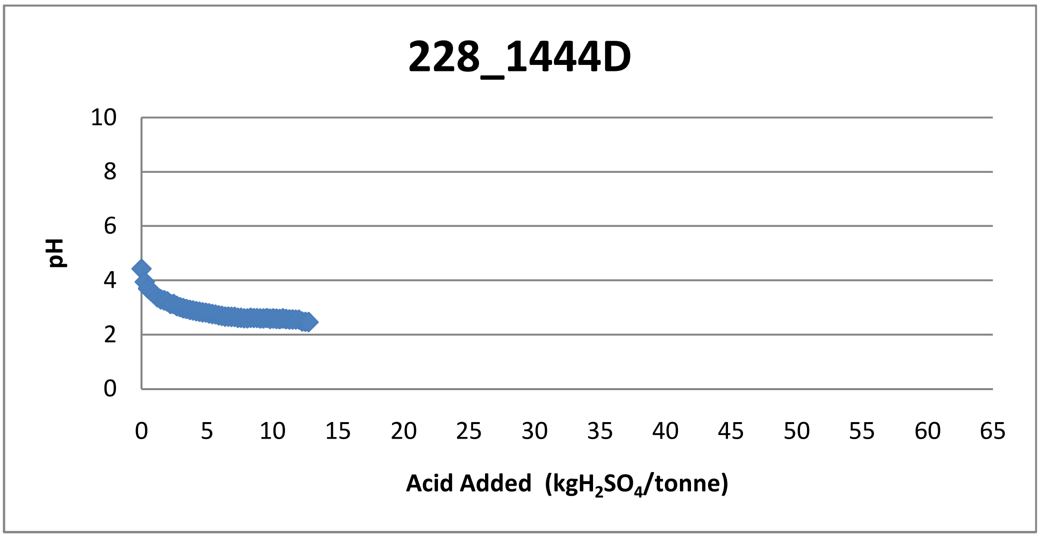
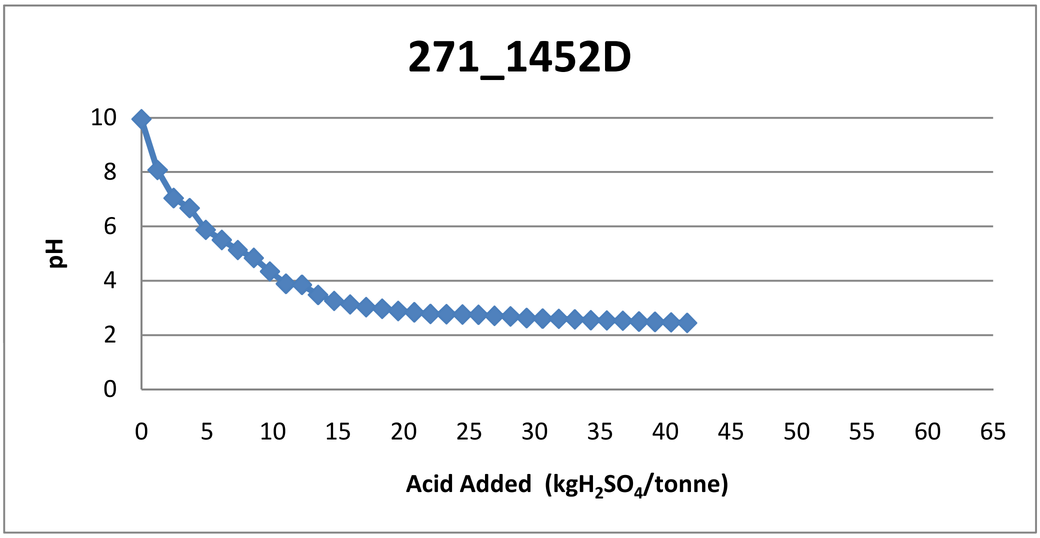
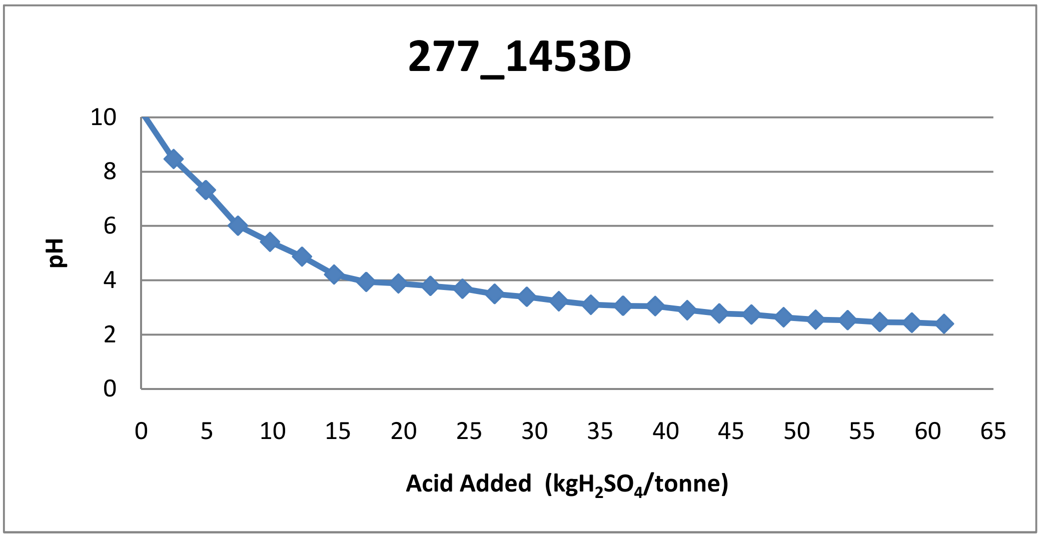
Acid Added (kgH2SO4/tonne)
10
8
6
4
2
0
0
5
10
15
20
25
30
35
40
45
50
55
60
65

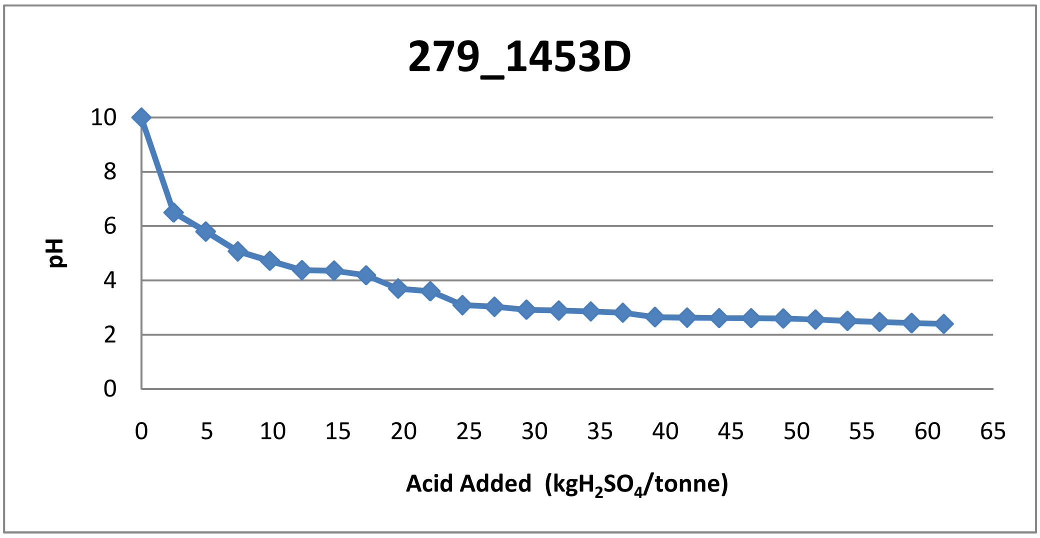

213_1434D
pH
Acid Added (kgH2SO4/tonne)
10
8
6
4
2
0
0
5
10
15
20
25
30
35
40
45
50
55
60
65


228_1444D
pH
Acid Added (kgH2SO4/tonne)
10
8
6
4
2
0
0
5
10
15
20
25
30
35
40
45
50
55
60
65


228_1444D
pH
10
8
6
4
2
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65
Acid Added (kgH2SO4/tonne)


271_1452D
pH
10
8
6
4
2
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65
Acid Added (kgH2SO4/tonne)


277_1453D
pH
10
8
6
4
2
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65
Acid Added (kgH2SO4/tonne)


279_1453D
pH
10
8
6
4
2
0
0
5
10
15
20
25
30
35
40
45
50
55
60
65
Acid Added (kgH2SO4/tonne)

Appendix 5: Whole Rock Multi Element Assay

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr
		Units	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
		LOD	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1
1388R_95	SAND		0.09	5.09	11.7	490	1.8	0.29	0.28	0.03	74	18.4	82
1388R_96	SANDSTONE		0.1	7.41	4.3	370	1.43	0.14	3.1	0.07	43	14	50
1388R_97	SANDSTONE		0.11	7.63	7.3	380	2.41	0.42	1.47	0.14	78.5	14.3	47
1388R_100	SANDSTONE		0.13	8.01	12.4	440	2.16	0.41	0.16	0.16	77.9	9.9	40
1389R_102	SILTSTONE		0.05	8.05	10.5	1890	1.23	0.16	0.32	0.02	70.4	6.8	43
1389R_103	SILTSTONE		0.08	6.09	6.2	520	2.24	0.29	0.23	0.1	61.1	7.6	41
1389R_104/105/106	COAL, undifferentiated		0.09	7.17	5.5	340	2.34	0.44	0.3	0.25	74.9	11.2	30
1389R_107	SANDSTONE		0.19	6.95	12.2	350	1.87	0.36	0.16	0.14	70.3	10.2	35
1397D_134	CLAY		0.06	5.24	4.7	210	1.42	0.26	0.57	0.02	50.7	8.6	50
1397D_135	CLAY		0.06	2.63	1.5	970	0.58	0.14	0.01	<0.02	17.65	3.2	25
1397D_136	SAND		0.04	2.5	2.8	340	0.75	0.16	0.05	0.02	44	6.9	31
1397D_137	CLAY		0.08	12.85	12.3	1540	6.5	0.41	0.3	0.12	77.1	7.6	4
1397D_138	SILTSTONE		0.05	3.93	6.3	220	1.4	0.11	0.01	0.02	45.8	4.5	22
1397D_139	SANDSTONE		0.04	3.63	4.4	210	1.55	0.12	0.03	0.05	39	3.9	35
1397D_140	SANDSTONE		0.04	3.75	3.8	230	1.5	0.14	0.02	0.06	52.5	3.6	35
1397D_141	SANDSTONE		0.04	2.79	1.5	180	0.81	0.1	0.01	<0.02	31	2.7	24
1397D_146	SILTSTONE		0.07	6.83	2	440	2.8	0.37	0.06	0.09	76	2.9	53
1402C_151	SOIL		0.04	3.52	4.2	50	0.69	0.16	0.04	<0.02	27.6	3.6	42
1402C_152	CLAY		0.09	4.89	7.8	120	1.14	0.22	0.07	<0.02	23.3	4.3	54
1402C_153	SILTSTONE		0.07	6.38	12.5	2040	1.36	0.18	7.63	0.29	43.3	25.9	34
1403D_159	SAND		0.06	7.81	13.7	550	0.51	0.32	0.06	<0.02	20.6	1.3	42
1403D_160	CLAY		0.04	9	9.7	190	0.66	0.3	0.09	<0.02	24.9	3.6	46
1403D_161	CLAY		0.06	8.36	3.8	280	3.34	0.41	0.04	0.08	85.7	12.9	47
1403D_162	CLAYSTONE		0.1	9.7	40.6	680	4.32	0.54	0.08	0.38	139.5	30.7	54
1403D_163	SILTSTONE		0.08	7.63	8.7	520	2.87	0.48	0.03	0.12	86.9	7.7	62
1403D_164	PEBBLE CONGLOMERATE		0.1	3.73	3.5	250	0.68	0.29	0.02	<0.02	28.2	2.9	26
1403D_165	SANDSTONE		0.01	3.87	3.8	380	1.12	0.11	0.1	0.4	37.5	27.5	34
1412C_166	LATERITE		0.09	5.17	6.4	370	1.27	0.19	0.28	0.03	44.6	12	39
1412C_167	SILTSTONE		0.02	8.73	8.9	420	1.87	0.27	1.73	0.05	51.5	15.4	52
1412C_168	SANDSTONE		0.17	8.88	9.8	370	1.9	0.31	1.52	0.1	52.4	11.8	50
1412C_169	SANDSTONE		0.09	7.47	8.4	370	2.12	0.39	0.14	0.12	72.6	11.6	43
1412C_170	SILTSTONE		0.13	12.65	2.8	420	4.32	0.89	0.06	0.23	149	8.1	62
1412C_171	CARBONACEOUS MUDSTONE		0.47	9.52	8.6	390	4.03	0.7	0.15	0.22	45.2	20	45
1412C_173	SANDSTONE		0.08	8.12	8.1	460	2.34	0.41	0.08	0.18	83.8	6	39
1414X_175	CLAY		0.1	6.36	7.7	370	1.77	0.33	1.58	0.05	74.5	16.4	51
1414X_176	CONGLOMERATE		0.03	2.14	2.4	160	0.73	0.11	0.2	0.02	48.3	4.9	47
1414X_177	SILTSTONE		0.04	10.7	13.3	620	3.07	0.65	0.07	0.02	115.5	1.5	55
1414X_178	CARBONACEOUS MUDSTONE		0.14	11.05	8.9	520	8.75	0.84	0.26	0.64	438	29.1	65
1429R_190	SOIL		0.06	8.39	8.2	500	2.49	0.41	0.17	0.03	85.9	18.9	64
1429R_191	MUDSTONE		0.08	8.57	11.7	330	1.78	0.13	0.41	0.02	36.9	14.3	42
1429R_192	CARBONACEOUS SHALE		0.93	4.74	44.3	290	1.24	0.42	0.61	0.11	47.7	3.3	4
1429R_193	MUDSTONE		0.14	8.1	6.7	380	2.4	0.43	1.66	0.14	68.2	12.2	36
1429R_194	COAL, undifferentiated		3.13	9.57	5.5	300	2.16	0.41	0.67	0.14	32	9.1	7
1429R_195	SANDSTONE		0.08	4.28	6.1	320	1.25	0.14	1.01	0.06	40.8	7	41
1429R_196	COAL, undifferentiated		0.65	3.12	5.8	90	1.51	0.28	0.19	0.07	21.4	5	9
1434D_205	SOIL		0.13	4.73	16.9	160	2.51	0.29	0.06	0.02	128.5	26.2	135
1434D_206	CLAYSTONE		0.15	9.27	3.4	740	3.07	0.43	0.04	0.05	152.5	18.8	58
1434D_207	SANDSTONE		0.15	6.27	16.1	590	2.35	0.11	0.05	0.03	33.6	17.5	25
1434D_208	SILTSTONE		0.04	9.52	12.8	710	1.65	0.1	0.73	0.06	40.9	8.8	34
1434D_209	SANDSTONE		0.03	8.26	8.9	490	1.53	0.12	3.15	0.1	39.3	12.8	43

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr
		Units	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
		LOD	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1
1434D_210	SILTSTONE		0.13	8.32	6.8	540	2.26	0.3	1.16	0.18	53.8	18.9	52
1434D_211	SANDSTONE		0.02	3.57	5.3	220	1.24	0.1	0.02	0.03	35	5.5	34
1434D_212	CARBONACEOUS SANDSTONE		0.15	10.45	5.3	470	3.48	0.68	0.27	0.18	82.5	18.2	51
1434D_213	CARBONACEOUS SANDSTONE		0.14	10.5	6.4	470	2.83	0.66	0.25	0.21	88.7	10.1	59
1444D_227	SANDSTONE		0.03	5.99	18.9	380	1.91	0.2	0.07	0.08	75.4	7.3	37
1444D_228	CARBONACEOUS SHALE		0.23	10.75	10.7	410	4.26	0.74	0.27	0.24	66.1	32.7	44
1444D_229	SILTSTONE		0.06	9.35	19	550	2.05	0.21	0.09	0.12	53.7	6.3	40
1445D_233	CARBONACEOUS SANDSTONE		0.49	8.26	21.3	360	2.15	0.52	0.48	0.18	48.7	25.5	24
1445D_234	SILTSTONE		0.1	9.86	3.6	320	2.19	0.5	1.79	0.15	70.6	7.8	16
1445D_235	CARBONACEOUS SHALE		0.28	4.4	15.3	240	1.32	0.51	1.25	0.11	44.7	1.7	5
1445D_237	CARBONACEOUS SANDSTONE		0.06	8.04	7.6	490	3.41	0.48	0.09	0.15	103	7.7	67
1445D_238	SANDSTONE		0.02	4.33	5.4	380	1.31	0.1	0.08	0.03	33.3	6.5	32
1445D_239	CARBONACEOUS SANDSTONE		0.14	11.6	9.8	500	4.45	0.73	0.41	0.21	96.6	19.2	57
1445D_240	CARBONACEOUS SANDSTONE		0.17	10.1	4.7	450	3.88	0.73	0.36	0.19	84.3	20.2	52
1445D_241	SILTSTONE		1.13	10.1	7.1	470	2.72	0.56	0.2	0.25	63.8	18.3	44
1451D_264	CLAY		0.05	4.74	5.9	250	1.4	0.25	0.06	0.02	57	10.2	47
1451D_265	SILTSTONE		0.32	8.54	9.8	430	4.36	0.59	0.05	0.18	108.5	11.1	68
1451D_266	CARBONACEOUS SANDSTONE		0.17	11.3	4	670	3.82	0.72	0.12	0.26	103	9.9	59
1451D_267	SANDSTONE		0.1	6.21	13.4	380	2.06	0.33	0.05	0.12	70.8	8.5	44
1452D_268	CLAY		0.07	9.39	34.4	380	1.52	0.5	0.02	0.02	66.9	8	61
1452D_269	CLAYSTONE		0.08	10.15	16.3	690	2.93	0.12	0.33	0.08	52.3	20.4	35
1452D_270	SILTSTONE		0.13	9.19	2.5	180	1.61	0.46	0.62	1.37	70.5	21.7	20
1452D_271	SANDSTONE		0.2	7.88	10.7	400	1.51	0.15	1.47	0.08	42	17.3	40
1452D_272	SILTSTONE		0.12	9.65	5	510	2.88	0.62	1.21	0.18	105	17.8	58
1452D_273	MUDSTONE		0.15	10.25	7.5	660	1.75	0.3	1.33	0.13	57.3	11.5	5
1452D_274	SANDSTONE		0.03	3.58	9.1	390	0.55	0.09	0.04	0.03	26.3	14	39
1453D_275	SOIL		0.12	6.98	7.5	490	1.69	0.33	0.76	0.04	67.1	14.1	55
1453D_276	CLAYSTONE		0.13	9.69	5.7	240	2.59	0.51	0.05	0.02	231	17	45
1453D_277	SANDSTONE		0.09	7.88	6.7	280	1.36	0.14	2.09	0.07	41.5	15.9	32
1453D_278	CARBONACEOUS MUDSTONE		3.47	4.63	1.8	510	4.74	0.35	0.45	0.11	31.1	1.9	5
1453D_279	CARBONACEOUS SANDSTONE		0.06	7.24	5.8	520	1.25	0.09	2.39	0.06	47.6	15	52
1453D_280	SANDSTONE		0.11	8.18	6.3	440	2.17	0.33	1.68	0.14	60.3	17.7	36
1453D_281	SILTSTONE		0.06	4.53	3.1	300	1.07	0.13	0.04	0.02	51.5	3.8	28
1453D_282	SANDSTONE		0.18	9.89	12	470	2.49	0.62	0.36	0.17	91	12.7	56
1454D_284	SILTSTONE		0.19	10.55	5.2	350	2.87	0.66	0.22	0.2	86.9	12.6	46
1454D_285	SILTSTONE		0.1	8.7	5.7	380	1.59	0.21	1.68	0.1	47.7	15.1	36
1454D_286	SANDSTONE		0.46	6.94	5.2	390	2.62	0.41	0.35	0.14	29.1	26.9	39
1454D_288	SILTSTONE		0.55	9.92	14	350	3.9	0.77	0.31	0.26	36.5	52.7	37
1454D_289	CARBONACEOUS SHALE		0.15	10.7	5.5	480	2.74	0.71	0.35	0.21	99.7	15.3	52
1454D_290	MUDSTONE		1.4	9.84	6.2	400	3.03	0.57	0.21	0.25	45.4	14.5	47
1398X_1	SOIL		0.03	4.8	5.6	190	1.17	0.24	0.14	<0.02	57.2	8.7	66
1398X_2	SAND		0.03	4.42	5	150	1	0.24	0.12	<0.02	40.7	3.9	47
1398X_9	SAND		0.02	2.22	5.2	100	0.67	0.14	0.02	<0.02	24.5	3.4	73
1398X_14	SAND		0.01	4.92	3.7	250	1.29	0.19	0.03	<0.02	63.3	3.5	41
1398X_19	CLAY		0.07	3.96	1.8	200	0.99	0.11	0.02	<0.02	53	1.9	79
1398X_22	SAND		0.05	4.67	1.9	780	1.6	0.17	0.03	<0.02	130	1.3	33
1398X_28	SAND		0.04	2.81	14.6	180	0.84	0.11	0.02	<0.02	42.2	2.6	116
1398X_5032	SANDSTONE		0.06	2.3	8.1	140	1.14	0.17	0.09	<0.02	24.6	1.7	34
1398X_33	SANDSTONE		<0.01	6.29	15.5	380	1.75	0.2	0.04	0.06	76.4	8.8	64
1398X_34	COAL, undifferentiated		0.03	5.67	10.3	350	1.54	0.19	0.03	0.08	66.1	7.5	74

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr
		Units	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
		LOD	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1
1399X_2	SOIL		0.02	3.76	6.3	100	1.12	0.18	0.07	<0.02	62.9	8.3	89
1399X_6	SAND		0.03	5.85	3.8	260	1.16	0.26	0.49	<0.02	48.3	6.7	50
1399X_11	SAND		0.02	2.89	3.2	90	0.65	0.14	0.04	<0.02	36.7	4.6	65
1399X_19	SAND		<0.01	4.2	3.8	230	1.13	0.15	0.04	<0.02	41.9	2.3	92
1399X_24	SAND		0.01	3.63	2.2	200	1.05	0.31	0.05	<0.02	37.3	1.6	39
1399X_31	CLAY		0.08	10.2	2.6	690	2.28	0.59	0.09	<0.02	116	1.7	52
1399X_32	CLAY		0.03	11.45	4.9	440	2.94	0.94	0.07	<0.02	101	1.6	55
1399X_34	SANDSTONE		0.05	5.44	6.9	450	1.81	0.24	0.05	<0.02	68.9	4.1	61
1399X_35	SANDSTONE		0.01	6.19	7.4	430	2.13	0.33	0.04	0.11	89.8	8.2	47
1399X_36	SANDSTONE		0.01	4.59	7.3	410	1.29	0.14	0.02	0.06	66.6	4.3	83
1400X_2	SOIL		0.04	4.66	5.7	330	1.2	0.26	0.19	<0.02	59.1	10.9	45
1400X_7	SAND		0.04	2.68	3.8	220	0.54	0.15	0.02	<0.02	28	3.3	64
1400X_11	SAND		0.06	3.01	15.2	220	1.2	0.19	0.03	<0.02	27.9	7.6	115
1400X_25	CLAY		0.08	10.2	14.6	720	3.27	0.63	0.05	0.12	147	43.3	71
1400X_26	COALY SHALE		0.31	8.13	7.6	470	3.94	0.54	0.05	0.66	84.9	30.4	66
1401X_2	SOIL		0.04	2.12	5.4	90	0.68	0.2	0.02	<0.02	32.7	4.9	109
1401X_3	SOIL		0.02	1.74	3.4	80	0.56	0.16	0.02	<0.02	32	4.1	79
1401X_15	SAND		0.04	2.46	10	240	0.86	0.73	0.03	<0.02	21.7	6.4	75
1401X_27	SANDSTONE		0.1	5.12	8.5	330	1.44	0.18	0.03	0.06	60.7	6	36
1401X_28	SANDSTONE		0.12	4.84	51.2	270	1.93	0.18	0.03	0.05	56.6	4.7	50
1404C_2	CLAY		0.03	5	6.1	340	1.29	0.27	0.1	<0.02	67.4	16	119
1404C_4	SANDSTONE		0.02	2.24	5.2	130	0.64	0.13	0.05	<0.02	21.1	4.4	49
1404C_8	SILTSTONE		0.06	8.97	26.1	430	0.89	0.43	0.08	<0.02	74.3	2.5	83
1404C_11	SILTSTONE		0.01	10.45	5.7	930	0.89	0.32	0.13	<0.02	41.3	5.2	45
1404C_18	SILTSTONE		0.03	8.98	5.2	520	3.8	0.55	0.08	0.1	155	25.6	53
1404C_19	SILTSTONE		0.03	8.97	4.5	400	3.61	0.59	0.07	0.02	72.8	21.7	62
1404C_20	SILTSTONE		0.02	8.28	6.5	460	3.06	0.53	0.07	<0.02	109	5.5	52
1404C_22	SILTSTONE		0.05	7.75	11.1	760	2.48	0.45	0.06	<0.02	92	2.4	48
1404C_24	SILTSTONE		0.64	7.2	25.6	160	3.06	0.31	0.12	0.28	64.8	49	12
1405C_1	CLAY		0.05	5.95	10.6	660	0.86	0.32	0.52	<0.02	52.2	7.3	44
1405C_6	SILTSTONE		0.03	8.55	25.9	230	3.12	0.34	0.16	0.03	123.5	30.6	58
1405C_19	SANDSTONE		0.05	7.58	5.1	960	1.29	0.13	1.83	0.25	45.8	12.5	70
1405C_20	SANDSTONE		0.06	7.25	5.4	830	1.48	0.12	1.5	0.09	46.5	15.8	46
1405C_21	SANDSTONE		0.03	7.54	5.5	850	1.36	0.12	1.65	0.08	44.3	13.3	68
1405C_22	SANDSTONE		0.04	7.26	7.1	600	1.15	0.1	2.66	0.07	43	20.5	59
1405C_25	SANDSTONE		0.05	8.25	6.9	700	1.27	0.12	3.97	0.07	44.7	17.1	51
1405C_26	SANDSTONE		0.05	6.88	5.9	550	0.97	0.09	8.5	0.06	41.2	15.4	39
1405C_28	SANDSTONE		0.06	8.32	6.2	470	1.44	0.17	1.75	0.11	48.6	14.8	56
1405C_30	SANDSTONE		0.04	8.37	11.7	430	1.28	0.13	2.88	0.08	45.7	15.7	45
1405C_31	SANDSTONE		0.06	8.16	10.4	430	1.36	0.16	2.23	0.08	46.7	17	50
1405C_32	SANDSTONE		0.07	8.01	8.2	420	1.45	0.21	1.98	0.1	49.1	14.7	42
1405C_33	SANDSTONE		0.06	8.01	8.1	370	1.41	0.2	1.47	0.1	47.3	15	54
1405C_36	SANDSTONE		0.06	8.05	10	410	1.32	0.18	2.35	0.09	49.4	15	44
1405C_40	SANDSTONE		0.07	7.94	11.1	410	1.57	0.24	1.58	0.12	54.3	14.9	51
1405C_42	SANDSTONE		0.06	8.13	13.7	450	1.59	0.25	1.32	0.12	57.5	15.1	51
1405C_43	SANDSTONE		0.06	7.58	12.3	400	1.55	0.24	2.86	0.11	56.3	15	52
1405C_44	SANDSTONE		0.05	8.04	10.9	450	1.6	0.25	1.35	0.11	54.9	13.5	48
1405C_48	SANDSTONE		0.08	7.74	12.4	420	1.71	0.27	2.35	0.13	60.7	20.4	51
1405C_49	SANDSTONE		0.07	8.59	15.9	470	1.78	0.28	1.69	0.12	59.3	14.3	50
1405C_50	SANDSTONE		0.08	7.97	14.6	420	1.77	0.25	3.02	0.11	58.3	16.5	47

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr
		Units	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
		LOD	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1
1405C_51	SANDSTONE		0.06	8.09	5.2	460	1.87	0.28	1.36	0.1	65.6	14.1	50
1405C_52	SANDSTONE		0.05	7.69	6.6	470	2	0.29	0.93	0.12	72.6	14.1	53
1405C_53	SANDSTONE		0.05	7.13	5.2	440	2.13	0.3	1.29	0.09	76.3	11.3	46
1405C_54	SANDSTONE		0.07	8.6	8.2	470	2.17	0.36	1.36	0.13	83.6	11.4	40
1407C_78603	SAND		0.04	3.7	3.6	220	0.48	0.19	0.04	<0.02	18.6	2.8	43
1407C_78606	SILTSTONE		0.03	11.55	14.1	290	0.71	0.3	0.04	<0.02	39.8	0.9	57
1407C_78610	SILTSTONE		0.04	8.57	12.2	270	0.97	0.4	0.1	<0.02	23.3	6	51
1407C_78611	SILTSTONE		0.07	8.83	18.6	790	1.84	0.48	0.11	<0.02	154.5	12	45
1407C_78612	CLAY		0.04	9.85	13.2	410	1.96	0.65	0.09	<0.02	73.6	20.3	65
1407C_78614	CLAY		0.04	10.3	6.8	1400	3.55	0.58	0.07	<0.02	158	5	54
1407C_78616	CLAY		0.01	10.25	4.4	790	2.44	0.56	0.06	<0.02	100.5	1.5	44
1407C_78619	CLAY		0.06	9.43	5.4	370	2.09	0.38	0.06	<0.02	126.5	1.8	41
1407C_78621	CLAY		0.01	13.65	20.1	210	2.19	0.54	0.08	0.02	73.8	1.9	17
1407C_78624	SILTSTONE		0.06	7.45	5.9	370	2.14	0.4	0.02	<0.02	103	1.7	61
1407C_78627	SILTSTONE		0.06	5.82	2.8	280	2.03	0.24	0.03	<0.02	76.4	2.4	59
1407C_78628	SILTSTONE		0.06	4.77	4.6	240	1.77	0.18	0.02	<0.02	63.8	5.5	48
1407C_78630	SANDSTONE		0.09	7.78	2.7	360	2.6	0.47	0.03	<0.02	98.5	1.9	64
1407C_78631	SANDSTONE		0.1	5.2	3	260	1.78	0.28	0.02	<0.02	60.2	2.1	66
1407C_78632	SANDSTONE		0.04	2.69	1.3	150	0.9	0.11	0.01	<0.02	31	1.6	73
1407C_78633	SANDSTONE		0.05	3.82	2.9	190	1.12	0.2	0.02	<0.02	38	1.6	62
1408C_78650	SAND		0.05	5.17	8.2	600	0.61	0.19	0.02	<0.02	23	2.4	64
1408C_78704	SILTSTONE		0.04	9.5	10.4	380	0.91	0.24	0.04	<0.02	55.7	1.3	50
1408C_78708	SILTSTONE		0.08	8.43	13.4	690	2.16	0.56	0.1	<0.02	106	22.5	46
1408C_78712	CLAY		0.06	9.28	6.3	320	1.89	0.54	0.06	<0.02	62	9	51
1408C_78715	CLAY		0.09	8.34	4.7	460	2.51	0.56	0.06	<0.02	105	4.2	48
1408C_78717	CLAY		0.05	9.54	15.1	160	1.68	0.49	0.07	<0.02	61.1	2.2	13
1408C_78720	SILTSTONE		0.07	8.04	11.7	390	2.24	0.49	0.03	<0.02	79.6	2.2	63
1408C_78725	SILTSTONE		0.06	6.77	4.2	320	2.11	0.28	0.13	<0.02	88.3	4.5	60
1408C_78726	SANDSTONE		0.03	3.36	5.6	170	1.06	0.12	0.02	<0.02	42.9	3	83
1408C_78727	SANDSTONE		0.07	3.9	2.5	200	1.34	0.33	0.02	<0.02	36.2	2.1	61
1408C_78728	SANDSTONE		0.06	4.06	2.1	210	1.36	0.25	0.02	<0.02	44.2	2.2	248
1408C_78730	SANDSTONE		0.04	1.69	2	100	0.57	0.11	0.01	<0.02	29.5	1.2	103
1409C_5	SANDSTONE		0.03	5.92	20.4	610	1.13	0.13	0.03	<0.02	58.8	13.5	37
1409C_11	COAL WEATHERED		0.09	7.98	61.9	360	3.59	0.22	0.07	0.02	53.6	11.7	58
1409C_12	COAL WEATHERED		0.05	8.24	32.7	370	2.97	0.18	0.09	0.02	50.7	10	53
1409C_13	COAL WEATHERED		0.08	13.8	45.4	230	7.86	0.75	0.28	0.15	46	25.4	17
1409C_14	COAL, undifferentiated		0.06	10.2	8.9	400	3.25	0.21	0.27	0.12	38.4	21.9	43
1409C_17	SANDSTONE		0.05	9.07	13.7	420	1.83	0.11	0.59	0.05	38.4	13.3	30
1409C_19	SANDSTONE		0.07	8.7	11.3	330	1.67	0.12	1.31	0.06	39.9	19.1	35
1409C_22	SANDSTONE		0.08	8.5	4.9	290	1.68	0.24	1.69	0.08	55.2	10	36
1409C_23	SANDSTONE		0.1	8.42	7	270	1.72	0.31	1.53	0.11	60	17.6	29
1409C_24	SANDSTONE		0.1	7.27	4.5	260	1.94	0.32	0.84	0.13	56.8	11.6	28
1409C_25	MUDSTONE		0.11	8.37	4.1	160	1.64	0.42	1.98	0.08	77.3	7.8	13
1409C_26	CARBONACEOUS MUDSTONE		0.08	7.89	168.5	160	1.42	0.25	1.57	0.13	52	11.5	24
1409C_27	CARBONACEOUS MUDSTONE		0.73	5.14	12.5	100	1.44	0.28	1.04	0.15	36.4	6.4	10
1409C_29	SANDSTONE		0.07	7.29	22.3	410	1.22	0.13	2.23	0.06	41.7	12.9	57
1409C_30	SANDSTONE		0.08	6.73	7.3	390	1.4	0.15	2.09	0.08	47.3	14.2	44
1409C_31	SANDSTONE		0.08	7.95	9.1	500	1.35	0.16	2.2	0.07	44.1	15.1	51
1409C_32	SANDSTONE		0.08	7.73	8.2	490	1.2	0.16	3.68	0.09	44.4	16.5	43
1409C_33	SANDSTONE		0.09	8.01	11.8	480	1.51	0.32	2.32	0.11	52.8	15.6	53

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr
		Units	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
		LOD	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1
1409C_34	SILTSTONE		0.1	7.69	11.8	440	2.07	0.42	3.45	0.11	78.9	12.3	45
1410C_1	SAND		0.08	6.76	6	130	1.19	0.32	0.12	<0.02	78.1	9.5	67
1410C_2	LATERITE		0.13	8.55	19.5	200	1.66	0.4	0.08	<0.02	43.7	7.4	111
1410C_3	SANDSTONE		0.05	6.73	15.5	1040	1.27	0.22	0.04	<0.02	102	6.8	49
1410C_8	SANDSTONE		0.03	6.37	12.6	350	1.26	0.14	0.02	<0.02	43.4	2.4	48
1410C_13	SANDSTONE		0.04	10.7	11.4	500	2.06	0.15	0.08	0.02	110	6.1	49
1410C_17	SILTSTONE		0.08	9.07	5	520	4.27	0.23	0.35	0.04	50.2	46.6	40
1410C_22	MUDSTONE		0.1	7.27	4	1210	2.27	0.5	0.49	0.49	65.3	4.5	39
1410C_28	COAL, undifferentiated		0.27	1.05	33.3	50	1.29	0.1	0.07	0.04	11.95	7.2	4
1410C_29	COAL, undifferentiated		0.09	5.09	7.7	150	1.26	0.18	0.37	0.08	28.3	4.5	10
1410C_30	COAL, undifferentiated		0.4	5.35	5.8	150	1.61	0.31	0.46	0.11	33.2	4.1	2
1410C_31	COAL, undifferentiated		0.07	2.98	2	2190	3.41	0.26	0.2	0.08	25.3	3.1	21
1410C_35	SILTSTONE		0.1	7.43	2.7	690	2.07	0.36	1.1	0.11	56.7	14.4	34
1410C_40	SANDSTONE		0.07	7.76	6	380	1.26	0.14	2.66	0.08	39.8	10.9	45
1410C_46	SANDSTONE		0.06	6.33	5.6	430	1.02	0.12	7.11	0.05	40.3	12.3	48
1410C_47	SANDSTONE		0.07	6.87	7.6	490	1.07	0.11	4.35	0.06	39.3	13.9	46
1410C_48	SANDSTONE		0.07	5.71	6.6	360	1.11	0.12	7.28	0.05	43.1	14.4	28
1410C_49	SANDSTONE		0.07	7.66	7.2	410	1.38	0.16	1.77	0.1	49	15.5	46
1410C_50	SANDSTONE		0.08	7.65	7.1	390	1.43	0.17	1.59	0.09	50	14.7	40
1410C_51	SANDSTONE		0.07	7.16	11.9	360	1.22	0.16	6.13	0.07	51.5	13.9	48
1410C_57	SILTSTONE		0.08	7.57	5.9	400	1.07	0.12	6.16	0.05	43.3	13.1	38
1410C_58	SANDSTONE		0.06	7.79	8.3	430	1.21	0.15	2.41	0.08	43.6	14.1	44
1410C_59	SANDSTONE		0.07	7.87	9.5	460	1.34	0.17	2.02	0.1	47.7	17.8	42
1410C_60	SANDSTONE		0.07	8.25	8.2	460	1.35	0.18	2.47	0.1	45.7	17.7	44
1410C_65	SANDSTONE		0.09	8.84	10	520	1.64	0.31	1.57	0.14	56.5	14.2	47
1410C_70	SANDSTONE		0.07	8.47	12.6	480	1.32	0.19	2.73	0.09	48.3	16.5	45
1410C_74	SANDSTONE		0.08	8.52	10.4	480	1.69	0.29	1.38	0.13	51.5	14.9	51
1410C_78	SANDSTONE		0.1	8.75	6.2	470	1.77	0.3	2.26	0.12	57.8	16.6	46
1410C_84	SILTSTONE		0.11	8.38	5.7	490	2.82	0.6	0.49	0.18	77.3	18.3	56
1412C_1	CLAY		0.11	5.06	6.3	360	1.41	0.21	0.4	<0.02	52.9	15.5	42
1412C_8	SANDSTONE		0.1	7.53	10.6	320	1.66	0.3	1.29	0.14	57.8	18.9	48
1412C_17	SANDSTONE		0.05	7.52	8.7	2270	1.53	0.25	2.84	0.24	47.9	16.5	43
1412C_19	SANDSTONE		0.09	8.34	11.8	340	1.69	0.33	1.19	0.11	54.8	14.9	48
1412C_20	SANDSTONE		0.09	8.34	7.6	500	1.66	0.28	1.61	0.11	50.6	15	51
1412C_21	SANDSTONE		0.08	8.48	7.8	330	1.67	0.28	1.37	0.11	52.5	13.9	50
1412C_22	SANDSTONE		0.08	8.07	8.4	320	1.63	0.25	1.91	0.11	49.9	22.3	52
1412C_23	SANDSTONE		0.08	8.96	9.4	350	1.68	0.3	1.31	0.12	54.9	14.7	50
1412C_27	SANDSTONE		0.09	8.49	7.3	350	1.79	0.29	1.34	0.1	57.3	20.4	50
1412C_28	SANDSTONE		0.09	8.66	8.7	350	1.85	0.3	1.92	0.12	56	12.7	48
1412C_51	SANDSTONE		0.08	6.42	8.1	360	2.18	0.34	0.07	0.07	70.4	6.9	72
1412C_52	SANDSTONE		0.09	6.65	8.8	370	2.16	0.31	0.1	0.07	72.4	8.1	61
1412C_53	SANDSTONE		0.11	5.35	7.6	320	2.15	0.27	0.04	0.05	70	7.4	62
1412C_56	SANDSTONE		0.11	7.23	6	360	2.68	0.36	0.07	0.09	81	7.4	73
1414X_3	SANDSTONE		0.07	4.83	5.2	340	1.18	0.23	0.04	<0.02	48.9	8.5	54
1414X_8	SANDSTONE		0.05	2.91	8.6	320	0.75	0.32	0.31	<0.02	22.9	8	63
1414X_14	SANDSTONE		0.04	4.41	1.9	210	1.22	0.16	0.04	<0.02	48.1	2.7	74
1414X_25	SANDSTONE		0.03	1.35	4.1	120	0.62	0.1	0.14	<0.02	19.75	3.9	113
1429R_24	CLAYSTONE		0.14	9.34	5.2	390	1.42	0.24	0.13	<0.02	168	4.3	51
1429R_26	SILTSTONE		0.08	7.97	12.4	600	5.15	0.09	0.28	0.02	36.3	24.3	44
1429R_31	MUDSTONE		0.09	8.65	7.7	310	1.47	0.15	0.92	1.26	49.9	12.5	42

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr
		Units	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
		LOD	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1
1429R_33	SANDSTONE		0.08	8.26	5.4	310	1.37	0.16	1.99	0.27	51.6	27.3	40
1429R_38	SANDSTONE		0.12	8.71	3.7	190	1.59	0.43	2.66	0.12	64.3	7.8	18
1429R_41	COAL, undifferentiated		0.96	4.89	4.8	110	1.09	0.27	1.17	0.13	27.7	11	30
1429R_42	CLAY		1.46	5.01	4.4	140	1.66	0.19	1.06	0.1	38.2	2.4	11
1429R_43	CARBONACEOUS SHALE		0.38	4.98	12	180	1.75	0.28	0.83	0.12	38.1	8.7	4
1429R_44	CARBONACEOUS SHALE		0.47	4.38	4.7	190	1.94	0.41	0.64	0.13	64.7	3.4	8
1429R_74	SILTSTONE		0.09	8.16	5.9	410	1.52	0.18	1.45	0.08	44.4	11.7	51
1429R_80	SILTSTONE		0.11	8.16	8.3	390	1.55	0.22	1.47	0.09	46.5	12.8	57
1429R_83	SILTSTONE		0.1	7.65	5.9	330	1.75	0.22	1.45	0.1	53.9	12.3	40
1429R_84	SILTSTONE		0.08	8.18	6.7	350	1.6	0.21	2.11	0.09	54.4	13.3	52
1429R_85	SILTSTONE		0.09	8.54	10.4	430	1.72	0.24	1.46	0.14	46.4	13.6	56
1429R_88	SILTSTONE		0.09	8.41	9.6	440	1.65	0.25	1.3	0.12	48.1	13.7	58
1429R_92	SILTSTONE		0.18	8.05	9.7	380	1.54	0.24	7.44	0.11	48.8	11.9	62
1429R_95	SANDSTONE		0.11	9.25	13.3	430	1.91	0.39	0.86	0.12	55.8	21.1	56
1429R_98	SANDSTONE		0.1	8.84	10.9	460	1.78	0.32	1.88	0.12	53.5	14	51
1429R_119	SILTSTONE		0.13	7.73	6.2	270	3.85	0.47	0.25	0.13	27.4	7.2	39
1429R_120	SILTSTONE		0.09	7.34	12.8	420	2.73	0.44	0.18	0.1	70.3	8	84
1429R_121	SILTSTONE		0.54	6.65	4.8	320	2.47	0.37	0.3	0.09	54.5	5	51
1429R_122	SILTSTONE		0.07	4.38	5.4	300	1.38	0.22	0.13	0.04	47.9	3.9	62
1429R_129	SANDSTONE		0.07	6.22	7.2	410	1.49	0.26	0.19	0.08	58.4	5.5	85
1429R_130	SANDSTONE		0.36	7.1	8.2	270	5.2	0.82	0.19	0.24	67.4	13.4	48
1429R_131	COAL, undifferentiated		0.31	7.8	8.3	380	3.18	0.67	0.23	0.19	52.6	23.8	42
1429R_132	MUDSTONE		0.15	10.05	5.2	440	2.83	0.71	0.32	0.17	82.1	12	67
1429R_133	MUDSTONE		0.14	10.15	6.2	430	2.78	0.75	0.34	0.19	86.5	16.3	66
1429R_139	COAL, undifferentiated		2.79	3.18	6.1	80	2.58	0.46	0.16	0.14	57.5	3.9	36
1429R_140	COAL, undifferentiated		0.09	2.18	7.2	40	2.61	0.39	0.13	0.06	40.7	3.4	10
1429R_141	COAL, undifferentiated		0.64	4.74	4.1	450	1.61	0.28	1.23	0.11	29.8	3.7	13
1429R_142	COAL, undifferentiated		0.06	6.68	4.8	420	1.53	0.29	0.07	0.09	64	2.9	47
1429R_143	COAL, undifferentiated		0.03	6.89	5.5	430	1.84	0.24	0.08	0.06	56	3.2	61
1447L_34	SAND		0.03	0.58	3.1	40	0.26	0.08	0.01	<0.02	11	1.4	41
1447L_37	CLAY		0.07	5.64	4.5	280	1.35	0.29	0.07	<0.02	95.3	16.3	56
1447L_39	CLAY		0.05	4.51	5.1	200	0.96	0.25	0.05	<0.02	34.4	5.8	43
1447L_41	CLAY		0.07	5.68	4.8	390	0.99	0.3	0.06	<0.02	48	6.6	73
1447L_43	CLAY		0.08	3.59	12.6	200	1.51	0.23	0.04	<0.02	44.4	5.5	75
1447L_46	SILCRETE		0.13	3.11	4.2	670	0.71	0.22	0.03	<0.02	31.7	2.8	58
1447L_47	SILCRETE		0.19	1.13	2.6	770	0.37	0.25	0.03	<0.02	20.7	1	38
1447L_50	SILCRETE		0.03	10.55	2.6	230	0.8	0.41	0.03	<0.02	33.5	1.6	59
1447L_52	SILCRETE		0.02	8.64	2.1	320	0.81	0.37	0.03	<0.02	66.5	1.4	61
1447L_54	SANDSTONE		0.01	5.1	1.9	240	0.55	0.26	0.02	<0.02	27	1	52
1447L_60	CLAY		0.03	9.32	5.2	1390	1.16	0.28	0.2	<0.02	79.5	14	41
1447L_63	CLAY		0.04	8.24	9	3050	1.1	0.27	0.8	0.02	72.3	12.3	70
1447L_66	CLAY		0.05	7.77	9.3	770	1.51	0.22	0.21	<0.02	46.5	15.6	50
1447L_70	CLAY		0.11	9.36	10.4	580	2.25	0.39	0.18	0.04	112	26.3	41
1447L_77	CLAY		0.06	8.97	5	460	4.34	0.53	0.19	0.2	94.6	26.1	54
Tailings -250			0.04	2.56	1.9	60	1.45	0.21	0.12	0.1	27.1	3.3	32
Rejects +250			0.11	13.5	64.6	140	0.98	0.75	0.14	0.23	73.6	2.3	16
Product +250			0.02	1.88	1.3	40	3.41	0.3	0.12	0.08	30.3	5.6	28

MEMS61 - 4 acid digest

MEMS42 - Aqua regia digest

Samples with TC > were ashed prior to MEMS61

Aqua regia digest was carried out on a split of samples with TC > 5% to capture volatile elements (As, Hg, Sb, Se, Te and Tl)

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Cs	Cu	Fe	Ga	Ge	Hf	In	K	La	Li	Mg
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%
		LOD	0.05	0.2	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01
1388R_95	SAND		4.13	29.2	6.5	15.45	0.18	2.7	0.061	0.41	30.3	21.4	0.22
1388R_96	SANDSTONE		3.95	27.8	4.56	18.4	0.15	3	0.05	1.45	20.5	9.3	0.82
1388R_97	SANDSTONE		8.83	37.6	4.29	21	0.19	4.2	0.066	1.93	38	31	0.7
1388R_100	SANDSTONE		9.05	25	3.82	19.15	0.18	3.8	0.066	1.69	37.8	34.2	0.34
1389R_102	SILTSTONE		2.99	15.6	5.77	19.2	0.22	3	0.043	0.3	27.2	8.8	0.8
1389R_103	SILTSTONE		7.84	20	1.59	16.75	0.11	3.9	0.053	1.48	30.4	27.6	0.41
1389R_104/105/106	COAL, undifferentiated		6.65	40.1	2.08	17.5	0.14	3.8	0.064	1.25	35.5	28.5	0.29
1389R_107	SANDSTONE		7.18	27	3.05	17.05	0.16	3.2	0.062	1.46	34.1	28.1	0.28
1397D_134	CLAY		3.91	14.9	2.23	14.25	0.11	3.2	0.045	0.47	25.2	19.4	0.38
1397D_135	CLAY		1.81	7.6	0.89	7.27	0.05	1.9	0.021	0.2	11.2	12.7	0.16
1397D_136	SAND		2.5	10.3	1.26	6.84	0.09	2.6	0.024	0.4	19.8	12	0.25
1397D_137	CLAY		1.44	91.4	1.31	35.6	0.19	7	0.153	1.24	32.5	33.7	0.53
1397D_138	SILTSTONE		5.06	6.6	0.74	11.15	0.09	4.4	0.029	1.13	23.5	17.7	0.22
1397D_139	SANDSTONE		4.6	7.2	0.34	10.45	0.07	2.3	0.027	1.08	20.3	16.2	0.14
1397D_140	SANDSTONE		5.5	6.9	0.39	11.55	0.09	3.6	0.03	1.18	26.5	16.7	0.17
1397D_141	SANDSTONE		3.3	5	0.5	7.61	0.07	1.8	0.022	0.9	14.8	14.7	0.06
1397D_146	SILTSTONE		12.2	17.7	1.13	20.8	0.13	4	0.062	1.69	38	32	0.33
1402C_151	SOIL		2.36	9.3	1.93	9.38	0.08	1.9	0.028	0.15	11.3	16.1	0.04
1402C_152	CLAY		3.62	17.1	3.51	13.75	0.11	2.5	0.044	0.43	14.1	18.5	0.18
1402C_153	SILTSTONE		5.29	27.8	5.19	15.2	0.18	2.7	0.044	1.82	21.5	9.5	0.56
1403D_159	SAND		2.97	16.7	4.24	21.5	0.11	4	0.033	0.28	13.2	5.8	0.62
1403D_160	CLAY		4	19.3	2.92	22.6	0.11	4.6	0.042	0.39	14.7	5.5	1.02
1403D_161	CLAY		10.3	31.5	4.26	21.7	0.21	4.3	0.063	1.27	40.1	19.9	0.4
1403D_162	CLAYSTONE		8.94	40	0.59	24.5	0.21	5.3	0.096	1.47	62.6	33.5	0.31
1403D_163	SILTSTONE		11.85	28.6	2.17	23.3	0.16	4.4	0.072	2.05	44	39.3	0.52
1403D_164	PEBBLE CONGLOMERATE		2.08	9.1	0.21	7	<0.05	2.2	0.031	1.16	14.6	11.8	0.03
1403D_165	SANDSTONE		1.99	5	0.19	8.85	0.06	2.3	0.022	1.45	18.2	14.4	0.05
1412C_166	LATERITE		3.11	23.1	2.71	11.4	0.1	2.9	0.038	0.43	22	14	0.36
1412C_167	SILTSTONE		6.67	44.2	4.51	19.4	0.16	3.9	0.065	1.89	26.2	12.2	0.98
1412C_168	SANDSTONE		6.38	44.6	3.77	20.3	0.17	4	0.066	2	26.4	12.8	0.97
1412C_169	SANDSTONE		7.65	23.2	2.61	18.2	0.14	4.8	0.064	1.76	37.9	36	0.57
1412C_170	SILTSTONE		9.6	37.8	1.18	31.8	0.18	8.2	0.123	1.93	73.8	44	0.42
1412C_171	CARBONACEOUS MUDSTONE		8.05	64.6	4.58	23.2	0.17	5	0.097	1.02	18.5	42.6	0.29
1412C_173	SANDSTONE		9.86	21.1	1.95	21.2	0.16	3.4	0.081	2.11	39.4	40.3	0.33
1414X_175	CLAY		5.87	26.2	3.29	14.6	0.18	3.8	0.054	0.97	36.7	20.8	0.43
1414X_176	CONGLOMERATE		1.47	10.3	1.87	5.24	0.08	1.8	0.018	0.32	25.9	11	0.09
1414X_177	SILTSTONE		8.38	37.7	2.95	27.6	0.18	5.6	0.082	0.96	61.4	30.8	0.17
1414X_178	CARBONACEOUS MUDSTONE		8.29	95.5	1.07	31.2	0.49	6	0.112	0.98	181	36.8	0.25
1429R_190	SOIL		8.36	29.2	4.28	20.2	0.19	4.4	0.07	1.23	41.9	29.3	0.51
1429R_191	MUDSTONE		5.94	19.9	4.86	18.95	0.18	3.3	0.047	1.51	18.9	8.7	0.96
1429R_192	CARBONACEOUS SHALE		1.61	16.3	1.91	11.05	0.12	3.2	0.046	0.2	22.4	9.2	0.67
1429R_193	MUDSTONE		7.15	34.2	3.43	18.95	0.2	4.8	0.075	1.7	34.4	32	0.58
1429R_194	COAL, undifferentiated		2.05	28.7	1.93	21.7	0.11	6.3	0.085	0.5	12.6	29.4	0.54
1429R_195	SANDSTONE		4.69	13.9	1.52	10.35	0.12	3	0.029	1.64	21.8	17.1	0.29
1429R_196	COAL, undifferentiated		1.34	17.1	1.17	9.79	0.09	2	0.036	0.31	9	15.2	0.1
1434D_205	SOIL		3.51	22	8.67	12.75	0.22	2.7	0.063	0.22	32.7	21.8	0.08
1434D_206	CLAYSTONE		18.1	50.9	4.84	22.6	0.29	4.2	0.075	1.42	98.4	27.7	0.47
1434D_207	SANDSTONE		3.31	9	1.05	13.45	0.11	2.5	0.034	2.16	18.4	12.6	0.11
1434D_208	SILTSTONE		4.77	17.2	2.02	21.1	0.13	3.4	0.048	1.67	21.1	13.8	0.94
1434D_209	SANDSTONE		3.29	27.2	2.68	19.55	0.16	2.8	0.052	1.49	20.1	12.3	0.89

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Cs	Cu	Fe	Ga	Ge	Hf	In	K	La	Li	Mg
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%
		LOD	0.05	0.2	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01
1434D_210	SILTSTONE		6.55	45.9	6	19.3	0.21	3.8	0.061	1.74	26.9	15.6	1.17
1434D_211	SANDSTONE		4.4	5.6	0.93	9.61	0.07	2.7	0.024	1.13	19.8	17.8	0.22
1434D_212	CARBONACEOUS SANDSTONE		12.9	54.9	7.91	25.4	0.22	5.1	0.089	2.34	41.9	39.6	0.5
1434D_213	CARBONACEOUS SANDSTONE		12.65	56.6	3.32	26.9	0.19	5.4	0.1	2.62	43.9	41.1	0.49
1444D_227	SANDSTONE		6.86	11.1	1.35	15	0.14	4.1	0.048	1.87	39.6	27.2	0.34
1444D_228	CARBONACEOUS SHALE		10.1	72	3.25	26.4	0.19	5.6	0.103	2.15	27.9	44.8	0.38
1444D_229	SILTSTONE		9.93	14.6	1.98	24.8	0.14	4	0.071	2.6	27.5	57.2	0.32
1445D_233	CARBONACEOUS SANDSTONE		7.3	52.7	5.1	18.5	0.18	3.5	0.06	1.68	21.9	22.7	0.64
1445D_234	SILTSTONE		3.82	34.7	2.94	20.8	0.19	9	0.063	0.61	34.2	11.2	1.45
1445D_235	CARBONACEOUS SHALE		1.28	9.2	2.01	9.61	0.12	2.5	0.042	0.17	21.2	9.1	0.51
1445D_237	CARBONACEOUS SANDSTONE		14.2	24.6	1.7	23.8	0.17	5	0.079	2.52	53.8	39.6	0.48
1445D_238	SANDSTONE		3.76	4.6	2.13	11.85	0.1	2.3	0.022	1.82	17.5	20.3	0.24
1445D_239	CARBONACEOUS SANDSTONE		14.65	60.5	4.23	30.3	0.24	5.8	0.101	3.04	49.2	48	0.55
1445D_240	CARBONACEOUS SANDSTONE		14	49.6	5.75	26.2	0.25	5.1	0.097	2.77	42.7	40.6	0.53
1445D_241	SILTSTONE		12.15	44.3	1.81	26	0.16	4.6	0.092	2.53	25.7	45.8	0.35
1451D_264	CLAY		3.93	17	2.65	11.9	0.13	2.7	0.042	0.51	22.4	20.6	0.21
1451D_265	SILTSTONE		14.4	27.5	1.5	24.3	0.17	5.4	0.084	2.13	57.2	44.3	0.53
1451D_266	CARBONACEOUS SANDSTONE		12.65	62.5	1.88	29.2	0.16	5.7	0.114	1.47	51.1	48.2	0.42
1451D_267	SANDSTONE		6.71	11.7	1.74	15.5	0.15	4	0.058	1.61	35.8	31.9	0.26
1452D_268	CLAY		13.25	28.5	3.89	25.8	0.17	4.3	0.071	1.69	33.4	14.9	0.32
1452D_269	CLAYSTONE		5.55	18.1	1.61	24.1	0.13	3.5	0.059	1.99	25.3	17	0.51
1452D_270	SILTSTONE		3.49	35.8	1.87	21.9	0.15	7.9	0.066	0.68	33.5	14	1.22
1452D_271	SANDSTONE		3.41	24.3	5.71	18.6	0.21	3.2	0.044	1.52	21.5	11.7	1
1452D_272	SILTSTONE		11.65	44.5	4.04	26.6	0.26	5	0.093	2.5	54.4	40.6	0.68
1452D_273	MUDSTONE		3.65	181	2.57	25.2	0.18	4.8	0.087	1.1	27.4	15.6	0.99
1452D_274	SANDSTONE		1.87	3.5	0.36	6.82	0.07	1.8	0.018	1.65	13.5	9.6	0.05
1453D_275	SOIL		7.01	27.6	3.41	17.35	0.18	3.6	0.058	1.09	33.9	24.4	0.52
1453D_276	CLAYSTONE		12.05	43	4.5	23.6	0.35	4.2	0.076	0.91	84	19.1	0.48
1453D_277	SANDSTONE		4.04	20	3.78	18.05	0.2	3.4	0.043	1.2	20.9	9.6	0.99
1453D_278	CARBONACEOUS MUDSTONE		0.92	20.1	0.53	10.75	0.07	2.6	0.034	0.14	14.3	15.4	0.43
1453D_279	CARBONACEOUS SANDSTONE		2.72	19.8	4.06	18.35	0.21	2.9	0.054	1.9	22.7	22.9	0.79
1453D_280	SANDSTONE		5.58	35.5	4.38	20.3	0.22	4.8	0.064	1.66	29.5	12	1.12
1453D_281	SILTSTONE		5.29	6.8	0.95	12.85	0.1	3.7	0.036	1.48	27	16.4	0.25
1453D_282	SANDSTONE		10.7	49.3	4.41	26.8	0.24	4.9	0.096	2.69	44.6	33.8	0.51
1454D_284	SILTSTONE		8.7	59.2	2.43	29.6	0.19	4.8	0.091	1.81	45.2	47.1	0.75
1454D_285	SILTSTONE		4.71	27.9	3.4	20.8	0.2	4.3	0.054	1.21	23.5	10.3	1.01
1454D_286	SANDSTONE		8.99	42.8	1.21	17.45	0.11	3.3	0.059	2.27	12.4	23	0.32
1454D_288	SILTSTONE		7.45	88.9	4.31	25.7	0.18	6.1	0.094	1.76	13.6	42.5	0.28
1454D_289	CARBONACEOUS SHALE		13.9	61.3	3.7	29.7	0.23	5.5	0.104	3.09	50.2	37.7	0.48
1454D_290	MUDSTONE		11.9	56.2	1.76	25.3	0.14	4.9	0.098	2.33	17.2	44.1	0.33
1398X_1	SOIL		4.36	20.2	2.62	12.95	0.2	2.9	0.043	0.54	24.1	17.1	0.17
1398X_2	SAND		3.65	12.8	2.38	12.25	0.19	2.9	0.041	0.41	20.1	14.7	0.14
1398X_9	SAND		1.69	6.5	1.78	5.84	0.14	1.9	0.022	0.19	12.3	11.1	0.07
1398X_14	SAND		6.25	10.1	1.02	13.8	0.18	3.5	0.041	0.93	31	16	0.23
1398X_19	CLAY		3.98	15.1	0.62	10.35	0.15	2.9	0.031	0.84	22.7	12.4	0.14
1398X_22	SAND		4.25	6.9	0.37	15.3	0.2	2.7	0.038	0.91	90.2	15.1	0.15
1398X_28	SAND		3.45	10.5	0.99	8.18	0.15	3.4	0.024	0.69	21.8	10.8	0.11
1398X_5032	SANDSTONE		1.42	5.7	5.35	5.23	0.24	1.8	0.032	0.36	12	10.1	0.09
1398X_33	SANDSTONE		6.4	8.2	1.32	16.85	0.22	4.6	0.046	1.55	38.5	25.2	0.23
1398X_34	COAL, undifferentiated		5.64	8.1	2.19	15	0.21	4	0.042	1.46	32.5	24.9	0.22

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Cs	Cu	Fe	Ga	Ge	Hf	In	K	La	Li	Mg
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%
		LOD	0.05	0.2	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01
1399X_2	SOIL		2.79	12.2	2.93	11.05	0.2	2	0.038	0.22	19.9	17.2	0.15
1399X_6	SAND		4.52	15.9	2.83	15.05	0.22	3.3	0.047	0.58	24.7	17.4	0.42
1399X_11	SAND		2.21	6.8	1.47	7.69	0.14	1.8	0.023	0.2	16.6	16	0.14
1399X_19	SAND		4.44	7.5	1.45	12.1	0.17	2.9	0.033	0.71	27.7	17.8	0.15
1399X_24	SAND		3.49	5.3	0.93	10.1	0.14	2.5	0.069	0.59	21.3	15.2	0.13
1399X_31	CLAY		11.45	15	2.54	27.8	0.26	5	0.072	1.09	58.2	28.6	0.25
1399X_32	CLAY		9.37	36.4	2.89	30.6	0.32	6.1	0.141	0.93	45.3	34.4	0.2
1399X_34	SANDSTONE		6.08	24.9	4.09	13.55	0.28	3.3	0.047	1.2	31.8	17.8	0.14
1399X_35	SANDSTONE		6.43	15	1.57	16.5	0.24	3.9	0.055	1.16	42.4	18.6	0.14
1399X_36	SANDSTONE		4.11	6	0.7	11.7	0.18	3.7	0.034	1.48	30.8	15.3	0.11
1400X_2	SOIL		5	17.9	2.47	12.7	0.24	3.3	0.043	0.9	25.9	16.9	0.26
1400X_7	SAND		2.5	9.7	1.49	7.12	0.16	1.9	0.024	0.51	13.1	10.8	0.11
1400X_11	SAND		2.33	12.5	6.08	8.46	0.24	1.8	0.041	0.28	14.1	14.5	0.13
1400X_25	CLAY		10.85	57.2	1.43	28.9	0.27	5.4	0.099	1.06	65.9	31.9	0.19
1400X_26	COALY SHALE		7.57	48.1	1.05	22.6	0.14	4	0.089	0.8	37.9	32.4	0.14
1401X_2	SOIL		1.53	10.1	2.59	6.59	0.15	2.2	0.033	0.22	14.8	9.8	0.04
1401X_3	SOIL		1.31	6.7	1.31	5.08	0.13	1.9	0.02	0.19	13.2	9.4	0.04
1401X_15	SAND		1.86	9.2	3.81	7.64	0.18	1.6	0.036	0.19	11.4	16	0.11
1401X_27	SANDSTONE		4.97	10.4	3	15	0.26	3.9	0.043	1.24	29.9	24.8	0.19
1401X_28	SANDSTONE		4.42	10.1	3.63	13.15	0.08	2.6	0.043	1.1	28.3	25.1	0.17
1404C_2	CLAY		5.12	18.6	2.76	13.5	0.23	3.1	0.046	0.77	28	18.5	0.26
1404C_4	SANDSTONE		2.1	8.5	2.08	6.33	0.15	1.4	0.023	0.22	10.2	12.8	0.11
1404C_8	SILTSTONE		3.58	11.8	10.4	30.2	0.43	5	0.075	0.37	40.3	10.9	0.13
1404C_11	SILTSTONE		3.71	12.8	4.49	23.8	0.25	5	0.05	0.38	22.4	5.7	0.67
1404C_18	SILTSTONE		12.55	29.1	6.5	24.7	0.46	4.4	0.097	1.45	76	14.2	0.44
1404C_19	SILTSTONE		13.85	32.5	7.17	24.6	0.35	4.5	0.104	1.56	39.2	16.3	0.41
1404C_20	SILTSTONE		9.8	27	3.64	24	0.37	4.6	0.077	1.45	51.2	17.4	0.35
1404C_22	SILTSTONE		9.81	21.7	4.02	19.85	0.31	4.6	0.075	1.36	45.5	15.3	0.31
1404C_24	SILTSTONE		3.76	89.9	1.14	20.3	0.12	4.2	0.08	0.51	23.3	15.9	0.35
1405C_1	CLAY		2.81	16.5	2.66	14.25	0.23	3.5	0.051	0.2	25.6	13.2	0.35
1405C_6	SILTSTONE		10	39.1	5.89	21	0.38	3.9	0.075	0.94	68.7	11	0.45
1405C_19	SANDSTONE		3.8	24.7	1.82	18.95	0.23	3.1	0.05	1.54	22.5	10.1	1.02
1405C_20	SANDSTONE		4.77	25.9	5.47	17.25	0.31	2.9	0.048	1.45	22.9	8.9	1
1405C_21	SANDSTONE		3.69	21.8	2.91	19.05	0.27	3.3	0.052	1.47	22	10.4	1.14
1405C_22	SANDSTONE		3.1	20.4	4.74	17.1	0.27	2.8	0.052	1.44	21.3	10.2	1.04
1405C_25	SANDSTONE		4.13	25.4	3.06	18.15	0.25	3.1	0.049	1.58	22.4	13.8	1.09
1405C_26	SANDSTONE		3.76	19	3.78	15.45	0.22	2.5	0.046	1.32	21.2	11.3	0.78
1405C_28	SANDSTONE		4.83	31.2	4.27	19.15	0.27	3.3	0.053	1.54	23.7	13.6	1.25
1405C_30	SANDSTONE		4.46	25.7	3.6	19	0.27	3.1	0.05	1.61	22.9	14.5	1.18
1405C_31	SANDSTONE		4.71	29.2	4.72	18.45	0.29	3.1	0.049	1.55	23.2	13.7	1.22
1405C_32	SANDSTONE		5.76	33.6	4.15	19.45	0.28	3.4	0.056	1.53	24.3	13.9	1.23
1405C_33	SANDSTONE		5.34	37.6	4.63	19.25	0.28	3.3	0.056	1.48	23.6	13.6	1.33
1405C_36	SANDSTONE		5.29	31.4	3.5	19.4	0.29	3.3	0.055	1.69	24.2	12	1.2
1405C_40	SANDSTONE		6.72	35.8	3.52	19.5	0.28	3.6	0.063	1.94	26.7	14.6	1.13
1405C_42	SANDSTONE		7.12	36	4.02	20.3	0.3	3.7	0.062	2.15	28.4	16.1	1.12
1405C_43	SANDSTONE		6.93	33.2	4.65	18.25	0.31	3.4	0.06	2.02	27.8	15.1	1.07
1405C_44	SANDSTONE		6.7	35.8	3.81	19.5	0.28	3.5	0.062	2.16	27.2	15.3	1.07
1405C_48	SANDSTONE		7.22	37	4.98	18.6	0.33	3.5	0.06	1.85	30	13.5	1.16
1405C_49	SANDSTONE		7.03	36.7	4.88	20.1	0.33	3.9	0.065	1.91	28.9	12.8	1.31
1405C_50	SANDSTONE		6.69	32.1	4.91	18.9	0.32	3.8	0.061	1.66	29.1	11.9	1.2

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Cs	Cu	Fe	Ga	Ge	Hf	In	K	La	Li	Mg
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%
		LOD	0.05	0.2	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01
1405C_51	SANDSTONE		7.72	27.3	3.42	19.6	0.27	4.3	0.065	1.83	32.3	16.4	0.98
1405C_52	SANDSTONE		8.63	25.5	3.1	19.95	0.29	4.3	0.068	1.91	36.2	21	0.88
1405C_53	SANDSTONE		8.5	20.6	3.29	18.5	0.29	4.3	0.059	1.78	37.7	22.5	0.84
1405C_54	SANDSTONE		7.8	34.3	2.4	21.3	0.26	5.3	0.075	1.52	38.9	19.4	0.97
1407C_78603	SAND		2.71	9.3	1.78	10.1	0.11	2	0.029	0.23	11.7	10.2	0.18
1407C_78606	SILTSTONE		1.91	9	4.92	32.3	0.17	4.6	0.051	0.17	21.9	11.9	0.09
1407C_78610	SILTSTONE		5.53	19.4	5.76	25.4	0.16	4.6	0.052	0.55	15.1	8.3	0.45
1407C_78611	SILTSTONE		6.89	24.2	6.1	25.8	0.23	4.3	0.063	0.83	82.5	8	0.51
1407C_78612	CLAY		8.23	23.8	5.51	28	0.2	5	0.085	0.97	40.5	10.1	0.45
1407C_78614	CLAY		8.85	22.8	4	27.7	0.26	4.4	0.117	1.34	87.7	12.4	0.38
1407C_78616	CLAY		9.17	22.5	1.68	27.9	0.18	5	0.072	1.41	56.6	14	0.36
1407C_78619	CLAY		5.93	56.2	0.9	22.1	0.36	5.1	0.112	0.75	49.6	13.4	0.2
1407C_78621	CLAY		4.03	142.5	2.96	39.2	0.32	8.2	0.22	0.33	25.1	19.5	0.17
1407C_78624	SILTSTONE		9.23	15.8	0.97	22.4	0.16	4.5	0.069	1.5	51.2	24.6	0.24
1407C_78627	SILTSTONE		7.45	15	1.65	16.4	0.12	4.3	0.049	1.23	36.6	19.7	0.2
1407C_78628	SILTSTONE		6.39	20.3	0.83	14	0.11	4.3	0.041	1.06	29.5	18.5	0.16
1407C_78630	SANDSTONE		10.3	21.7	0.73	22.8	0.13	4.3	0.083	1.7	45.8	29.5	0.25
1407C_78631	SANDSTONE		6.44	18.9	0.65	14.65	0.1	3.1	0.046	1.17	29.5	21.7	0.16
1407C_78632	SANDSTONE		2.86	6.6	0.4	7.36	0.05	1.9	0.018	0.59	16.5	12.9	0.08
1407C_78633	SANDSTONE		3.62	10.9	0.54	10	0.07	2.3	0.027	0.75	19.5	15.5	0.1
1408C_78650	SAND		2.29	10.9	3.31	15.25	0.12	2.8	0.03	0.18	15.8	11.8	0.13
1408C_78704	SILTSTONE		3.59	17.3	3.92	23.2	0.15	4.3	0.036	0.39	33.9	7.7	0.2
1408C_78708	SILTSTONE		8.38	33.1	5.39	26.6	0.26	4.5	0.079	0.86	59.8	9	0.51
1408C_78712	CLAY		10.25	29.7	2.62	25.2	0.16	4.6	0.072	1.34	34	14.1	0.38
1408C_78715	CLAY		8.93	30.3	1.03	24.9	0.15	5	0.061	1.23	56.4	15.1	0.33
1408C_78717	CLAY		2.63	149.5	1.31	36.8	0.19	7.9	0.17	0.25	18.2	17.8	0.15
1408C_78720	SILTSTONE		10.1	21.2	1.7	23.9	0.15	4.6	0.088	1.59	43	24.9	0.26
1408C_78725	SILTSTONE		7.7	19.7	0.85	20	0.14	4.9	0.064	1.33	42	23.7	0.23
1408C_78726	SANDSTONE		3.79	10.8	0.73	8.83	0.08	2.7	0.033	0.71	21.1	14.8	0.1
1408C_78727	SANDSTONE		4.98	7	0.91	10.75	0.08	2.6	0.027	0.87	18.8	16.6	0.12
1408C_78728	SANDSTONE		4.74	10.4	0.83	11.4	0.08	2.9	0.028	0.89	22.4	16.4	0.13
1408C_78730	SANDSTONE		1.33	7.8	0.35	4.22	0.06	1.7	0.011	0.33	15.2	12.8	0.04
1409C_5	SANDSTONE		4.41	6.5	0.9	14.95	0.11	2.3	0.034	1.42	26.6	11.2	0.07
1409C_11	COAL WEATHERED		6.82	27.1	7.28	20.3	0.28	3.1	0.059	1.27	28.3	18.2	0.16
1409C_12	COAL WEATHERED		3.5	12.7	4.1	19.6	0.21	3.1	0.053	1.3	24.6	19.3	0.12
1409C_13	COAL WEATHERED		2.38	39.3	4.44	32.3	0.29	7.8	0.089	0.25	18.7	41.8	0.16
1409C_14	COAL, undifferentiated		3.4	16.9	1.06	23.4	0.11	3.2	0.05	1.64	19.2	21.5	0.18
1409C_17	SANDSTONE		4.59	15.8	1.8	21.6	0.14	3	0.045	1.66	17.9	17.4	0.79
1409C_19	SANDSTONE		4.81	17.5	3.1	19.8	0.18	3.2	0.045	1.32	19.6	15.7	0.98
1409C_22	SANDSTONE		5.2	28.6	2.33	20.1	0.17	4.3	0.051	1.06	26.2	15.6	1
1409C_23	SANDSTONE		5.2	29.6	2.11	19.6	0.15	5	0.054	0.93	28.4	16.2	1
1409C_24	SANDSTONE		5.23	31.1	3.36	19.15	0.2	4.7	0.055	0.82	26.9	16.2	0.97
1409C_25	MUDSTONE		3.18	24.8	2.57	19.3	0.2	7.4	0.056	0.46	35.5	10.8	1.29
1409C_26	CARBONACEOUS MUDSTONE		1.86	22.2	2.57	17.35	0.17	4.8	0.059	0.37	23.9	11.1	1.22
1409C_27	CARBONACEOUS MUDSTONE		0.86	17.9	1.17	16.45	<0.05	4.8	0.064	0.16	16	14.6	0.75
1409C_29	SANDSTONE		3.19	21.6	4.01	17.75	0.2	2.9	0.047	1.31	20.6	9.1	0.86
1409C_30	SANDSTONE		4.54	27.9	2.96	20.6	0.24	3.2	0.061	1.23	23.3	12.2	0.81
1409C_31	SANDSTONE		4.52	29	4.46	19.2	0.24	3	0.051	1.61	21.7	12.6	0.98
1409C_32	SANDSTONE		4.83	29	4.39	18.1	0.22	3	0.051	1.55	22.2	11.1	0.93
1409C_33	SANDSTONE		6.26	43.2	4.97	20.1	0.23	3.5	0.065	1.87	25.9	12.2	0.99

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Cs	Cu	Fe	Ga	Ge	Hf	In	K	La	Li	Mg
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%
		LOD	0.05	0.2	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01
1409C_34	SILTSTONE		7.99	30.9	4.57	20.6	0.26	4.3	0.072	1.69	38.6	18.8	0.83
1410C_1	SAND		5.33	21	3.26	20.8	0.19	3.8	0.074	0.28	29.2	20.5	0.09
1410C_2	LATERITE		4.39	22.9	9.92	23.3	0.27	3.8	0.109	0.3	23.2	18.8	0.09
1410C_3	SANDSTONE		4.08	19.1	3.52	17.7	0.25	3.1	0.059	0.76	53.3	10.7	0.1
1410C_8	SANDSTONE		2.58	11.4	1.81	16.2	0.15	2.6	0.048	0.92	22.2	10.4	0.07
1410C_13	SANDSTONE		7.35	18.3	1.29	27.4	0.23	3.7	0.08	2.07	49.1	13.6	0.26
1410C_17	SILTSTONE		6.06	39.9	1.78	23.2	0.19	4.6	0.057	1.25	24.2	12.5	1.1
1410C_22	MUDSTONE		5.5	31	2.46	19.35	0.2	4	0.054	0.94	31.1	11.9	0.9
1410C_28	COAL, undifferentiated		0.5	5.8	0.76	4.09	<0.05	0.7	0.015	0.09	5.7	5	0.1
1410C_29	COAL, undifferentiated		0.77	49.6	1.58	13.25	<0.05	3.5	0.057	0.37	12.3	14.1	0.48
1410C_30	COAL, undifferentiated		0.86	23.4	0.9	14.7	<0.05	3.4	0.056	0.29	14.5	15.2	0.55
1410C_31	COAL, undifferentiated		3.18	17	0.46	9.43	<0.05	1.8	0.037	0.35	10.9	15	0.16
1410C_35	SILTSTONE		6.51	48.2	7.83	20.5	0.32	3.6	0.063	1.8	27.5	16.9	0.92
1410C_40	SANDSTONE		3.21	26.2	2.2	21.4	0.22	2.7	0.057	1.41	19.5	10.5	0.81
1410C_46	SANDSTONE		2.95	18.3	3.2	15.1	0.22	2.6	0.046	1.74	20.9	11.6	0.56
1410C_47	SANDSTONE		2.87	18.5	3.48	16.4	0.2	2.5	0.048	1.86	20.1	13.7	0.68
1410C_48	SANDSTONE		3.58	19.2	2.64	16.25	0.21	2.6	0.044	1.5	22.2	9.8	0.56
1410C_49	SANDSTONE		4.33	40.9	3.43	20.7	0.22	3.4	0.058	1.55	23.3	12.6	0.9
1410C_50	SANDSTONE		4.54	29.1	3.44	21.5	0.22	3.8	0.063	1.41	24.4	12.7	0.99
1410C_51	SANDSTONE		4.2	26.1	2.52	19.25	0.27	3.2	0.059	1.41	25.6	11	0.77
1410C_57	SILTSTONE		3.72	24.9	2.75	19.1	0.23	2.8	0.052	1.56	21.8	10.2	0.81
1410C_58	SANDSTONE		4.19	30	3.06	20.6	0.22	3.3	0.054	1.59	21.3	11.5	0.96
1410C_59	SANDSTONE		4.45	31.4	4	20.7	0.23	3.3	0.053	1.68	23.9	12.8	1.03
1410C_60	SANDSTONE		4.59	33.6	4.69	19.7	0.23	3.2	0.057	1.71	22.5	11.6	1.03
1410C_65	SANDSTONE		6.54	51.2	3.68	22.1	0.23	3.8	0.069	2.04	27.7	13.7	1.07
1410C_70	SANDSTONE		4.87	35.7	4.11	20.4	0.22	3.1	0.054	1.92	23.7	9.8	1.12
1410C_74	SANDSTONE		6.76	46	3.59	22	0.22	3.8	0.072	2.11	24.6	13.7	0.97
1410C_78	SANDSTONE		6.58	41.2	4.51	21.3	0.26	4	0.065	1.9	28.9	13	1.03
1410C_84	SILTSTONE		10.8	45	3.09	27	0.25	5	0.097	2.34	37.1	35.5	0.6
1412C_1	CLAY		3.29	24	3.85	13.45	0.2	2.9	0.046	0.44	23.6	13.5	0.36
1412C_8	SANDSTONE		5.79	42.6	3.36	21.6	0.24	3.8	0.069	1.76	27.6	13.6	0.88
1412C_17	SANDSTONE		5.04	39.4	3.01	19.4	0.23	3.3	0.062	1.58	24.3	10.3	0.82
1412C_19	SANDSTONE		5.62	41.9	4.21	21.3	0.24	3.7	0.064	1.9	26.5	13.5	1.06
1412C_20	SANDSTONE		5.64	41.7	4.88	20.9	0.26	3.6	0.064	1.9	25.1	13.2	1.1
1412C_21	SANDSTONE		6.02	42.2	3.96	20.9	0.23	3.7	0.067	1.96	25.6	13.7	1.08
1412C_22	SANDSTONE		5.47	39.6	5.29	19.8	0.26	3.4	0.06	1.79	24.3	12.4	1.16
1412C_23	SANDSTONE		6.46	44.8	3.6	22.3	0.23	3.9	0.069	1.96	26.4	13.8	1.14
1412C_27	SANDSTONE		6.51	38.1	3.79	21.7	0.23	3.9	0.065	1.77	28.4	11.5	1.15
1412C_28	SANDSTONE		5.64	37	4.5	21.4	0.26	4.2	0.059	1.6	27.1	10.9	1.26
1412C_51	SANDSTONE		8.84	19	1.73	19.25	0.2	4.6	0.059	1.75	37	25.2	0.42
1412C_52	SANDSTONE		8.31	18.1	1.92	18.25	0.2	5.7	0.062	1.79	38.1	24.2	0.44
1412C_53	SANDSTONE		7.83	14.9	1.52	17.75	0.18	5	0.051	1.55	37.1	24.4	0.35
1412C_56	SANDSTONE		9.13	22.6	1.22	20.9	0.2	4.5	0.067	1.85	42.3	28.3	0.4
1414X_3	SANDSTONE		4.57	16.1	2.39	12	0.11	2.6	0.043	0.61	23.8	18.5	0.24
1414X_8	SANDSTONE		1.97	10.3	3.03	7.63	0.09	1.7	0.029	0.21	12	14	0.3
1414X_14	SANDSTONE		5.6	5.7	0.91	12.45	0.07	3.2	0.035	0.84	26.9	16.4	0.17
1414X_25	SANDSTONE		1.27	10.4	1.53	3.72	0.06	1.6	0.012	0.19	11.8	10.8	0.09
1429R_24	CLAYSTONE		6.01	18.9	1.05	24.1	0.27	3.4	0.064	1.93	58.9	11.4	0.41
1429R_26	SILTSTONE		5.1	48.8	2.54	20.6	0.14	2.8	0.047	1.78	17.8	8.1	0.65
1429R_31	MUDSTONE		5.64	33.3	3.88	19.95	0.21	3.6	0.049	1.27	23.9	7.8	0.95

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Cs	Cu	Fe	Ga	Ge	Hf	In	K	La	Li	Mg
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%
		LOD	0.05	0.2	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01
1429R_33	SANDSTONE		4.7	22.5	2.75	19.05	0.19	3.8	0.048	1.16	26	8.2	0.98
1429R_38	SANDSTONE		3.83	30.1	3.07	19.8	0.24	7	0.058	0.69	29.7	8.6	1.3
1429R_41	COAL, undifferentiated		1.69	27.8	2.42	10.3	0.06	2.8	0.046	0.29	12.4	11	0.55
1429R_42	CLAY		1.18	8	1.64	11.95	0.07	3.1	0.043	0.25	17.7	8.8	0.72
1429R_43	CARBONACEOUS SHALE		1.45	53.1	1.7	14.7	0.07	3	0.054	0.38	17.5	11.5	0.77
1429R_44	CARBONACEOUS SHALE		1.36	17.5	1.48	15	0.09	4.1	0.055	0.2	30.1	9.9	0.67
1429R_74	SILTSTONE		4.68	26.2	3.47	19.45	0.24	3.6	0.055	1.72	21.9	11.1	1.1
1429R_80	SILTSTONE		5.15	30.3	3.82	19.5	0.24	3.8	0.058	1.56	22.6	10.1	1.17
1429R_83	SILTSTONE		4.71	26	3.72	20.9	0.26	4.3	0.059	1.17	25.5	10.1	1.18
1429R_84	SILTSTONE		4.77	24.7	3.38	21.4	0.27	4.4	0.059	1.29	25.7	10.3	1.21
1429R_85	SILTSTONE		5.9	38.7	4.17	20.8	0.27	3.6	0.061	1.83	22.8	11.3	1.17
1429R_88	SILTSTONE		5.68	36.9	4.21	21.1	0.25	3.6	0.061	2.17	23.4	14.3	1.03
1429R_92	SILTSTONE		5.56	37.7	4.18	18.85	0.24	3.4	0.061	2.41	23.9	17.4	0.77
1429R_95	SANDSTONE		6.58	47.8	4.64	22.9	0.28	4	0.07	2.88	25.8	25.3	0.79
1429R_98	SANDSTONE		6.07	47.3	3.59	22.5	0.25	4.1	0.07	2.8	26.1	18.4	0.76
1429R_119	SILTSTONE		6.39	24.7	2.4	24.5	<0.05	5	0.071	1.2	11	57.3	0.28
1429R_120	SILTSTONE		10.75	18.9	2.46	21	0.22	4.6	0.066	2.01	37.4	32	0.48
1429R_121	SILTSTONE		6.94	15.9	1.81	17.8	0.05	3.8	0.06	1.2	26.7	28.8	0.48
1429R_122	SILTSTONE		5.67	11	1.26	12.6	0.15	4.4	0.036	1.4	24.8	18.5	0.31
1429R_129	SANDSTONE		6.05	14.7	2.08	17.4	0.19	3.6	0.05	1.95	28.9	23.3	0.27
1429R_130	SANDSTONE		6.47	54.2	1.77	23.7	0.08	5.3	0.099	1.31	28.3	39.4	0.23
1429R_131	COAL, undifferentiated		10.75	55	2.48	25.1	0.09	5.1	0.093	2.15	23.6	35.7	0.34
1429R_132	MUDSTONE		12.4	54.7	3.51	28.4	0.25	5.4	0.098	2.51	37.9	35.9	0.48
1429R_133	MUDSTONE		13.45	54.7	3.64	33.8	0.26	5.4	0.108	2.41	39.6	37.6	0.5
1429R_139	COAL, undifferentiated		1.4	27.2	0.75	10.65	0.08	2.6	0.067	0.29	23	16.7	0.08
1429R_140	COAL, undifferentiated		0.49	18.5	1.2	8.1	0.11	1.8	0.049	0.09	16.3	11	0.06
1429R_141	COAL, undifferentiated		6.14	51.7	1.33	15.35	0.05	3.4	0.06	0.72	13.6	14.2	0.42
1429R_142	COAL, undifferentiated		6.09	9	1.36	19.15	0.2	4.4	0.056	1.91	32.5	21.4	0.13
1429R_143	COAL, undifferentiated		7.04	10.4	0.91	20.8	0.17	3.7	0.055	2	28.5	24.3	0.14
1447L_34	SAND		0.55	3.2	1.21	1.75	0.11	0.9	0.01	0.08	5.3	9.2	0.02
1447L_37	CLAY		4.73	18.4	2.69	15.25	0.26	3.7	0.049	0.49	38	18.8	0.31
1447L_39	CLAY		3.36	12.9	2.58	11.85	0.18	3	0.04	0.39	19.3	14.5	0.25
1447L_41	CLAY		4.28	12	2.89	15.9	0.2	3.7	0.057	0.44	24.3	15.2	0.31
1447L_43	CLAY		2.55	12.9	7.47	9.75	0.25	2.6	0.059	0.27	23.3	9.5	0.18
1447L_46	SILCRETE		1.43	14.3	2.38	9.27	0.1	4	0.035	0.13	11.4	10.8	0.08
1447L_47	SILCRETE		0.58	8	0.74	4.41	0.06	5.3	0.026	0.06	12.1	7.8	0.03
1447L_50	SILCRETE		2.43	6.8	1.79	28.3	0.1	4.3	0.061	0.21	21	14	0.06
1447L_52	SILCRETE		2.94	6.2	1.21	23.4	0.09	4.3	0.048	0.29	37.2	13.2	0.07
1447L_54	SANDSTONE		2.15	4.7	0.93	14.05	0.07	2.9	0.032	0.2	16.2	12.9	0.05
1447L_60	CLAY		5.47	25.1	4.36	22.8	0.18	3.5	0.057	0.82	38.6	6.1	0.95
1447L_63	CLAY		5.31	23.6	4.39	21.6	0.24	3.7	0.056	1.28	28	9.4	0.88
1447L_66	CLAY		8.97	27.1	5.92	20.5	0.2	3.2	0.067	1.3	23.7	6	0.92
1447L_70	CLAY		6.37	78.4	2.95	22.9	0.23	4.3	0.072	1.31	45.7	10.6	0.68
1447L_77	CLAY		11.95	42	3.83	26.5	0.22	4.8	0.087	2.09	47.3	33.5	0.69
Tailings -250			0.36	12.7	2.2	8.43	0.11	1.9	0.03	0.09	12.8	11.3	0.05
Rejects +250			1.3	19.7	4.75	29.7	0.22	4.1	0.086	0.38	34.6	66.1	0.13
Product +250			0.23	12.9	0.77	6.62	0.09	1.9	0.029	0.04	14.4	10.6	0.04

MEMS61 - 4 acid digest

MEMS42 - Aqua regia digest

Samples with TC > were ashed prior to MEMS61

Aqua regia digest was carried out on a split of samples with TC > 5% to capture volatile elements (As, Hg, Sb, Se, Te and Tl)

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
		LOD	5	0.05	0.01	0.1	0.2	10	0.5	0.1	0.002	0.01	0.05
1388R_95	SAND		1400	1.11	0.11	7.4	29.2	220	25	46.5	<0.002	0.01	1.46
1388R_96	SANDSTONE		598	0.77	0.88	6	21.6	700	10.5	72.6	0.002	0.03	0.49
1388R_97	SANDSTONE		768	1.3	0.4	10.7	26.2	750	20.9	123.5	<0.002	0.05	0.77
1388R_100	SANDSTONE		402	1.22	0.09	12.7	21.4	290	24.2	116	0.002	0.15	0.72
1389R_102	SILTSTONE		61	0.88	0.35	5.8	16.1	580	10.9	23.6	0.002	0.08	0.51
1389R_103	SILTSTONE		129	0.92	0.1	10.1	18	180	18.2	105.5	<0.002	0.11	0.57
1389R_104/105/106	COAL, undifferentiated		219	1.38	0.1	8.8	19.4	400	21.5	81.8	0.002	0.08	0.8
1389R_107	SANDSTONE		254	1.27	0.08	10.8	20.6	250	20.7	106.5	<0.002	0.14	0.68
1397D_134	CLAY		168	0.58	0.14	10.9	15.2	80	14.7	55	<0.002	0.01	0.74
1397D_135	CLAY		84	0.26	0.1	4.8	6.8	40	6.9	21.9	<0.002	0.03	0.41
1397D_136	SAND		47	0.29	0.17	7.4	10.7	60	9.5	33.1	<0.002	0.01	0.71
1397D_137	CLAY		30	1.9	0.28	9.6	24.7	830	43.4	50	0.002	0.01	0.86
1397D_138	SILTSTONE		50	0.35	0.04	8.6	12.4	70	9.9	80.4	<0.002	0.09	0.47
1397D_139	SANDSTONE		18	0.42	0.05	6.7	9	70	11.3	77.1	0.002	0.04	0.49
1397D_140	SANDSTONE		24	0.27	0.03	8.5	8.7	70	10.2	85.8	<0.002	0.01	0.75
1397D_141	SANDSTONE		25	0.12	0.03	5.4	8.3	60	12.4	63.9	<0.002	0.01	0.56
1397D_146	SILTSTONE		86	0.4	0.07	14.2	11.2	160	23.5	131	<0.002	0.03	0.66
1402C_151	SOIL		47	0.58	0.01	5.4	12.8	90	9	25.7	<0.002	<0.01	0.5
1402C_152	CLAY		73	0.71	0.07	7.1	16.5	90	15	47.8	<0.002	<0.01	0.7
1402C_153	SILTSTONE		2310	1.08	0.48	5.8	29.7	1310	9.8	93.9	0.002	0.06	0.44
1403D_159	SAND		27	0.67	0.23	7.9	7.7	120	6.8	23.8	<0.002	0.02	0.61
1403D_160	CLAY		36	0.7	0.32	8.6	10.1	140	5.8	32.3	<0.002	0.02	0.82
1403D_161	CLAY		101	1	0.14	12.3	21.8	520	30.3	116.5	<0.002	0.01	17.2
1403D_162	CLAYSTONE		24	1.24	0.14	13.1	24.7	440	24.1	112	0.003	0.06	3100
1403D_163	SILTSTONE		179	0.63	0.06	13.6	23.1	170	25	151.5	<0.002	0.02	1
1403D_164	PEBBLE CONGLOMERATE		23	1.13	0.05	4.5	6.3	80	26.7	72.7	<0.002	0.01	80.2
1403D_165	SANDSTONE		22	0.74	0.07	4.5	23	130	21.4	80.4	0.005	0.05	1.09
1412C_166	LATERITE		608	0.68	0.41	6.9	16.7	110	20.6	42	<0.002	0.03	0.58
1412C_167	SILTSTONE		666	1.05	0.86	7.5	25.4	740	16.1	108	0.002	0.04	0.54
1412C_168	SANDSTONE		282	0.91	0.8	7.8	24.5	790	16.5	112	<0.002	0.04	0.56
1412C_169	SANDSTONE		102	1.71	0.15	10.2	21.8	300	22.3	123.5	0.002	0.11	1.87
1412C_170	SILTSTONE		72	2.37	0.06	20.4	21.2	160	53.5	148.5	0.003	0.03	1.27
1412C_171	CARBONACEOUS MUDSTONE		336	1.49	0.07	12.3	37.1	520	29.8	68.3	0.002	0.1	1.45
1412C_173	SANDSTONE		139	0.96	0.08	16.3	16.3	160	33.7	145	0.002	0.04	0.79
1414X_175	CLAY		1120	0.61	0.23	11	25.5	360	22.7	90.3	<0.002	0.02	0.89
1414X_176	CONGLOMERATE		262	0.3	0.1	3.9	7.7	140	17.7	25.6	<0.002	0.01	0.47
1414X_177	SILTSTONE		55	1.1	0.27	13.6	5.1	570	37.7	84	<0.002	0.02	0.94
1414X_178	CARBONACEOUS MUDSTONE		49	1.55	0.32	14.8	43.3	400	36	85.5	0.006	0.08	1.18
1429R_190	SOIL		1060	0.53	0.36	12.6	34.6	270	24.1	116.5	<0.002	0.02	0.99
1429R_191	MUDSTONE		116	0.73	1.05	5.8	39.5	660	14.3	83	<0.002	0.01	0.64
1429R_192	CARBONACEOUS SHALE		174	2.66	0.41	5	2.6	120	19.9	12.1	0.002	0.29	0.78
1429R_193	MUDSTONE		645	2.35	0.33	9.8	19.2	1040	20.7	113	0.002	0.05	0.65
1429R_194	COAL, undifferentiated		57	3.66	0.27	10.9	12.8	580	26	13	0.002	0.1	0.59
1429R_195	SANDSTONE		269	1.62	0.17	6.2	12.5	270	14.8	98.1	<0.002	0.05	0.47
1429R_196	COAL, undifferentiated		82	1.32	0.08	3.6	8.5	120	10.1	15.5	<0.002	0.13	0.96
1434D_205	SOIL		689	1.52	0.03	8.1	33.3	200	31.4	33.3	<0.002	0.01	1.15
1434D_206	CLAYSTONE		399	0.29	0.14	10.1	87.5	480	21.3	170	<0.002	0.03	6.87
1434D_207	SANDSTONE		119	0.44	0.42	5.5	27.6	90	15	110.5	<0.002	0.01	0.55
1434D_208	SILTSTONE		293	0.46	0.66	5.9	17	630	14.4	83.5	<0.002	0.04	0.94
1434D_209	SANDSTONE		783	0.71	0.8	5.8	18.5	770	13.4	72.9	<0.002	0.05	0.81

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
		LOD	5	0.05	0.01	0.1	0.2	10	0.5	0.1	0.002	0.01	0.05
1434D_210	SILTSTONE		809	0.79	0.71	7.2	26.3	660	15.8	96.5	0.002	0.04	0.89
1434D_211	SANDSTONE		71	0.58	0.03	7.2	15.7	60	10.9	84.6	<0.002	0.3	0.53
1434D_212	CARBONACEOUS SANDSTONE		1940	0.92	0.11	11.8	31.9	800	29.4	154	0.002	0.08	1.02
1434D_213	CARBONACEOUS SANDSTONE		233	0.91	0.15	13	22.7	670	29	165	0.002	0.06	0.93
1444D_227	SANDSTONE		94	0.66	0.06	11	23.5	190	20.7	129.5	<0.002	0.02	0.56
1444D_228	CARBONACEOUS SHALE		519	1.72	0.12	13.8	59.9	610	32.8	119.5	<0.002	0.09	1.42
1444D_229	SILTSTONE		103	2.86	0.1	13.9	22	120	26.4	156.5	<0.002	0.02	0.43
1445D_233	CARBONACEOUS SANDSTONE		1065	2.81	0.52	5.1	42.2	500	21.2	73.7	0.002	0.28	1.05
1445D_234	SILTSTONE		517	10	0.73	9.9	12.2	600	27.5	36.7	0.002	0.04	1.07
1445D_235	CARBONACEOUS SHALE		400	1.32	0.27	5.4	2	80	17.8	10.1	0.003	0.28	0.66
1445D_237	CARBONACEOUS SANDSTONE		111	0.78	0.1	15.7	20.6	130	30.2	180	<0.002	0.02	0.71
1445D_238	SANDSTONE		113	0.6	0.08	5.5	9.9	140	16.7	108.5	<0.002	0.01	0.49
1445D_239	CARBONACEOUS SANDSTONE		659	0.97	0.17	13.8	46.5	710	32.7	184.5	0.002	0.12	1.26
1445D_240	CARBONACEOUS SANDSTONE		1770	0.87	0.19	12	35.5	680	30.1	173.5	0.002	0.05	0.99
1445D_241	SILTSTONE		118	1.06	0.16	14.5	32.6	310	31.4	143.5	0.002	0.04	0.85
1451D_264	CLAY		434	0.57	0.18	7.5	18.4	140	17.2	53.9	<0.002	0.01	1.64
1451D_265	SILTSTONE		97	0.81	0.07	16.5	29.3	150	32.5	171	0.002	0.04	0.87
1451D_266	CARBONACEOUS SANDSTONE		163	0.7	0.07	14.3	20	580	32.5	129.5	0.002	0.07	0.96
1451D_267	SANDSTONE		147	1.15	0.06	11.5	19.3	140	24.3	119.5	<0.002	0.25	0.5
1452D_268	CLAY		59	0.45	0.2	11.2	30	210	15.9	154	<0.002	0.02	1.08
1452D_269	CLAYSTONE		932	0.99	0.56	5.8	21.2	530	21.6	95	<0.002	0.02	1.35
1452D_270	SILTSTONE		47	3.11	0.18	8.9	23.7	450	49.6	41.2	<0.002	0.02	1.76
1452D_271	SANDSTONE		957	1.1	0.68	5.8	23.1	610	13.8	73.3	<0.002	0.04	23.5
1452D_272	SILTSTONE		717	1.2	0.32	13.4	33.8	780	31.1	169.5	0.002	0.04	0.93
1452D_273	MUDSTONE		129	2.89	0.34	6.8	3.9	1510	20.4	51.1	0.002	0.09	0.66
1452D_274	SANDSTONE		34	0.63	0.06	3.2	14.6	150	19.4	86.3	<0.002	0.08	1.43
1453D_275	SOIL		741	0.37	0.22	8.9	29.6	230	20	100	<0.002	0.02	1.19
1453D_276	CLAYSTONE		195	0.35	0.24	9	35.2	700	34.6	106	<0.002	0.02	0.89
1453D_277	SANDSTONE		719	1.1	0.84	5.4	20.3	790	20.6	59	<0.002	0.03	2.94
1453D_278	CARBONACEOUS MUDSTONE		21	2.02	0.31	4.2	2.7	30	14.2	7.1	<0.002	0.12	2.69
1453D_279	CARBONACEOUS SANDSTONE		526	0.44	1.11	5.5	21.3	800	11.8	88.7	<0.002	0.02	0.57
1453D_280	SANDSTONE		852	1.51	0.73	7	23.8	740	28.1	89.3	<0.002	0.03	1.06
1453D_281	SILTSTONE		59	0.35	0.04	8.2	9.2	70	13.7	97.8	<0.002	0.02	0.45
1453D_282	SANDSTONE		1190	0.82	0.33	12	25.8	780	29.6	159.5	0.002	0.04	1
1454D_284	SILTSTONE		188	0.85	0.41	12.1	27.9	440	30.8	109.5	<0.002	0.04	1.05
1454D_285	SILTSTONE		612	1.47	0.91	6.5	24.3	660	20.5	62.2	<0.002	0.04	0.88
1454D_286	SANDSTONE		111	2.32	0.4	7.1	40.4	270	16	100	<0.002	0.09	1.53
1454D_288	SILTSTONE		1565	2.72	0.13	12.8	76.5	600	37.1	78	0.002	0.14	1.59
1454D_289	CARBONACEOUS SHALE		802	0.69	0.17	12.3	30.4	700	32.4	180.5	<0.002	0.08	1.13
1454D_290	MUDSTONE		125	0.76	0.14	13.6	30.3	350	29.1	124	0.002	0.04	0.95
1398X_1	SOIL		344	1.58	0.05	8.3	16.5	200	14.4	58.5	<0.002	<0.01	0.73
1398X_2	SAND		100	1.07	0.05	7.6	11.6	180	14	42.9	<0.002	<0.01	0.69
1398X_9	SAND		52	0.57	0.08	5.3	6.9	80	9.5	21.8	<0.002	0.01	0.48
1398X_14	SAND		30	0.69	0.13	10.2	8.3	100	13.6	76.7	<0.002	0.01	0.57
1398X_19	CLAY		32	2.15	0.1	8.3	5.8	70	10.1	64.8	<0.002	0.01	0.51
1398X_22	SAND		23	0.63	0.12	9.6	3.6	760	100.5	69.2	<0.002	0.01	0.52
1398X_28	SAND		47	1.55	0.07	7.3	7.7	80	11.2	51.6	<0.002	0.24	1.27
1398X_5032	SANDSTONE		278	0.64	0.06	3.8	3.7	90	9.7	23.4	<0.002	0.09	0.76
1398X_33	SANDSTONE		100	0.93	0.11	12.6	19	120	18.9	110.5	<0.002	0.16	0.51
1398X_34	COAL, undifferentiated		196	1.03	0.11	10.9	16.5	110	18	92.4	<0.002	0.14	0.48

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
		LOD	5	0.05	0.01	0.1	0.2	10	0.5	0.1	0.002	0.01	0.05
1399X_2	SOIL		207	1.23	0.04	5.7	14.4	90	14.8	36.1	<0.002	<0.01	0.66
1399X_6	SAND		81	0.46	0.22	11.2	13.4	100	16	59.4	<0.002	0.01	0.77
1399X_11	SAND		74	0.39	0.12	4.6	8	70	9.2	22.6	<0.002	<0.01	0.45
1399X_19	SAND		53	1.12	0.08	8.3	6.4	110	13.2	55.9	<0.002	0.01	0.61
1399X_24	SAND		45	0.37	0.07	7	4.2	90	12.8	48.5	<0.002	0.01	0.81
1399X_31	CLAY		95	0.72	0.18	13.6	5.8	550	37.2	90.3	0.002	0.01	0.79
1399X_32	CLAY		93	1.92	0.17	15	6.3	420	32.5	81.9	0.002	0.01	1.38
1399X_34	SANDSTONE		502	0.73	0.1	9	7.9	210	20.8	84.2	<0.002	0.06	0.57
1399X_35	SANDSTONE		77	0.55	0.1	9.6	12.4	270	23.1	87.5	<0.002	0.1	0.61
1399X_36	SANDSTONE		55	0.73	0.08	9	8.7	140	15	94.1	<0.002	0.12	0.43
1400X_2	SOIL		498	0.4	0.25	9.7	15.4	220	17	74.1	<0.002	0.03	0.81
1400X_7	SAND		51	0.78	0.17	4.8	8.1	100	10.5	37.9	<0.002	0.01	0.57
1400X_11	SAND		123	0.85	0.19	4.2	14.2	220	18.3	27.5	<0.002	0.01	0.92
1400X_25	CLAY		44	1.07	0.25	13.6	44.4	630	39.5	95.6	0.006	0.58	1.87
1400X_26	COALY SHALE		34	1.24	0.19	11.3	49.2	410	26	69.2	0.003	0.12	1.21
1401X_2	SOIL		91	1.4	0.02	6.8	8.1	130	12.6	20.2	<0.002	0.01	0.71
1401X_3	SOIL		102	0.6	0.02	6.4	5.2	90	11.7	17.2	<0.002	<0.01	0.52
1401X_15	SAND		114	0.98	0.09	3.8	10.7	120	14.5	20.1	<0.002	0.01	0.76
1401X_27	SANDSTONE		365	0.87	0.06	10.2	14.4	150	18.1	90.8	<0.002	0.16	0.48
1401X_28	SANDSTONE		182	2.59	0.05	9.2	18.1	110	16.4	77.1	<0.002	0.34	0.7
1404C_2	CLAY		719	0.76	0.25	9.6	19.1	190	19.2	70.9	<0.002	0.02	0.78
1404C_4	SANDSTONE		117	0.56	0.11	2.9	8.7	100	10.3	23.1	<0.002	0.02	0.43
1404C_8	SILTSTONE		138	1.19	0.23	11.6	4.7	340	26.3	30.3	<0.002	0.03	0.9
1404C_11	SILTSTONE		65	1.35	0.42	10.1	8.3	280	13.8	34.3	<0.002	0.03	0.67
1404C_18	SILTSTONE		338	1.12	0.28	13.6	45.4	960	34	135	0.002	0.02	0.87
1404C_19	SILTSTONE		158	1.4	0.25	14.4	38.9	740	24	137	<0.002	0.02	0.86
1404C_20	SILTSTONE		66	1.6	0.26	14.3	12.3	530	26.2	105	0.002	0.02	0.94
1404C_22	SILTSTONE		30	1.5	0.22	12.7	10.8	460	25.3	110.5	<0.002	0.03	0.77
1404C_24	SILTSTONE		37	1.26	0.31	7.7	41.9	190	19.1	35.8	0.009	0.18	0.84
1405C_1	CLAY		351	1.85	0.07	8.5	12.9	110	13.8	26.1	<0.002	0.02	0.73
1405C_6	SILTSTONE		376	2.25	0.13	8.8	49.1	360	30.9	93.7	<0.002	0.03	0.71
1405C_19	SANDSTONE		302	0.99	0.63	7	22.2	600	13.1	82.7	0.002	0.04	0.47
1405C_20	SANDSTONE		310	2.37	0.58	6.3	25.7	600	12.2	81	0.002	0.04	0.58
1405C_21	SANDSTONE		514	0.91	0.63	7.1	23	650	14.1	78.1	0.002	0.04	0.46
1405C_22	SANDSTONE		838	1.42	0.64	6.3	22.4	750	10.8	70.6	<0.002	0.04	0.45
1405C_25	SANDSTONE		751	1.64	0.66	6.4	24.2	820	10.7	77.3	<0.002	0.05	0.45
1405C_26	SANDSTONE		1500	0.83	0.62	5.3	16.2	850	9.1	64.5	<0.002	0.04	0.36
1405C_28	SANDSTONE		561	0.9	0.59	6.8	22.4	740	12.7	80.1	<0.002	0.04	0.52
1405C_30	SANDSTONE		637	1.19	0.69	6.5	22.2	790	14.1	80.6	<0.002	0.04	0.48
1405C_31	SANDSTONE		721	1.38	0.63	6.5	22.7	780	12.3	78.9	<0.002	0.04	0.49
1405C_32	SANDSTONE		622	0.92	0.55	7.2	21.5	790	13	83.8	0.002	0.04	0.49
1405C_33	SANDSTONE		659	0.92	0.51	6.7	23	820	13	78.2	0.002	0.04	0.46
1405C_36	SANDSTONE		596	1	0.59	6.9	21.8	860	13	90.3	<0.002	0.04	0.47
1405C_40	SANDSTONE		575	0.96	0.5	7.9	23.9	740	14.8	108	<0.002	0.04	0.55
1405C_42	SANDSTONE		578	1.12	0.48	8.3	25.7	760	15.8	120	<0.002	0.04	0.6
1405C_43	SANDSTONE		1010	1.08	0.43	7.8	22.9	830	14.4	111	<0.002	0.04	0.5
1405C_44	SANDSTONE		607	0.87	0.46	8	22.4	820	15.1	117	0.002	0.05	0.56
1405C_48	SANDSTONE		1000	1.05	0.43	7.9	29.6	1120	14.9	104	0.004	0.05	0.55
1405C_49	SANDSTONE		964	1.22	0.47	8.6	23.1	1020	16.1	106	<0.002	0.04	0.57
1405C_50	SANDSTONE		1140	1.07	0.45	8.4	26.2	1070	15.7	94.7	<0.002	0.07	0.57

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
		LOD	5	0.05	0.01	0.1	0.2	10	0.5	0.1	0.002	0.01	0.05
1405C_51	SANDSTONE		550	1.25	0.45	9.9	25.2	850	17.7	111.5	<0.002	0.04	0.64
1405C_52	SANDSTONE		426	1.16	0.47	11	25.2	710	19.4	113	<0.002	0.04	0.73
1405C_53	SANDSTONE		541	1.15	0.39	11.5	21.6	500	18.9	121	<0.002	0.03	0.68
1405C_54	SANDSTONE		288	1.77	0.33	11.8	18.4	610	24.2	91.2	0.002	0.07	0.73
1407C_78603	SAND		41	0.61	0.13	5.8	8.7	70	9	24	<0.002	0.01	0.53
1407C_78606	SILTSTONE		21	0.93	0.09	9.3	3.5	190	22.1	14.4	<0.002	0.01	0.95
1407C_78610	SILTSTONE		110	1.34	0.16	10.8	9.9	160	11.7	45.5	<0.002	0.01	0.85
1407C_78611	SILTSTONE		104	1.39	0.16	11.8	14	860	33.5	73.8	<0.002	0.01	0.87
1407C_78612	CLAY		120	1.59	0.13	14.9	21.8	450	25.4	90	<0.002	0.01	0.94
1407C_78614	CLAY		53	1.79	0.1	14.9	12.7	1090	28.9	108	<0.002	0.01	0.75
1407C_78616	CLAY		24	1.51	0.1	16.4	6.6	490	28.6	117	<0.002	<0.01	0.86
1407C_78619	CLAY		13	2.15	0.07	11.5	5.2	230	26.7	63.9	0.002	0.02	1.65
1407C_78621	CLAY		13	4.79	0.08	13.7	7.2	230	32.2	28.5	0.003	0.01	1.67
1407C_78624	SILTSTONE		24	0.86	0.05	16.2	13.8	170	21.6	124	<0.002	<0.01	0.76
1407C_78627	SILTSTONE		41	0.39	0.04	12.9	5.7	110	21.2	97.1	<0.002	0.03	0.6
1407C_78628	SILTSTONE		22	1.27	0.03	11	11.6	90	18.9	84.9	0.002	0.16	0.6
1407C_78630	SANDSTONE		30	0.26	0.05	15.5	7.5	120	19.5	131.5	<0.002	0.01	0.77
1407C_78631	SANDSTONE		40	0.44	0.03	10.9	5.7	80	13.9	90.2	<0.002	0.02	0.69
1407C_78632	SANDSTONE		18	0.24	0.02	5.7	3	50	9.9	44.1	<0.002	0.01	0.43
1407C_78633	SANDSTONE		19	0.58	0.03	7.4	4.5	70	11.2	55.4	<0.002	0.01	0.52
1408C_78650	SAND		34	1.33	0.1	7.3	6.3	100	12.7	20.5	<0.002	0.02	0.68
1408C_78704	SILTSTONE		22	0.98	0.1	10.1	3	280	19.5	30.4	<0.002	0.01	0.67
1408C_78708	SILTSTONE		101	3.15	0.14	14.2	21.3	700	29.3	81.9	<0.002	0.01	0.92
1408C_78712	CLAY		60	2.15	0.09	16.5	14.6	200	16.4	118	<0.002	<0.01	0.86
1408C_78715	CLAY		22	1.04	0.08	15.5	7.5	250	30.6	112.5	<0.002	0.03	0.84
1408C_78717	CLAY		9	3.93	0.07	13.7	6.2	130	25.9	22.1	<0.002	0.01	1.42
1408C_78720	SILTSTONE		25	1.61	0.05	17.2	15	180	22.2	129.5	<0.002	<0.01	1
1408C_78725	SILTSTONE		45	0.86	0.12	14.7	10.4	140	18.2	102	<0.002	0.11	0.7
1408C_78726	SANDSTONE		36	0.39	0.03	6.8	5.6	60	12.4	53.4	<0.002	0.08	0.54
1408C_78727	SANDSTONE		87	0.65	0.03	8.1	4.8	60	11.5	66.5	<0.002	0.02	0.58
1408C_78728	SANDSTONE		44	0.42	0.03	8.9	5.6	60	12.5	68	<0.002	0.02	0.5
1408C_78730	SANDSTONE		28	0.89	0.01	3.3	3.3	40	7.5	24.9	<0.002	0.01	0.33
1409C_5	SANDSTONE		60	0.69	0.23	5.7	16.5	150	17	78.4	<0.002	0.01	0.66
1409C_11	COAL WEATHERED		223	2.19	0.25	8.6	22.7	930	21	83.9	<0.002	0.01	0.77
1409C_12	COAL WEATHERED		130	0.8	0.29	8.6	9.5	610	15.1	70.7	<0.002	0.01	0.75
1409C_13	COAL WEATHERED		186	3.52	0.05	13.6	26.9	640	24.4	13.1	<0.002	0.01	1.27
1409C_14	COAL, undifferentiated		81	1.39	0.14	6.4	24.8	170	15.9	73.3	<0.002	0.04	0.73
1409C_17	SANDSTONE		362	0.6	0.54	6.1	15.5	570	14.2	73.1	<0.002	0.03	0.54
1409C_19	SANDSTONE		1180	0.91	0.41	6.1	23.6	530	15.1	64.2	<0.002	0.03	0.59
1409C_22	SANDSTONE		437	1.16	0.26	7.7	14.1	530	17.8	58.9	0.002	0.03	0.8
1409C_23	SANDSTONE		302	1.61	0.18	8.3	23.7	490	21.3	54.1	0.002	0.05	0.92
1409C_24	SANDSTONE		714	2.48	0.16	8.2	15.9	520	19.5	53.4	0.002	0.03	0.85
1409C_25	MUDSTONE		395	3.13	0.11	9.8	11.8	1340	25.2	29.1	<0.002	0.03	0.7
1409C_26	CARBONACEOUS MUDSTONE		274	3.24	0.11	7.1	18.9	490	21.4	20.2	0.002	0.62	1.25
1409C_27	CARBONACEOUS MUDSTONE		102	2.22	0.07	6	8	320	16.8	6.4	0.003	0.1	0.43
1409C_29	SANDSTONE		795	1.02	0.66	6.5	18.2	680	12.1	65.5	<0.002	0.08	0.48
1409C_30	SANDSTONE		527	1	0.61	7.5	21.3	640	12.9	76	<0.002	0.03	0.52
1409C_31	SANDSTONE		729	0.81	0.73	6.9	21.4	710	12	80.1	<0.002	0.08	0.5
1409C_32	SANDSTONE		777	0.94	0.74	6.7	18.7	770	12.9	78.7	0.002	0.07	0.43
1409C_33	SANDSTONE		973	1.03	0.62	7.4	25.8	980	17.3	94.5	0.002	0.04	0.53

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
		LOD	5	0.05	0.01	0.1	0.2	10	0.5	0.1	0.002	0.01	0.05
1409C_34	SILTSTONE		940	1.23	0.48	10.1	21.5	1000	22.1	104	0.002	0.06	0.71
1410C_1	SAND		169	1.01	0.03	11.7	21.1	150	20.4	44.1	<0.002	0.01	0.82
1410C_2	LATERITE		69	1.84	0.04	10.4	17.2	240	29	32.9	<0.002	0.01	1.18
1410C_3	SANDSTONE		95	1.15	0.07	8.2	16.2	220	20.6	53.1	0.002	0.03	0.86
1410C_8	SANDSTONE		48	1.04	0.08	6	8.8	190	15.1	53	<0.002	0.02	0.67
1410C_13	SANDSTONE		36	0.48	0.33	7.5	21.6	240	32.7	100.5	<0.002	0.02	0.67
1410C_17	SILTSTONE		655	0.8	0.45	7.7	36.6	570	16.6	67.8	<0.002	0.01	0.67
1410C_22	MUDSTONE		36	2.62	0.24	7.9	29.5	1360	27.5	60.9	0.002	0.05	1.31
1410C_28	COAL, undifferentiated		36	4.11	0.04	1.2	6.3	40	3.1	5.7	<0.002	0.07	0.17
1410C_29	COAL, undifferentiated		331	2.46	0.08	4.6	11.1	390	12.4	8.8	<0.002	0.15	0.43
1410C_30	COAL, undifferentiated		77	1.48	0.09	4.7	2.9	300	18.3	7.1	0.002	0.12	0.42
1410C_31	COAL, undifferentiated		31	3.17	0.05	3	15.6	90	9.3	19.7	0.003	0.18	6.47
1410C_35	SILTSTONE		1820	1.03	0.27	7.2	27	760	17.7	90.6	0.002	0.06	0.52
1410C_40	SANDSTONE		546	0.78	0.68	5.7	14.8	720	13.7	65.7	<0.002	0.04	0.41
1410C_46	SANDSTONE		1100	0.79	0.84	5.4	15.4	720	11.6	77.5	<0.002	0.03	0.39
1410C_47	SANDSTONE		700	0.73	0.97	5.1	19.4	770	12.1	76.4	<0.002	0.06	0.54
1410C_48	SANDSTONE		1020	0.85	0.74	5.1	17	620	11.2	80.9	0.002	0.03	0.38
1410C_49	SANDSTONE		465	4.26	0.7	6.6	24.5	600	13.6	79.3	<0.002	0.03	0.58
1410C_50	SANDSTONE		462	1.17	0.64	7	22.9	580	13.5	76.6	<0.002	0.03	0.47
1410C_51	SANDSTONE		1050	1.08	0.63	7	22.1	750	12.3	72.1	0.002	0.03	0.41
1410C_57	SILTSTONE		1080	0.94	0.69	5.5	18.1	870	10.7	67.3	0.002	0.03	0.33
1410C_58	SANDSTONE		523	0.91	0.66	6.3	21.9	730	15.9	74.8	0.002	0.04	0.4
1410C_59	SANDSTONE		563	1.05	0.67	6.3	25	700	14.8	84	<0.002	0.04	0.48
1410C_60	SANDSTONE		723	0.92	0.68	6.4	23.4	770	15.4	83	<0.002	0.04	0.45
1410C_65	SANDSTONE		541	1.1	0.62	7.9	24.6	790	16.8	101	0.002	0.05	0.56
1410C_70	SANDSTONE		880	1.09	0.68	6.4	24.8	890	12.3	90.4	0.002	0.04	0.46
1410C_74	SANDSTONE		599	0.91	0.6	7.8	22.5	900	15.9	103.5	0.002	0.05	0.52
1410C_78	SANDSTONE		995	1.24	0.58	8.4	23.5	1000	16.9	95.1	<0.002	0.05	0.56
1410C_84	SILTSTONE		315	1.47	0.31	14	33.3	630	29.3	138	0.002	0.05	0.88
1412C_1	CLAY		767	0.72	0.31	7.1	18.9	180	15.3	44.3	<0.002	0.03	0.58
1412C_8	SANDSTONE		634	1.11	0.7	8	26.7	630	18	98.6	0.003	0.05	0.62
1412C_17	SANDSTONE		860	1.55	0.76	7	26.6	550	14	90.4	0.002	0.09	0.5
1412C_19	SANDSTONE		792	1.2	0.75	7.6	24	760	15.9	97.8	0.002	0.05	0.6
1412C_20	SANDSTONE		935	0.82	0.77	7.4	22.3	800	14.4	92.6	0.003	0.06	0.54
1412C_21	SANDSTONE		687	0.76	0.78	7.6	20.6	790	15.9	98.2	<0.002	0.05	0.52
1412C_22	SANDSTONE		1040	0.61	0.74	7	30.8	860	13.8	88.6	0.002	0.05	0.47
1412C_23	SANDSTONE		578	0.65	0.81	7.9	22.7	850	17.3	97.6	0.002	0.06	0.56
1412C_27	SANDSTONE		635	1.36	0.77	8.3	27.9	940	16.5	95.9	0.002	0.05	0.56
1412C_28	SANDSTONE		860	1.1	0.74	8	23	930	17.5	80.4	<0.002	0.05	0.54
1412C_51	SANDSTONE		111	0.59	0.07	12.6	22.9	140	20.6	121	<0.002	0.05	0.72
1412C_52	SANDSTONE		130	0.67	0.08	12.6	22.6	160	19.8	118	<0.002	0.2	0.86
1412C_53	SANDSTONE		101	0.52	0.05	12.3	21.7	110	17.7	115	<0.002	0.03	0.64
1412C_56	SANDSTONE		78	0.68	0.06	13	22.9	120	24	130.5	<0.002	0.06	0.77
1414X_3	SANDSTONE		378	0.38	0.23	8.4	15.7	190	15.8	59.5	<0.002	0.01	0.68
1414X_8	SANDSTONE		160	0.83	0.26	4.8	10.6	70	12.6	22.5	<0.002	0.02	0.64
1414X_14	SANDSTONE		59	0.24	0.13	9.4	7.2	80	14.7	71.2	<0.002	0.01	0.45
1414X_25	SANDSTONE		134	0.97	0.1	2.8	5.9	50	8.2	16.7	<0.002	0.01	0.42
1429R_24	CLAYSTONE		49	0.52	0.67	8.3	7.5	180	28.5	95.4	<0.002	0.02	1.04
1429R_26	SILTSTONE		708	0.74	1.03	6.1	23.6	440	13.5	75.7	<0.002	0.02	0.56
1429R_31	MUDSTONE		173	1.23	0.92	7	25.4	610	15.4	68	0.002	0.02	0.72

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb
		Units	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
		LOD	5	0.05	0.01	0.1	0.2	10	0.5	0.1	0.002	0.01	0.05
1429R_33	SANDSTONE		527	1.39	0.89	6.8	23.1	910	15.5	59.2	0.003	0.04	0.72
1429R_38	SANDSTONE		726	2.71	0.81	8.6	14	610	23.9	35	<0.002	0.04	0.81
1429R_41	COAL, undifferentiated		493	3.52	0.39	3.5	21.9	270	10.9	10.9	0.003	0.23	0.38
1429R_42	CLAY		235	1.12	0.43	4.9	2.9	220	14	8.6	<0.002	0.15	0.42
1429R_43	CARBONACEOUS SHALE		231	2.64	0.47	4.5	3.9	520	15.2	14.1	0.002	0.22	0.48
1429R_44	CARBONACEOUS SHALE		208	1.9	0.42	6.4	6.2	170	20.5	12	0.002	0.15	0.7
1429R_74	SILTSTONE		518	0.84	1	6.9	22.9	630	14.8	80.4	<0.002	0.03	0.48
1429R_80	SILTSTONE		607	1	0.96	7.1	22.6	710	14.5	76.3	<0.002	0.04	0.5
1429R_83	SILTSTONE		729	1.8	0.83	7.6	21.1	670	16.5	64.5	0.002	0.03	0.54
1429R_84	SILTSTONE		646	1.69	0.87	7.7	23.6	750	16.5	69.3	<0.002	0.03	0.52
1429R_85	SILTSTONE		731	1.08	0.97	7.2	24.5	790	14.4	91.7	<0.002	0.04	0.61
1429R_88	SILTSTONE		664	1.24	0.86	7.1	23.4	840	17	106	<0.002	0.04	0.6
1429R_92	SILTSTONE		1010	1.16	0.65	7	20.8	850	14.9	97.7	<0.002	0.04	0.53
1429R_95	SANDSTONE		729	0.57	0.63	7.9	36.2	830	17.1	121	<0.002	0.07	0.63
1429R_98	SANDSTONE		782	0.98	0.65	7.8	23.4	1020	17.1	120	0.002	0.05	0.61
1429R_119	SILTSTONE		102	1.09	0.13	14.1	14.5	420	27.4	48.9	0.002	0.2	0.79
1429R_120	SILTSTONE		130	1.14	0.11	12.7	25.5	170	24.9	129	<0.002	0.55	0.7
1429R_121	SILTSTONE		107	1.06	0.15	10.7	11.9	200	19.3	66.9	0.002	0.11	0.72
1429R_122	SILTSTONE		104	1.19	0.11	8.7	11.7	110	14.1	83.4	<0.002	0.09	0.48
1429R_129	SANDSTONE		197	1.13	0.11	9.2	11.2	270	21.4	109	<0.002	0.02	0.55
1429R_130	SANDSTONE		153	1.71	0.1	12.3	24.3	250	30.9	76.6	0.002	0.09	1.22
1429R_131	COAL, undifferentiated		173	1.38	0.13	12.8	43.5	570	28.8	106.5	0.002	0.1	1.15
1429R_132	MUDSTONE		204	0.8	0.17	12.7	23.9	730	30.9	145.5	0.002	0.07	0.99
1429R_133	MUDSTONE		216	1.18	0.13	13.3	33.7	680	31.3	145.5	0.002	0.06	0.98
1429R_139	COAL, undifferentiated		66	1.59	0.06	5.7	10.2	120	18.4	15.8	0.002	0.11	0.76
1429R_140	COAL, undifferentiated		80	1.08	0.03	4.1	10.1	80	12.8	4.4	<0.002	0.15	0.63
1429R_141	COAL, undifferentiated		121	2.13	0.36	6.9	6.8	420	17.8	24.4	<0.002	0.18	0.63
1429R_142	COAL, undifferentiated		70	0.66	0.08	13.1	10.4	100	25	116.5	<0.002	0.63	0.71
1429R_143	COAL, undifferentiated		62	0.43	0.08	12.9	9.7	110	25.1	127	<0.002	0.1	0.53
1447L_34	SAND		36	0.5	0.01	1.2	3.7	50	5.4	6.2	<0.002	<0.01	0.29
1447L_37	CLAY		351	0.79	0.19	10.3	18.3	120	17.2	50.2	<0.002	0.01	0.74
1447L_39	CLAY		85	0.47	0.19	7.9	10.9	110	14.1	36.3	<0.002	0.01	0.72
1447L_41	CLAY		72	0.58	0.23	10.5	14.2	110	16.5	41.5	<0.002	0.01	0.86
1447L_43	CLAY		81	1.62	0.17	6.8	11.8	360	25.1	24.5	<0.002	0.01	1.04
1447L_46	SILCRETE		40	1.92	0.1	13.6	7.4	100	21.8	13.9	<0.002	0.04	1.1
1447L_47	SILCRETE		25	1.93	0.08	18.1	2.7	70	26.6	5.2	<0.002	0.06	1.32
1447L_50	SILCRETE		20	0.91	0.11	11.5	9.2	100	26.1	19.6	<0.002	0.02	1.04
1447L_52	SILCRETE		24	0.64	0.1	11	8.4	180	29.4	26.9	<0.002	0.02	1.05
1447L_54	SANDSTONE		20	0.47	0.07	5.9	4.9	70	13.1	19	<0.002	0.02	0.65
1447L_60	CLAY		68	0.97	0.39	8	23.1	510	16.7	60.4	<0.002	0.05	0.5
1447L_63	CLAY		226	1.06	1.05	9.1	23.6	670	14.2	79.3	0.002	0.09	0.99
1447L_66	CLAY		111	1.07	0.39	7.8	21.6	640	17.8	94	<0.002	0.03	0.63
1447L_70	CLAY		59	1.21	0.33	10.7	25	530	22.9	91.3	0.004	0.11	0.75
1447L_77	CLAY		406	1.92	0.15	15	40.6	500	27.2	156.5	0.002	0.06	0.89
Tailings -250			237	0.88	0.02	3.7	10.2	50	10.7	5.2	<0.002	0.3	0.53
Rejects +250			244	4.19	0.06	10.8	6	210	32.2	20.7	0.002	2.43	0.51
Product +250			82	1.01	0.03	3.1	15.6	30	9.7	2.6	0.002	0.39	0.83

MEMS61 - 4 acid digest
MEMS42 - Aqua regia digest
Samples with TC > were ashed prior to MEMS61
Aqua regia digest was carried out on a split of samples with TC > 5% to capture volatile elements (As, Hg, Sb, Se, Te and Tl)

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
		LOD	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1	1
1388R_95	SAND		11	1	1.8	86	0.57	0.11	10.7	0.318	0.4	1.8	145
1388R_96	SANDSTONE		15.8	1	1.6	311	0.45	0.05	7.5	0.453	0.34	2.2	131
1388R_97	SANDSTONE		15.5	2	3.3	132.5	0.88	0.09	15.1	0.384	0.7	3.5	94
1388R_100	SANDSTONE		12.4	1	3.6	85.3	1.1	0.08	15.2	0.36	2.19	3.6	78
1389R_102	SILTSTONE		14.2	1	1.5	811	0.43	0.06	7.4	0.388	0.13	1.3	133
1389R_103	SILTSTONE		10.6	1	3.4	71.1	0.89	0.06	12.8	0.312	0.64	2.9	59
1389R_104/105/106	COAL, undifferentiated		12.5	1	2.8	107.5	0.75	0.1	14.5	0.351	0.64	3.3	79
1389R_107	SANDSTONE		11.5	1	3.3	72.1	0.91	0.08	12.8	0.318	1.18	2.8	73
1397D_134	CLAY		10.1	1	2.5	90.8	0.9	<0.05	11.8	0.384	0.31	1.4	55
1397D_135	CLAY		4.8	<1	1.3	40.3	0.43	<0.05	6.1	0.171	0.13	0.8	26
1397D_136	SAND		5.6	1	1.3	44	0.61	<0.05	8.1	0.283	0.21	1.3	40
1397D_137	CLAY		25.5	3	2.7	213	0.68	0.22	9.9	0.912	0.25	3.8	203
1397D_138	SILTSTONE		6.2	1	2.8	27.6	0.79	<0.05	8.8	0.235	0.49	2	32
1397D_139	SANDSTONE		5.8	1	2.8	28.8	0.64	<0.05	6.8	0.184	0.41	1.5	31
1397D_140	SANDSTONE		6	1	3.1	29.8	0.79	<0.05	8.7	0.219	0.44	1.9	32
1397D_141	SANDSTONE		4	1	2.2	23.1	0.59	<0.05	6.1	0.109	0.3	1.8	17
1397D_146	SILTSTONE		11.2	1	4.3	63	1.23	0.05	16.7	0.335	0.63	3.7	60
1402C_151	SOIL		5.9	1	1.5	17.7	0.46	<0.05	7	0.215	0.18	1.1	47
1402C_152	CLAY		10.1	1	1.9	43	0.55	0.06	9.7	0.293	0.24	1.5	84
1402C_153	SILTSTONE		12.3	1	1.5	167	0.43	0.06	6.9	0.336	0.47	1.8	91
1403D_159	SAND		13.5	1	2.2	54.8	0.61	0.09	6.3	0.465	0.11	1.4	144
1403D_160	CLAY		18.2	1	2.4	86.2	0.65	0.07	7.8	0.487	0.16	1.7	122
1403D_161	CLAY		14.8	1	3.6	147.5	0.99	0.08	15.7	0.397	0.57	3.2	86
1403D_162	CLAYSTONE		18	3	4.2	131.5	1.14	0.12	18.1	0.421	0.62	4.8	92
1403D_163	SILTSTONE		13.9	1	4.7	48.5	1.21	0.06	19.2	0.389	0.73	3.9	78
1403D_164	PEBBLE CONGLOMERATE		3	1	2.1	35.2	0.52	<0.05	6	0.1	0.34	1.7	15
1403D_165	SANDSTONE		4.9	1	1.5	55	0.48	<0.05	6.9	0.096	0.79	1.5	31
1412C_166	LATERITE		9.8	1	1.5	102.5	0.55	0.06	8.1	0.344	0.26	1.8	79
1412C_167	SILTSTONE		16.9	1	2.1	157.5	0.62	0.08	9.1	0.466	0.47	2.3	128
1412C_168	SANDSTONE		18.2	2	2.3	153.5	0.62	0.09	9.7	0.481	0.45	2.9	132
1412C_169	SANDSTONE		12.3	2	3.4	46.8	0.94	0.09	14.6	0.336	0.74	3.3	68
1412C_170	SILTSTONE		19.8	2	6.5	50.8	1.8	0.09	31.5	0.504	0.74	7.3	90
1412C_171	CARBONACEOUS MUDSTONE		15.6	2	3.9	138	0.99	0.22	11.9	0.494	0.79	4.5	119
1412C_173	SANDSTONE		12.3	1	4.6	44.7	1.43	0.06	16.5	0.373	0.84	4.5	71
1414X_175	CLAY		13.4	1	2.5	172	0.95	0.09	12.9	0.454	0.46	2.2	92
1414X_176	CONGLOMERATE		4.6	1	1.5	42.3	0.38	<0.05	5.7	0.122	0.12	1.3	41
1414X_177	SILTSTONE		19.2	3	4.4	156	1.16	0.15	17.9	0.539	0.41	5.2	99
1414X_178	CARBONACEOUS MUDSTONE		20.7	9	4.9	158.5	1.27	0.26	20.9	0.534	1.23	5.5	99
1429R_190	SOIL		18.6	2	3.1	105	1.03	0.11	15	0.539	0.59	3.6	105
1429R_191	MUDSTONE		13.9	2	1.5	181	0.43	0.06	7.3	0.414	0.35	2	105
1429R_192	CARBONACEOUS SHALE		6	1	2.2	247	0.5	0.09	11.2	0.155	2.89	2.8	21
1429R_193	MUDSTONE		15	2	3.1	161	0.81	0.14	13.1	0.365	0.64	3.1	92
1429R_194	COAL, undifferentiated		11.5	2	2.7	283	0.86	0.16	8	0.465	0.56	4.1	61
1429R_195	SANDSTONE		6.7	1	2.1	69.2	0.57	<0.05	8.2	0.201	0.54	1.7	45
1429R_196	COAL, undifferentiated		5	1	1.4	39.7	0.35	0.1	4.1	0.154	0.89	1.4	31
1434D_205	SOIL		11.5	2	1.7	26.8	0.65	0.18	11.4	0.345	0.49	2.3	184
1434D_206	CLAYSTONE		20.2	2	2.7	132	0.8	0.1	12.1	0.492	0.69	3.3	118
1434D_207	SANDSTONE		7.8	1	1.4	67	0.46	<0.05	6.9	0.235	0.69	1.9	53
1434D_208	SILTSTONE		14	1	1.4	191.5	0.44	<0.05	6.7	0.434	0.44	1.7	101
1434D_209	SANDSTONE		16.9	1	1.6	457	0.41	0.06	5.7	0.465	0.39	1.5	152

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
		LOD	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1	1
1434D_210	SILTSTONE		18	1	2.1	476	0.57	0.1	9.2	0.45	0.42	2.5	135
1434D_211	SANDSTONE		5.2	1	2.7	28.8	0.65	<0.05	7.2	0.189	0.86	1.4	29
1434D_212	CARBONACEOUS SANDSTONE		21.9	2	3.8	137.5	0.99	0.14	17	0.472	0.76	4.1	122
1434D_213	CARBONACEOUS SANDSTONE		22.2	2	4.2	118.5	1.1	0.17	17.2	0.529	0.74	4.3	128
1444D_227	SANDSTONE		9.4	1	3.3	37.4	0.98	<0.05	13.3	0.288	0.6	3	49
1444D_228	CARBONACEOUS SHALE		18.8	2	4.2	103.5	1.08	0.23	16.3	0.565	0.95	5.2	131
1444D_229	SILTSTONE		12.8	2	4	53.7	1.18	0.05	11.5	0.353	0.83	3.2	51
1445D_233	CARBONACEOUS SANDSTONE		13.4	1	1.7	180.5	0.5	0.16	9.2	0.338	2.09	2.4	108
1445D_234	SILTSTONE		13.3	2	3	409	0.82	0.12	20.2	0.366	0.27	5.5	65
1445D_235	CARBONACEOUS SHALE		3.4	1	2.5	249	0.54	0.1	10.7	0.083	1.18	2.7	12
1445D_237	CARBONACEOUS SANDSTONE		15.3	2	4.9	57.6	1.36	0.08	20.1	0.409	0.81	4.7	80
1445D_238	SANDSTONE		5.9	1	2.1	34.5	0.52	<0.05	7.6	0.147	0.55	1.6	24
1445D_239	CARBONACEOUS SANDSTONE		24.9	3	4.6	111	1.15	0.16	18.4	0.543	0.93	4.7	136
1445D_240	CARBONACEOUS SANDSTONE		22.4	2	4.1	99.9	1.03	0.15	17.2	0.46	0.87	4.1	125
1445D_241	SILTSTONE		16.9	2	4.4	78.4	1.29	0.12	14.2	0.489	0.96	4.6	102
1451D_264	CLAY		9.7	1	1.9	48.7	0.64	0.06	10.2	0.302	0.29	2.2	64
1451D_265	SILTSTONE		16.1	2	5.4	62.6	1.45	0.1	22	0.432	0.84	5.1	84
1451D_266	CARBONACEOUS SANDSTONE		24.2	3	4.6	249	1.21	0.14	18.7	0.557	0.59	4.8	136
1451D_267	SANDSTONE		9.5	2	3.4	52.4	1.03	0.08	14	0.278	0.66	2.7	73
1452D_268	CLAY		15.3	2	3.4	41.6	0.95	0.09	13.7	0.461	0.72	3	152
1452D_269	CLAYSTONE		14	1	1.6	122.5	0.47	0.06	7.6	0.421	0.81	1.8	105
1452D_270	SILTSTONE		12.7	2	3	138.5	0.74	0.1	17.8	0.356	0.22	4.7	70
1452D_271	SANDSTONE		12	1	1.6	402	0.46	0.06	6.9	0.376	0.41	1.8	109
1452D_272	SILTSTONE		17.3	2	4.6	163.5	1.17	0.15	19	0.451	0.96	4.4	108
1452D_273	MUDSTONE		17.9	3	2.1	498	0.5	0.16	8.2	0.611	0.6	2.4	213
1452D_274	SANDSTONE		2.1	1	1.4	41.1	0.34	<0.05	5.8	0.067	0.75	1.2	12
1453D_275	SOIL		13.6	1	2.6	139	0.75	0.09	11.9	0.403	0.54	2.3	84
1453D_276	CLAYSTONE		18.1	1	2.4	393	0.78	0.1	13.4	0.427	0.54	3.1	100
1453D_277	SANDSTONE		11.1	1	1.5	187	0.42	0.05	7.6	0.339	0.4	1.9	82
1453D_278	CARBONACEOUS MUDSTONE		4.8	1	2.5	107.5	0.44	0.09	10.2	0.149	0.23	2.7	26
1453D_279	CARBONACEOUS SANDSTONE		17.7	1	1.6	271	0.41	0.05	7.6	0.424	0.44	1.5	122
1453D_280	SANDSTONE		15.6	2	2.5	449	0.59	0.11	12	0.406	0.47	3.1	94
1453D_281	SILTSTONE		6.2	1	2.8	31	0.78	<0.05	9.5	0.241	0.53	2	35
1453D_282	SANDSTONE		18.4	2	4.1	109	1.05	0.14	16.5	0.492	0.79	4.1	118
1454D_284	SILTSTONE		18.3	2	3.4	104.5	1.03	0.15	16.7	0.486	0.69	4.4	110
1454D_285	SILTSTONE		12.6	1	1.9	377	0.52	0.08	9.8	0.393	0.48	2.5	91
1454D_286	SANDSTONE		12.3	1	2.1	167.5	0.58	0.15	6.7	0.313	0.89	2	97
1454D_288	SILTSTONE		14.8	2	3.9	86.6	1	0.26	13	0.572	1	6.1	141
1454D_289	CARBONACEOUS SHALE		20.8	3	4.3	122	1.06	0.18	17.7	0.493	0.87	4.4	120
1454D_290	MUDSTONE		19.1	2	4.4	66.4	1.2	0.12	11.6	0.518	0.83	4.5	122
1398X_1	SOIL		9.7	2	2.1	52.6	0.72	0.06	10.5	0.32	0.32	2	66
1398X_2	SAND		8.5	1	2.1	49.2	0.67	0.06	10.1	0.268	0.25	1.9	60
1398X_9	SAND		4.2	1	1.1	18.7	0.46	<0.05	6.4	0.164	0.13	1.3	41
1398X_14	SAND		8	1	2.9	36.1	0.9	0.05	10	0.293	0.36	2	50
1398X_19	CLAY		5.3	1	3.1	22.4	0.78	<0.05	8.4	0.212	0.3	1.4	35
1398X_22	SAND		7.5	1	3.7	268	0.94	<0.05	12.1	0.248	0.33	1.7	45
1398X_28	SAND		4.6	1	2.1	25.1	0.69	<0.05	7.8	0.198	0.35	1.6	28
1398X_5032	SANDSTONE		6.2	1	1.2	22.2	0.33	0.05	6.7	0.117	0.18	1.7	20
1398X_33	SANDSTONE		8.8	2	3.3	42	1.09	0.07	14.1	0.3	0.75	2.8	59
1398X_34	COAL, undifferentiated		7.8	2	3	40	0.94	0.06	12.6	0.25	0.65	2.5	60

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
		LOD	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1	1
1399X_2	SOIL		7	1	1.7	29.6	0.5	0.06	8.9	0.199	0.22	1	66
1399X_6	SAND		11.7	2	2.4	88.1	0.92	0.06	12.3	0.45	0.36	1.7	70
1399X_11	SAND		5	1	1.3	25.8	0.42	<0.05	6.4	0.166	0.14	0.9	39
1399X_19	SAND		6.1	1	3	27.5	0.81	0.06	8.5	0.225	0.29	1.6	53
1399X_24	SAND		5.5	1	4.4	29.4	0.7	<0.05	8.1	0.177	0.23	1.4	33
1399X_31	CLAY		18.6	3	4.2	173.5	1.13	0.16	15.3	0.506	0.42	4.1	153
1399X_32	CLAY		22.7	4	4.8	121	1.31	0.22	22.8	0.559	0.38	7.1	114
1399X_34	SANDSTONE		8.8	2	2.4	65.7	0.77	0.07	11.2	0.247	0.51	2.6	70
1399X_35	SANDSTONE		10.6	3	2.8	89.9	0.83	0.1	12.6	0.3	0.67	3.2	73
1399X_36	SANDSTONE		6.1	1	2.4	48.8	0.8	<0.05	10.7	0.23	0.74	2.2	45
1400X_2	SOIL		10.4	2	2	76.7	0.79	0.07	11	0.381	0.41	2.3	67
1400X_7	SAND		5.4	1	1.2	33.3	0.4	<0.05	6.1	0.183	0.22	1.3	41
1400X_11	SAND		6.9	1	1.2	37.5	0.35	0.09	8.4	0.174	0.17	2	134
1400X_25	CLAY		19.5	4	4.2	228	1.14	0.16	18	0.502	1.33	5.4	118
1400X_26	COALY SHALE		18.6	2	3.7	155	0.83	0.12	13.6	0.415	1.98	3.7	100
1401X_2	SOIL		5.1	1	1.4	20.2	0.61	0.05	9.2	0.218	0.15	1.4	42
1401X_3	SOIL		3.7	1	1.3	18	0.58	<0.05	7.6	0.205	0.12	1.3	29
1401X_15	SAND		5.2	1	1.2	28	0.32	0.09	7.1	0.14	0.14	1.9	88
1401X_27	SANDSTONE		7.7	1	3.1	50	0.91	0.05	12	0.242	0.67	2.5	57
1401X_28	SANDSTONE		6.3	1	3	37.9	0.72	<0.05	11.3	0.218	3.16	1.9	49
1404C_2	CLAY		10.9	2	2.1	69	0.77	0.06	10.7	0.375	0.4	2.4	73
1404C_4	SANDSTONE		4.7	1	1	30	0.26	<0.05	5.2	0.119	0.14	0.9	51
1404C_8	SILTSTONE		10.8	6	3.2	117	0.86	0.16	13.4	0.622	0.18	2.3	292
1404C_11	SILTSTONE		15.1	2	2.7	131	0.77	0.11	9.2	0.471	0.16	2.3	112
1404C_18	SILTSTONE		17.7	2	4.1	277	1.11	0.11	19.4	0.413	0.7	3.9	102
1404C_19	SILTSTONE		17	2	4.3	126	1.21	0.13	19.8	0.421	0.77	4.4	103
1404C_20	SILTSTONE		15.4	2	4.2	204	1.19	0.13	17.4	0.418	0.57	3.7	101
1404C_22	SILTSTONE		12.7	3	3.7	120.5	1.02	0.12	17	0.353	0.54	3.3	79
1404C_24	SILTSTONE		13.7	4	2.5	99.1	0.6	0.12	8.6	0.337	0.86	3.3	63
1405C_1	CLAY		9.7	2	2.3	65.4	0.68	0.08	12.1	0.289	0.28	2.1	76
1405C_6	SILTSTONE		21.5	3	2.5	206	0.65	0.11	12.2	0.411	0.65	3.2	138
1405C_19	SANDSTONE		13.6	2	1.8	183.5	0.51	0.05	7.8	0.38	0.46	2.2	104
1405C_20	SANDSTONE		12.7	2	1.6	183.5	0.44	0.05	7.6	0.345	0.4	1.8	110
1405C_21	SANDSTONE		14	2	1.8	190	0.51	0.07	7.7	0.422	0.43	2	110
1405C_22	SANDSTONE		14.3	2	1.6	193.5	0.42	0.07	6.6	0.443	0.39	1.6	139
1405C_25	SANDSTONE		13.3	2	1.6	235	0.45	0.06	7.4	0.412	0.45	1.7	110
1405C_26	SANDSTONE		12.3	2	1.4	217	0.37	0.05	5.7	0.366	0.37	1.4	104
1405C_28	SANDSTONE		14.5	2	1.8	225	0.48	0.06	7.9	0.423	0.45	2	126
1405C_30	SANDSTONE		13.5	2	1.6	243	0.45	0.06	7.4	0.408	0.46	1.8	111
1405C_31	SANDSTONE		13.3	2	1.6	235	0.46	0.08	7.2	0.396	0.46	1.9	113
1405C_32	SANDSTONE		14.4	2	1.9	227	0.51	0.08	7.8	0.417	0.45	2	118
1405C_33	SANDSTONE		14.3	2	1.7	234	0.47	0.09	7.6	0.405	0.4	2	118
1405C_36	SANDSTONE		14	2	1.8	246	0.48	0.06	8.2	0.411	0.47	2	114
1405C_40	SANDSTONE		15.7	2	2.1	221	0.59	0.09	9.1	0.425	0.53	2.3	117
1405C_42	SANDSTONE		16.2	2	2.2	217	0.59	0.1	10	0.433	0.57	2.5	122
1405C_43	SANDSTONE		14.9	2	2.1	207	0.56	0.08	9	0.401	0.54	2.3	112
1405C_44	SANDSTONE		15.3	2	2.1	217	0.57	0.09	9.3	0.429	0.53	2.3	120
1405C_48	SANDSTONE		14.8	2	2.1	230	0.57	0.13	9.2	0.406	0.56	2.3	112
1405C_49	SANDSTONE		15.6	2	2.3	262	0.61	0.11	9.9	0.454	0.54	2.5	122
1405C_50	SANDSTONE		14.2	2	2.1	248	0.58	0.09	9.6	0.416	0.61	2.5	107

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
		LOD	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1	1
1405C_51	SANDSTONE		13.8	2	2.7	204	0.75	0.07	11.9	0.418	0.64	2.9	105
1405C_52	SANDSTONE		13.5	2	3.1	180	0.83	0.09	13.6	0.408	0.7	3.1	99
1405C_53	SANDSTONE		11.7	2	3.3	157.5	0.88	0.09	13.6	0.354	0.67	3.2	77
1405C_54	SANDSTONE		14.7	3	3.2	208	0.9	0.12	14.6	0.432	0.71	3.7	94
1407C_78603	SAND		5.2	1	1.8	27.9	0.5	<0.05	5.6	0.218	0.19	1	46
1407C_78606	SILTSTONE		7.6	3	2.6	48.2	0.68	0.1	8.6	0.593	0.12	1.8	236
1407C_78610	SILTSTONE		12.7	2	3.2	66.1	0.8	0.1	10.1	0.492	0.28	2.2	136
1407C_78611	SILTSTONE		13.9	3	3.5	419	0.88	0.09	14	0.421	0.43	2.6	108
1407C_78612	CLAY		15.1	2	4.6	117	1.16	0.08	16	0.403	0.51	3.5	96
1407C_78614	CLAY		15.9	2	4.5	274	1.17	0.12	17.8	0.47	0.61	3.5	116
1407C_78616	CLAY		15.8	2	4.9	172.5	1.33	0.12	16.4	0.493	0.59	3.8	108
1407C_78619	CLAY		26.8	5	3.4	90.9	0.91	0.17	13.8	0.39	0.31	6.1	87
1407C_78621	CLAY		27.1	9	4.1	66.3	0.92	0.31	15.6	0.772	0.15	13.6	342
1407C_78624	SILTSTONE		13.1	2	4.7	52.4	1.33	0.06	16.5	0.408	0.6	3.8	72
1407C_78627	SILTSTONE		9.2	1	4	35.1	1.09	0.05	12.8	0.339	0.49	3	57
1407C_78628	SILTSTONE		7.5	1	3.7	24.7	0.95	0.05	12.1	0.287	0.53	2.6	50
1407C_78630	SANDSTONE		13	2	4.9	31.8	1.27	0.07	17.1	0.416	0.69	4	82
1407C_78631	SANDSTONE		8	1	3.6	22.3	0.91	0.05	11.7	0.284	0.53	2.5	52
1407C_78632	SANDSTONE		3.8	1	2	16	0.49	<0.05	6	0.149	0.24	1.2	25
1407C_78633	SANDSTONE		5.2	1	2.6	20.5	0.62	<0.05	8.4	0.206	0.31	1.7	36
1408C_78650	SAND		6.5	2	2	39.3	0.54	0.05	6.8	0.339	0.14	1.2	97
1408C_78704	SILTSTONE		8.1	3	2.8	116.5	0.76	0.06	6	0.532	0.17	1.6	134
1408C_78708	SILTSTONE		14.8	2	4.1	238	1.01	0.11	15.5	0.36	0.52	2.7	98
1408C_78712	CLAY		17.9	2	4.5	57.8	1.26	0.12	16.7	0.465	0.59	3.6	98
1408C_78715	CLAY		17.4	3	4.6	96.2	1.25	0.1	18.2	0.411	0.56	4.2	78
1408C_78717	CLAY		20.4	6	4.1	53.2	0.92	0.25	9.9	0.615	0.11	10.6	138
1408C_78720	SILTSTONE		13.6	2	5	52.7	1.44	0.09	16.9	0.433	0.62	4.2	87
1408C_78725	SILTSTONE		11.1	2	4.4	46.3	1.16	0.08	13.2	0.402	0.61	3.6	70
1408C_78726	SANDSTONE		4.9	1	2.4	18.8	0.59	<0.05	6.9	0.185	0.39	1.6	31
1408C_78727	SANDSTONE		5.7	1	3.1	19.5	0.85	0.05	10.1	0.225	0.41	1.9	38
1408C_78728	SANDSTONE		5.7	1	3	21.8	0.74	<0.05	8.7	0.234	0.38	1.9	36
1408C_78730	SANDSTONE		2.3	1	1.6	10.4	0.32	<0.05	5.8	0.084	0.14	1.1	14
1409C_5	SANDSTONE		6.8	1	1.7	65.1	0.45	<0.05	6.8	0.214	0.47	1.3	44
1409C_11	COAL WEATHERED		17	2	2.3	51.7	0.63	0.06	9.4	0.37	0.52	2.8	100
1409C_12	COAL WEATHERED		13	2	2.1	45.1	0.62	0.06	9.5	0.424	0.41	2.3	99
1409C_13	COAL WEATHERED		13.4	4	5.3	67.9	1.11	0.17	19.6	0.544	0.13	6.5	94
1409C_14	COAL, undifferentiated		12.1	2	1.7	86.7	0.48	0.07	7.2	0.403	0.48	2.1	76
1409C_17	SANDSTONE		12	2	1.6	135.5	0.43	<0.05	6.4	0.417	0.49	1.6	98
1409C_19	SANDSTONE		11.8	1	1.6	140	0.44	0.06	6.9	0.368	0.45	1.7	92
1409C_22	SANDSTONE		13.1	2	2.1	141	0.56	0.08	10.7	0.399	0.4	2.8	94
1409C_23	SANDSTONE		12.3	2	2.4	135.5	0.62	0.12	12.8	0.379	0.42	3.4	88
1409C_24	SANDSTONE		12.4	2	2.3	128	0.59	0.08	12.1	0.332	0.32	3.4	77
1409C_25	MUDSTONE		11.1	2	2.9	158.5	0.76	0.1	18.1	0.322	0.25	5.3	53
1409C_26	CARBONACEOUS MUDSTONE		11.8	2	2.1	158	0.5	0.08	10.1	0.413	1.05	2.8	60
1409C_27	CARBONACEOUS MUDSTONE		10.7	2	2.3	109	0.49	0.09	7.4	0.353	0.42	2.4	49
1409C_29	SANDSTONE		13.6	2	1.6	377	0.45	0.05	6.9	0.418	0.44	1.7	120
1409C_30	SANDSTONE		16.1	2	2	371	0.5	0.07	7.3	0.409	0.4	1.7	111
1409C_31	SANDSTONE		14	2	1.8	437	0.47	0.06	7.1	0.422	0.51	1.8	116
1409C_32	SANDSTONE		14	2	1.7	448	0.47	0.07	6.8	0.421	0.38	1.7	119
1409C_33	SANDSTONE		15.4	2	2	407	0.56	0.07	9.1	0.43	0.52	2.4	121

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
		LOD	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1	1
1409C_34	SILTSTONE		13.5	2	3.2	299	0.87	0.11	14.8	0.36	0.68	3.5	89
1410C_1	SAND		14.5	2	2.5	42.4	0.89	0.09	12.7	0.432	0.41	2.6	89
1410C_2	LATERITE		14.4	3	2.5	31	0.81	0.14	14.5	0.48	0.28	3	240
1410C_3	SANDSTONE		12.1	2	2	43.3	0.68	0.05	9.6	0.353	0.49	2.1	104
1410C_8	SANDSTONE		10.1	1	1.7	36	0.5	<0.05	7.9	0.248	0.34	1.8	83
1410C_13	SANDSTONE		17.4	2	1.8	112	0.54	0.06	8.5	0.596	0.61	2.8	124
1410C_17	SILTSTONE		14.4	2	2.1	106	0.58	0.07	10.8	0.439	0.58	2.5	106
1410C_22	MUDSTONE		12.1	2	2.4	95.5	0.63	0.1	14.3	0.343	0.36	4.5	91
1410C_28	COAL, undifferentiated		2.5	<1	0.4	21.2	0.08	0.05	1.6	0.056	1.16	0.4	11
1410C_29	COAL, undifferentiated		9.1	2	1.7	120.5	0.35	0.06	4.8	0.286	0.38	1.5	69
1410C_30	COAL, undifferentiated		6.5	2	2.2	178	0.44	0.07	7	0.276	0.38	2	33
1410C_31	COAL, undifferentiated		5.7	1	1	98.9	0.2	0.11	4.1	0.143	0.54	1.2	36
1410C_35	SILTSTONE		15.9	2	2.1	217	0.57	0.11	10.2	0.343	0.55	2.5	99
1410C_40	SANDSTONE		16	2	1.7	371	0.41	<0.05	6.1	0.423	0.42	1.6	147
1410C_46	SANDSTONE		12.1	1	1.4	286	0.4	<0.05	6.8	0.359	0.47	1.5	102
1410C_47	SANDSTONE		12.5	1	1.4	286	0.39	0.06	6.4	0.397	0.59	1.6	114
1410C_48	SANDSTONE		12.6	1	1.4	288	0.39	0.05	6.6	0.285	0.49	1.6	83
1410C_49	SANDSTONE		15.3	2	1.9	388	0.5	0.05	7.9	0.381	0.48	2.1	108
1410C_50	SANDSTONE		15.4	2	2	419	0.53	0.06	8.5	0.392	0.45	2.3	99
1410C_51	SANDSTONE		15	2	1.8	382	0.5	0.05	7.3	0.449	0.43	1.9	112
1410C_57	SILTSTONE		14.4	1	1.5	412	0.42	0.07	6.3	0.384	0.42	1.5	107
1410C_58	SANDSTONE		14.9	2	1.7	424	0.48	0.06	7.4	0.425	0.45	1.9	108
1410C_59	SANDSTONE		14.6	2	1.7	433	0.47	0.07	7.7	0.388	0.49	2	107
1410C_60	SANDSTONE		14.9	2	1.7	440	0.46	0.06	7.5	0.425	0.46	1.9	115
1410C_65	SANDSTONE		17	2	2.1	436	0.62	0.09	9.9	0.462	0.5	2.6	128
1410C_70	SANDSTONE		15.4	2	1.7	474	0.46	0.07	8.1	0.42	0.47	2	122
1410C_74	SANDSTONE		16.8	2	2.2	403	0.6	0.08	9.7	0.46	0.57	2.5	125
1410C_78	SANDSTONE		15.7	2	2.3	407	0.63	0.09	10.4	0.462	0.57	2.7	119
1410C_84	SILTSTONE		16.7	2	4.4	157	1.19	0.12	15.8	0.441	1	4.5	103
1412C_1	CLAY		10.4	2	1.6	120.5	0.56	0.06	9.1	0.339	0.35	1.6	84
1412C_8	SANDSTONE		17.4	2	2.3	145.5	0.62	0.09	10.1	0.436	0.57	2.6	122
1412C_17	SANDSTONE		15.4	2	2	173	0.53	0.07	8.6	0.394	0.51	2.3	107
1412C_19	SANDSTONE		16.9	2	2.1	152	0.58	0.08	9.6	0.444	0.53	2.5	122
1412C_20	SANDSTONE		16.2	2	2.1	159.5	0.55	0.06	8.9	0.445	0.53	2.4	123
1412C_21	SANDSTONE		16.8	2	2.1	154.5	0.6	0.1	9.3	0.464	0.54	2.5	127
1412C_22	SANDSTONE		15.5	2	1.9	150	0.53	0.08	8.6	0.429	0.49	2.2	117
1412C_23	SANDSTONE		17.5	2	2.2	161.5	0.62	0.09	10	0.473	0.58	2.6	128
1412C_27	SANDSTONE		15.9	2	2.3	157.5	0.65	0.08	10.7	0.445	0.6	2.7	117
1412C_28	SANDSTONE		14.8	2	2.3	163	0.64	0.09	10.2	0.452	0.5	2.6	115
1412C_51	SANDSTONE		9.9	2	4.1	50.2	1.14	0.06	14.8	0.353	0.82	3.2	61
1412C_52	SANDSTONE		9.4	1	4	54	1.16	0.07	15.1	0.375	1.07	3.3	63
1412C_53	SANDSTONE		8.6	1	4	54.7	1.13	0.06	14.3	0.316	0.67	3	49
1412C_56	SANDSTONE		10.6	2	4.5	47.9	1.18	0.06	16.5	0.372	0.8	3.5	73
1414X_3	SANDSTONE		9.5	1	2	61.7	0.69	0.05	9.6	0.311	0.34	1.8	60
1414X_8	SANDSTONE		5	1	1.2	77	0.38	<0.05	6.5	0.183	0.16	1.1	80
1414X_14	SANDSTONE		6.8	1	3.2	30.1	0.76	<0.05	8.8	0.243	0.36	2.1	37
1414X_25	SANDSTONE		2.7	<1	1.2	24	0.26	<0.05	5.6	0.084	0.1	1.2	30
1429R_24	CLAYSTONE		18	3	2	126.5	0.58	0.08	8.8	0.555	0.6	2.8	102
1429R_26	SILTSTONE		13.4	2	1.4	156	0.4	<0.05	4.4	0.403	0.64	1.9	104
1429R_31	MUDSTONE		11.9	2	1.8	184	0.47	0.05	8.3	0.384	0.36	5.3	88

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Element	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
		LOD	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1	1
1429R_33	SANDSTONE		12.6	2	1.8	196	0.49	0.07	9.1	0.37	0.43	2.7	91
1429R_38	SANDSTONE		11.1	2	2.5	234	0.69	0.11	16.8	0.335	0.32	4.8	65
1429R_41	COAL, undifferentiated		9.7	2	1.5	133	0.29	0.13	5.3	0.299	0.59	1.3	73
1429R_42	CLAY		6.4	1	1.7	190	0.34	0.05	5.8	0.235	0.25	1.7	28
1429R_43	CARBONACEOUS SHALE		9.6	2	1.6	217	0.3	0.12	5.1	0.325	0.71	1.5	107
1429R_44	CARBONACEOUS SHALE		7.5	1	3.1	198.5	0.54	0.08	13.3	0.14	0.32	3	35
1429R_74	SILTSTONE		14.1	2	1.9	423	0.53	0.07	7.9	0.433	0.45	2.1	112
1429R_80	SILTSTONE		13.6	2	2	434	0.56	0.08	8.6	0.431	0.42	2.3	111
1429R_83	SILTSTONE		13	2	2	442	0.59	0.09	9.5	0.401	0.38	2.7	90
1429R_84	SILTSTONE		13.6	2	2.1	462	0.59	0.08	9.3	0.422	0.42	2.6	99
1429R_85	SILTSTONE		14.6	2	2	439	0.55	0.08	8.5	0.435	0.49	2.2	119
1429R_88	SILTSTONE		15.3	2	2	380	0.53	0.09	8.7	0.446	0.54	2.2	130
1429R_92	SILTSTONE		13.9	2	1.9	294	0.54	0.1	8.2	0.436	0.48	2.1	117
1429R_95	SANDSTONE		17.9	2	2.2	221	0.61	0.14	9.8	0.499	0.61	2.7	137
1429R_98	SANDSTONE		16.4	2	2.1	288	0.61	0.1	9.7	0.485	0.56	2.5	133
1429R_119	SILTSTONE		9.3	2	3.9	71.8	1.16	0.08	7.1	0.431	1.79	4.1	85
1429R_120	SILTSTONE		12.3	2	3.8	68.5	1.09	0.1	18.7	0.371	2.62	4.2	118
1429R_121	SILTSTONE		10.9	2	3.3	133.5	0.84	0.1	12.4	0.32	0.91	2.9	71
1429R_122	SILTSTONE		6.4	1	2.7	49.3	0.8	<0.05	11.4	0.255	0.62	2.4	48
1429R_129	SANDSTONE		8.5	1	2.8	50.4	0.8	0.05	12.7	0.276	0.66	2.9	55
1429R_130	SANDSTONE		15.5	3	4	71	0.9	0.27	15.8	0.405	0.72	4.7	91
1429R_131	COAL, undifferentiated		15.9	3	4.3	106	0.97	0.2	12.3	0.45	0.89	4	107
1429R_132	MUDSTONE		18.8	3	4	105	1.05	0.16	17	0.486	0.82	4.6	122
1429R_133	MUDSTONE		20.4	3	4.4	109	1.12	0.17	17.8	0.485	0.86	4.6	125
1429R_139	COAL, undifferentiated		7.5	3	1.9	36.2	0.48	0.14	7.9	0.189	0.46	2.2	32
1429R_140	COAL, undifferentiated		5.5	2	1.2	24.2	0.34	0.12	5.6	0.152	0.96	1.8	23
1429R_141	COAL, undifferentiated		8	1	2.4	211	0.54	0.07	5.5	0.301	0.65	2.1	79
1429R_142	COAL, undifferentiated		7	2	3.3	43.7	1.1	0.06	16.1	0.296	1.27	3.4	33
1429R_143	COAL, undifferentiated		8.1	2	3.2	48.5	1.09	0.07	13	0.261	0.83	3.1	35
1447L_34	SAND		1.3	1	0.4	6.7	0.11	<0.05	3.3	0.045	0.05	0.7	27
1447L_37	CLAY		11	2	2.2	67.9	0.87	0.08	12.6	0.42	0.35	2.4	69
1447L_39	CLAY		8.6	1	1.8	51	0.68	0.05	9.8	0.34	0.24	1.8	72
1447L_41	CLAY		11	1	2.4	58.4	0.89	0.09	13.2	0.416	0.3	2.3	79
1447L_43	CLAY		10.2	1	1.5	37.5	0.58	0.07	10.6	0.275	0.18	2.5	98
1447L_46	SILCRETE		7	2	2.4	62.3	1.02	0.05	7.6	0.628	0.11	1.9	49
1447L_47	SILCRETE		6	2	3.7	82.1	1.21	0.05	7.5	0.904	0.07	2.4	45
1447L_50	SILCRETE		8.8	1	3.2	54.1	0.9	<0.05	12.4	0.482	0.15	2.5	43
1447L_52	SILCRETE		9.5	1	3	76.9	0.84	<0.05	12.9	0.439	0.18	2.3	49
1447L_54	SANDSTONE		6.6	1	1.8	41.3	0.5	<0.05	9.5	0.263	0.12	1.6	44
1447L_60	CLAY		18.3	2	2.2	328	0.57	0.07	9.3	0.463	0.32	2.7	115
1447L_63	CLAY		15.2	2	2.3	212	0.63	0.07	8.8	0.462	0.38	2.5	114
1447L_66	CLAY		14.2	1	2.1	124	0.55	0.07	8.8	0.422	0.58	2.8	112
1447L_70	CLAY		14.1	2	3.1	251	0.8	0.09	12.8	0.427	0.7	3.9	95
1447L_77	CLAY		16.1	3	4.3	69	1.2	0.11	17.5	0.461	0.92	4.5	104
Tailings -250			4.1	1	1.1	16.8	0.24	0.07	5.1	0.106	0.87	1.5	21
Rejects +250			7.8	6	4.8	34.9	1.2	0.16	14.5	0.477	5.05	4.5	25
Product +250			5	2	1	18.5	0.22	0.11	5.5	0.101	0.53	1.6	23

MEMS61 - 4 acid digest

MEMS42 - Aqua regia digest

Samples with TC > were ashed prior to MEMS61

Aqua regia digest was carried out on a split of samples with TC > 5% to capture volatile elements (As, Hg, Sb, Se, Te and Tl)

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	C-IR07
		Element	W	Y	Zn	Zr	As	Hg	Sb	Se	Te	Tl	C
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
		LOD	0.1	0.1	2	0.5	0.1	0.005	0.05	0.2	0.01	0.02	0.01
1388R_95	SAND		1.6	23.9	36	91							0.12
1388R_96	SANDSTONE		1.1	16.6	77	97.6							1.02
1388R_97	SANDSTONE		2.2	27.4	75	139							2.06
1388R_100	SANDSTONE		2.8	24.1	78	129	8.4	0.161	0.23	0.6	0.04	1	6.26
1389R_102	SILTSTONE		1.1	8.7	36	100							0.04
1389R_103	SILTSTONE		2.7	15.9	71	129							3.67
1389R_104/105/106	COAL, undifferentiated		2.8	25.5	70	139	3.7	0.053	0.37	0.9	0.08	0.23	6.26
1389R_107	SANDSTONE		2.6	22.1	64	116	8.8	0.075	0.3	0.8	0.05	0.52	6.17
1397D_134	CLAY		2.7	16.9	174	103							0.21
1397D_135	CLAY		1.2	6.3	118	59.5							0.29
1397D_136	SAND		1.4	13.4	971	84							0.02
1397D_137	CLAY		2.1	44.2	75	269							1.46
1397D_138	SILTSTONE		2.5	10.6	47	136							0.06
1397D_139	SANDSTONE		1.5	9.6	65	72.8							0.33
1397D_140	SANDSTONE		1.8	10.8	50	111.5							0.12
1397D_141	SANDSTONE		1	24.2	18	55.8							0.07
1397D_146	SILTSTONE		2.8	18.4	50	126							2.99
1402C_151	SOIL		1	7.4	10	58.5							0.06
1402C_152	CLAY		1.7	8.9	21	85.4							0.02
1402C_153	SILTSTONE		1.2	23	68	95.2							2.41
1403D_159	SAND		1.6	8.4	30	133.5							0.02
1403D_160	CLAY		1.7	9.9	71	153.5							0.04
1403D_161	CLAY		2.6	22.2	119	147							0.05
1403D_162	CLAYSTONE		2.7	57.5	165	163.5							2.07
1403D_163	SILTSTONE		3.2	21.6	236	142.5							2.47
1403D_164	PEBBLE CONGLOMERATE		1.6	8.3	24	64.9							0.02
1403D_165	SANDSTONE		1	11.4	134	68.1							1.24
1412C_166	LATERITE		1.4	17	44	95.2							0.15
1412C_167	SILTSTONE		1.5	21.1	73	130							0.59
1412C_168	SANDSTONE		1.6	20.7	69	132.5							1.03
1412C_169	SANDSTONE		2.2	23.5	157	155.5							1.71
1412C_170	SILTSTONE		4.7	36.5	137	212							2.78
1412C_171	CARBONACEOUS MUDSTONE		3.7	23.7	216	203	6.1	0.107	0.67	1.8	0.17	0.27	10.4
1412C_173	SANDSTONE		3.3	21.7	126	118.5	5.3	0.039	0.21	0.5	0.03	0.19	5.17
1414X_175	CLAY		2.4	27.4	48	122							0.9
1414X_176	CONGLOMERATE		1.1	12.3	16	54.7							0.08
1414X_177	SILTSTONE		3.6	34.5	16	185							0.3
1414X_178	CARBONACEOUS MUDSTONE		3.3	171	55	201							4.08
1429R_190	SOIL		2.5	32.9	63	145							0.21
1429R_191	MUDSTONE		1.3	18.5	144	110							0.2
1429R_192	CARBONACEOUS SHALE		1.9	19.9	46	99.9	46.4	0.16	0.39	1	0.07	1.54	22.9
1429R_193	MUDSTONE		2.7	26.1	85	159.5							2.21
1429R_194	COAL, undifferentiated		2.7	18.5	86	200	3.4	0.133	0.29	1.3	0.11	0.32	9.83
1429R_195	SANDSTONE		3.5	12.6	47	89.6							1.18
1429R_196	COAL, undifferentiated		1.3	10.9	22	68.4	4.6	0.048	0.2	1.3	0.05	0.18	50
1434D_205	SOIL		1.7	24.1	341	86.9							0.24
1434D_206	CLAYSTONE		2.3	28.6	175	140.5							0.02
1434D_207	SANDSTONE		1.7	10.9	73	74.5							0.02
1434D_208	SILTSTONE		1.3	15.2	94	109.5							0.31
1434D_209	SANDSTONE		1	17.4	101	91.5							1.22

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	C-IR07
		Element	W	Y	Zn	Zr	As	Hg	Sb	Se	Te	Tl	C
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
		LOD	0.1	0.1	2	0.5	0.1	0.005	0.05	0.2	0.01	0.02	0.01
1434D_210	SILTSTONE		1.4	21.5	98	130							2.62
1434D_211	SANDSTONE		1.9	7.9	49	82.9							0.22
1434D_212	CARBONACEOUS SANDSTONE		2.9	33.2	105	171							4.54
1434D_213	CARBONACEOUS SANDSTONE		3.2	32.1	111	178							4.11
1444D_227	SANDSTONE		2.3	20.7	79	130.5							1.03
1444D_228	CARBONACEOUS SHALE		4	30.3	110	222	7.8	0.117	0.65	1.9	0.17	0.34	8.19
1444D_229	SILTSTONE		2.5	20.7	113	119							1.74
1445D_233	CARBONACEOUS SANDSTONE		1.4	19.3	108	138	17.3	0.231	0.49	0.8	0.12	0.99	8.25
1445D_234	SILTSTONE		3	29.6	124	318							1.31
1445D_235	CARBONACEOUS SHALE		0.8	19.5	38	77.4	16.6	0.07	0.26	1.1	0.08	0.5	28.6
1445D_237	CARBONACEOUS SANDSTONE		3.2	23.7	149	162.5							3.14
1445D_238	SANDSTONE		1.2	9.4	33	72.1							0.31
1445D_239	CARBONACEOUS SANDSTONE		4	35.8	134	201							4.08
1445D_240	CARBONACEOUS SANDSTONE		3.1	34.2	105	167							3.32
1445D_241	SILTSTONE		3.6	26.2	111	161	4	0.114	0.3	0.9	0.06	0.19	5.35
1451D_264	CLAY		1.9	15.1	75	87							0.04
1451D_265	SILTSTONE		3.7	25.8	169	174.5							3.68
1451D_266	CARBONACEOUS SANDSTONE		3.7	37.5	130	189							5
1451D_267	SANDSTONE		2.4	18.2	76	119							2.36
1452D_268	CLAY		2.1	27.4	333	143.5							0.06
1452D_269	CLAYSTONE		1.4	17.1	105	119							0.16
1452D_270	SILTSTONE		3	29.9	158	287							0.94
1452D_271	SANDSTONE		1.2	15.7	110	113							1.72
1452D_272	SILTSTONE		2.8	36.6	104	169.5							1.99
1452D_273	MUDSTONE		1.3	31.1	122	166							2.35
1452D_274	SANDSTONE		1.7	9.5	88	55.6							0.82
1453D_275	SOIL		2.6	26.3	218	121.5							0.64
1453D_276	CLAYSTONE		1.9	19.9	288	136.5							0.02
1453D_277	SANDSTONE		1.2	17	171	123.5							1.64
1453D_278	CARBONACEOUS MUDSTONE		1.4	15.3	166	102	0.8	0.03	0.6	0.5	0.05	0.11	23.1
1453D_279	CARBONACEOUS SANDSTONE		0.9	19.8	94	96.9							0.69
1453D_280	SANDSTONE		1.8	26.7	154	165							2.14
1453D_281	SILTSTONE		1.8	11	59	119.5							0.15
1453D_282	SANDSTONE		2.8	34	105	173							3.06
1454D_284	SILTSTONE		2.5	31	214	163.5							1.7
1454D_285	SILTSTONE		1.6	19.5	100	152.5							1.75
1454D_286	SANDSTONE		1.5	16.3	76	134	3.4	0.053	0.4	0.6	0.08	0.26	12.45
1454D_288	SILTSTONE		4.2	19.8	196	224	10.2	0.191	0.77	2.3	0.2	0.35	8.75
1454D_289	CARBONACEOUS SHALE		3.2	35.1	218	191.5							4.35
1454D_290	MUDSTONE		3.7	24.8	106	180.5	3.1	0.142	0.34	0.8	0.07	0.14	6.27
1398X_1	SOIL		1.8	17.1	30	102							
1398X_2	SAND		3	13.1	20	103.5							
1398X_9	SAND		1.7	9.2	6	65							
1398X_14	SAND		3.1	16.7	10	124							
1398X_19	CLAY		6.2	10.8	8	102.5							
1398X_22	SAND		5.9	16	3	101.5							
1398X_28	SAND		3.1	10.8	4	120.5							
1398X_5032	SANDSTONE		7.6	25.4	3	67.3							
1398X_33	SANDSTONE		2.6	21	52	157							
1398X_34	COAL, undifferentiated		6	18	49	133.5							

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	C-IR07
		Element	W	Y	Zn	Zr	As	Hg	Sb	Se	Te	Tl	C
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
		LOD	0.1	0.1	2	0.5	0.1	0.005	0.05	0.2	0.01	0.02	0.01
1399X_2	SOIL		1.8	14.1	11	70.5							
1399X_6	SAND		2.2	15.8	24	121.5							
1399X_11	SAND		2	9.8	9	59.8							
1399X_19	SAND		8.4	16.5	9	98.9							
1399X_24	SAND		2.4	13.2	5	84.4							
1399X_31	CLAY		3.7	37	21	189.5							
1399X_32	CLAY		4.2	46.2	20	223							
1399X_34	SANDSTONE		4.6	21.2	59	118.5							
1399X_35	SANDSTONE		2.3	25.5	24	139							
1399X_36	SANDSTONE		6.4	17	12	126.5							
1400X_2	SOIL		2	20.4	30	120.5							
1400X_7	SAND		4.9	8.8	11	65.2							
1400X_11	SAND		1.5	9.6	19	61.6							
1400X_25	CLAY		4.8	39.6	40	195							
1400X_26	COALY SHALE		2.7	30.9	322	135.5	4.7	0.097	0.29	1.1	0.06	0.89	10.2
1401X_2	SOIL		7.6	8.8	18	76.2							
1401X_3	SOIL		1.3	8.3	6	66.8							
1401X_15	SAND		3.4	8.3	11	55.3							
1401X_27	SANDSTONE		5.9	15.8	78	131							
1401X_28	SANDSTONE		6.8	13.2	35	82.1	47.2	0.34	0.32	1.4	0.03	2.14	5.28
1404C_2	CLAY		1.9	21.3	33	113.5							
1404C_4	SANDSTONE		3.2	6.6	11	46.4							
1404C_8	SILTSTONE		2.2	15.7	10	192.5							
1404C_11	SILTSTONE		2	16.9	20	188							
1404C_18	SILTSTONE		3.1	24.1	122	164.5							
1404C_19	SILTSTONE		2.8	22.1	88	165							
1404C_20	SILTSTONE		3	21	29	171.5							
1404C_22	SILTSTONE		2.5	23	19	168							
1404C_24	SILTSTONE		1.6	45.5	21	120	19.1	0.162	0.27	2.5	0.06	0.26	13.9
1405C_1	CLAY		2	23.2	13	122							
1405C_6	SILTSTONE		2.1	34.6	130	149.5							
1405C_19	SANDSTONE		1.2	17.6	64	119.5							
1405C_20	SANDSTONE		1.2	17	83	109							
1405C_21	SANDSTONE		1.2	16.7	81	118.5							
1405C_22	SANDSTONE		1.6	17.1	88	108.5							
1405C_25	SANDSTONE		1.9	17.2	74	114.5							
1405C_26	SANDSTONE		2.2	18.3	72	95.2							
1405C_28	SANDSTONE		1.4	18.1	77	122.5							
1405C_30	SANDSTONE		1.7	18.1	74	118.5							
1405C_31	SANDSTONE		1.5	18.4	72	119							
1405C_32	SANDSTONE		1.5	19.3	73	127							
1405C_33	SANDSTONE		1.3	18.8	74	126							
1405C_36	SANDSTONE		1.6	18.9	74	123							
1405C_40	SANDSTONE		2.4	21.2	77	132.5							
1405C_42	SANDSTONE		1.8	23.2	79	137.5							
1405C_43	SANDSTONE		1.6	24.9	74	129							
1405C_44	SANDSTONE		1.6	21.2	80	134							
1405C_48	SANDSTONE		1.5	24.8	74	134							
1405C_49	SANDSTONE		1.7	23.8	85	148							
1405C_50	SANDSTONE		1.6	24.5	74	144.5							

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	C-IR07
		Element	W	Y	Zn	Zr	As	Hg	Sb	Se	Te	Tl	C
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
		LOD	0.1	0.1	2	0.5	0.1	0.005	0.05	0.2	0.01	0.02	0.01
1405C_51	SANDSTONE		2.2	24.2	80	157							
1405C_52	SANDSTONE		2.2	23.5	83	159							
1405C_53	SANDSTONE		2.9	24.2	65	160.5							
1405C_54	SANDSTONE		2.5	27.3	81	193							
1407C_78603	SAND		2.8	6.2	14	60.2							
1407C_78606	SILTSTONE		2	12.2	10	166							
1407C_78610	SILTSTONE		2.5	16.3	32	159.5							
1407C_78611	SILTSTONE		2.5	21.5	42	154							
1407C_78612	CLAY		2.8	24.3	65	163.5							
1407C_78614	CLAY		2.9	26.6	32	153							
1407C_78616	CLAY		3	26.5	17	168							
1407C_78619	CLAY		2.9	82.1	7	192.5							
1407C_78621	CLAY		2.8	77.1	13	315							
1407C_78624	SILTSTONE		5.2	27.3	13	152.5							
1407C_78627	SILTSTONE		5.6	21.6	13	147.5							
1407C_78628	SILTSTONE		4.7	22.6	47	146							
1407C_78630	SANDSTONE		4.1	28.8	13	149							
1407C_78631	SANDSTONE		6.2	20.2	11	105.5							
1407C_78632	SANDSTONE		1.8	9.8	6	62							
1407C_78633	SANDSTONE		5	11.3	7	76.7							
1408C_78650	SAND		2.3	8.1	12	99.3							
1408C_78704	SILTSTONE		2.9	10.4	8	156.5							
1408C_78708	SILTSTONE		2.5	19.2	63	161							
1408C_78712	CLAY		2.7	26.6	35	167							
1408C_78715	CLAY		2.7	33.9	18	176.5							
1408C_78717	CLAY		2.9	75.2	10	276							
1408C_78720	SILTSTONE		3.2	25.5	21	157							
1408C_78725	SILTSTONE		4.5	28.7	24	173							
1408C_78726	SANDSTONE		2.8	15.5	13	89.1							
1408C_78727	SANDSTONE		6.6	14.3	7	88.3							
1408C_78728	SANDSTONE		3.6	13.5	8	97.2							
1408C_78730	SANDSTONE		7.7	8.7	3	54							
1409C_5	SANDSTONE		2.2	20.2	40	77.5							
1409C_11	COAL WEATHERED		2.7	21.4	92	110							
1409C_12	COAL WEATHERED		1.7	29.7	38	103							
1409C_13	COAL WEATHERED		4.6	51.7	59	262							
1409C_14	COAL, undifferentiated		1.2	18.7	54	106.5							
1409C_17	SANDSTONE		1.2	15.6	82	107.5							
1409C_19	SANDSTONE		1.1	17.8	71	114							
1409C_22	SANDSTONE		1.5	20.6	71	156.5							
1409C_23	SANDSTONE		1.7	22.2	71	185.5							
1409C_24	SANDSTONE		2.7	24.6	68	182.5							
1409C_25	MUDSTONE		3.1	34.3	42	264							
1409C_26	CARBONACEOUS MUDSTONE		1.7	25.5	78	173.5							
1409C_27	CARBONACEOUS MUDSTONE		1.9	19.2	55	109	9.9	0.066	0.18	0.8	0.06	0.27	9.82
1409C_29	SANDSTONE		0.9	16.7	72	102.5							
1409C_30	SANDSTONE		1.3	18.8	69	114.5							
1409C_31	SANDSTONE		1.3	18.1	76	107							
1409C_32	SANDSTONE		1.5	17.9	71	107.5							
1409C_33	SANDSTONE		1.5	24.5	80	124.5							

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	C-IR07
		Element	W	Y	Zn	Zr	As	Hg	Sb	Se	Te	Tl	C
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
		LOD	0.1	0.1	2	0.5	0.1	0.005	0.05	0.2	0.01	0.02	0.01
1409C_34	SILTSTONE		2.4	30	74	145.5							
1410C_1	SAND		1.9	23.5	17	124.5							
1410C_2	LATERITE		2.2	15.5	18	125.5							
1410C_3	SANDSTONE		3.4	25.5	34	100.5							
1410C_8	SANDSTONE		4.3	15	21	81.8							
1410C_13	SANDSTONE		1.7	26.8	86	128.5							
1410C_17	SILTSTONE		2	30	104	160							
1410C_22	MUDSTONE		2.5	36.1	92	164.5							
1410C_28	COAL, undifferentiated		0.8	7.5	10	24.1	43.2	0.167	<0.05	0.6	0.03	0.32	50
1410C_29	COAL, undifferentiated		0.9	14	39	94.9	4.9	0.075	0.12	0.6	0.03	0.19	23.5
1410C_30	COAL, undifferentiated		1	17.5	57	96.6	5.2	0.068	0.13	0.7	0.04	0.16	20.8
1410C_31	COAL, undifferentiated		0.7	13.2	23	77.3	1.2	0.022	0.31	0.7	0.07	0.14	38.3
1410C_35	SILTSTONE		1.6	29.1	69	123							
1410C_40	SANDSTONE		1.6	17.3	73	87.1							
1410C_46	SANDSTONE		3.5	17.7	52	84.5							
1410C_47	SANDSTONE		2.6	16.1	67	82.5							
1410C_48	SANDSTONE		2.4	19.6	51	85							
1410C_49	SANDSTONE		2.2	18.8	88	112							
1410C_50	SANDSTONE		1.9	21	91	123							
1410C_51	SANDSTONE		1.9	24.3	75	113							
1410C_57	SILTSTONE		1.7	20.2	70	91.3							
1410C_58	SANDSTONE		1.6	18.4	75	108.5							
1410C_59	SANDSTONE		1.9	19.2	75	107							
1410C_60	SANDSTONE		1.5	20.4	80	110							
1410C_65	SANDSTONE		1.6	24.1	90	132							
1410C_70	SANDSTONE		1.7	21.2	83	109							
1410C_74	SANDSTONE		1.6	23.3	86	131							
1410C_78	SANDSTONE		3.8	24.8	84	137.5							
1410C_84	SILTSTONE		3.3	27.8	90	163							
1412C_1	CLAY		2	22.4	46	96.9							
1412C_8	SANDSTONE		1.8	25	76	127							
1412C_17	SANDSTONE		1.3	25.6	77	115							
1412C_19	SANDSTONE		1.6	23.8	88	126							
1412C_20	SANDSTONE		1.4	23.9	81	123.5							
1412C_21	SANDSTONE		1.6	23.1	81	127							
1412C_22	SANDSTONE		1.3	23.7	78	119							
1412C_23	SANDSTONE		1.7	23.1	85	131							
1412C_27	SANDSTONE		1.7	24.4	85	132.5							
1412C_28	SANDSTONE		1.5	24.5	82	139.5							
1412C_51	SANDSTONE		4	19.3	68	143.5							
1412C_52	SANDSTONE		4.9	19.5	68	181.5							
1412C_53	SANDSTONE		4.7	17.8	57	153							
1412C_56	SANDSTONE		6.7	22	116	145							
1414X_3	SANDSTONE		2.7	18.9	31	87.8							
1414X_8	SANDSTONE		4.2	7.6	16	53.7							
1414X_14	SANDSTONE		2.3	10.9	14	103.5							
1414X_25	SANDSTONE		8.1	6.8	8	49.7							
1429R_24	CLAYSTONE		1.8	30.1	36	112.5							
1429R_26	SILTSTONE		1.4	52.6	135	95.5							
1429R_31	MUDSTONE		1.5	19.8	77	129							

Client Sample ID	Lithology	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	ME-MS42	C-IR07
		Element	W	Y	Zn	Zr	As	Hg	Sb	Se	Te	Tl	C
		Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
		LOD	0.1	0.1	2	0.5	0.1	0.005	0.05	0.2	0.01	0.02	0.01
1429R_33	SANDSTONE		2	23.9	68	141.5							
1429R_38	SANDSTONE		2.4	29.8	60	255							
1429R_41	COAL, undifferentiated		1.3	12.9	63	79.8	4.1	0.076	0.12	0.9	0.09	0.19	27.8
1429R_42	CLAY		1	16.9	42	103	2.8	0.032	0.13	0.5	0.03	0.1	19.55
1429R_43	CARBONACEOUS SHALE		1.3	22.3	67	90.3	10.6	0.062	0.23	1.1	0.08	0.31	12.15
1429R_44	CARBONACEOUS SHALE		1	22.6	57	103	3.6	0.048	0.31	0.8	0.05	0.15	12
1429R_74	SILTSTONE		1.4	19.6	79	116							
1429R_80	SILTSTONE		1.3	20.3	78	124.5							
1429R_83	SILTSTONE		1.5	22.8	76	144							
1429R_84	SILTSTONE		1.5	23.7	81	145							
1429R_85	SILTSTONE		1.6	20.8	77	121.5							
1429R_88	SILTSTONE		1.3	22.5	84	119.5							
1429R_92	SILTSTONE		1.5	23.2	80	115							
1429R_95	SANDSTONE		1.5	28.2	91	135							
1429R_98	SANDSTONE		1.7	23.3	93	132.5							
1429R_119	SILTSTONE		2.4	17.2	45	117	3.7	0.136	0.26	1.3	0.05	0.77	12.05
1429R_120	SILTSTONE		4.4	25.6	78	151							
1429R_121	SILTSTONE		2.3	20.4	58	118.5	3.5	0.086	0.22	0.7	0.05	0.4	7.35
1429R_122	SILTSTONE		4.1	14.2	50	132							
1429R_129	SANDSTONE		3	21.4	61	109.5							
1429R_130	SANDSTONE		5.3	24.6	77	170.5	5.2	0.098	0.41	2.1	0.18	0.11	14.3
1429R_131	COAL, undifferentiated		4.2	21.3	87	160	5.2	0.097	0.5	1.2	0.12	0.19	5.66
1429R_132	MUDSTONE		3.4	35.6	105	180.5							
1429R_133	MUDSTONE		4.2	35.8	108	176.5							
1429R_139	COAL, undifferentiated		1.7	24.5	42	78.5	4.6	0.069	0.27	2.4	0.09	0.05	37.4
1429R_140	COAL, undifferentiated		1.3	18.4	15	56.1	7.4	0.144	0.2	2.5	0.07	0.17	36.7
1429R_141	COAL, undifferentiated		1.5	13.3	52	107	2.8	0.069	0.23	0.8	0.04	0.22	19
1429R_142	COAL, undifferentiated		3.8	15.8	66	135							
1429R_143	COAL, undifferentiated		2.6	14.9	50	112.5							
1447L_34	SAND		2.1	3.3	2	23.1							
1447L_37	CLAY		1.9	27	30	117.5							
1447L_39	CLAY		2.1	14.2	18	95.9							
1447L_41	CLAY		2	14.6	21	115							
1447L_43	CLAY		4.2	10.1	36	80							
1447L_46	SILCRETE		4	13.1	17	147.5							
1447L_47	SILCRETE		6.3	15.1	5	201							
1447L_50	SILCRETE		2.3	11.5	17	143.5							
1447L_52	SILCRETE		4	12.5	13	147.5							
1447L_54	SANDSTONE		1.9	8.3	10	90.4							
1447L_60	CLAY		1.5	12.4	63	126.5							
1447L_63	CLAY		1.8	31.1	61	133.5							
1447L_66	CLAY		1.6	13.1	77	108							
1447L_70	CLAY		1.9	27	37	151.5							
1447L_77	CLAY		3.1	37.7	117	168.5							
Tailings -250			0.9	11.2	56	65.5							
Rejects +250			2.9	20.2	23	95.5							
Product +250			0.7	15.9	15	67.3							

MEMS61 - 4 acid digest
MEMS42 - Aqua regia digest
Samples with TC > were ashed prior to MEMS61
Aqua regia digest was carried out on a split of samples with TC > 5% to capture volatile elements (As, Hg, Sb, Se, Te and Tl)

Appendix 6: Global Abundance Index

Sample ID	Lithology	Ag	As	Ba	Be	Cd	Ce	Co	Cr	Cu	Hf	In	La	Mo	Mn
1388R_95	SAND														
1388R_96	SANDSTONE														
1388R_97	SANDSTONE														
1388R_100	SANDSTONE														
1389R_102	SILTSTONE			1											
1389R_103	SILTSTONE														
1389R_104/105/106	COAL, undifferentiated														
1389R_107	SANDSTONE	1													
1397D_136	SAND														
1397D_137	CLAY			1	1							1			
1397D_139	SANDSTONE														
1397D_146	SILTSTONE														
1402C_152	CLAY														
1402C_153	SILTSTONE			1											1
1403D_159	SAND														
1403D_160	CLAY														
1403D_161	CLAY														
1403D_162	CLAYSTONE		1												
1403D_163	SILTSTONE														
1403D_164	PEBBLE CONGLOMERATE														
1403D_165	SANDSTONE														
1412C_166	LATERITE														
1412C_167	SILTSTONE														
1412C_168	SANDSTONE														
1412C_169	SANDSTONE														
1412C_170	SILTSTONE										1				
1412C_171	CARBONACEOUS MUDSTONE	2													
1412C_173	SANDSTONE														
1414X_175	CLAY														
1414X_177	SILTSTONE														
1414X_178	CARBONACEOUS MUDSTONE				1	1	1						1		
1429R_190	SOIL														
1429R_191	MUDSTONE														
1429R_192	CARBONACEOUS SHALE	3	1												
1429R_193	MUDSTONE														
1429R_194	COAL, undifferentiated	5													
1429R_196	COAL, undifferentiated	2													
1434D_205	SOIL														
1434D_206	CLAYSTONE														
1434D_209	SANDSTONE														
1434D_210	SILTSTONE														
1434D_212	CARBONACEOUS SANDSTONE														
1434D_213	CARBONACEOUS SANDSTONE														
1444D_228	CARBONACEOUS SHALE	1													
1444D_229	SILTSTONE														
1445D_233	CARBONACEOUS SANDSTONE	2													
1445D_234	SILTSTONE										1			1	
1445D_235	CARBONACEOUS SHALE	1													
1445D_237	CARBONACEOUS SANDSTONE														
1445D_239	CARBONACEOUS SANDSTONE														
1445D_240	CARBONACEOUS SANDSTONE														
1445D_241	SILTSTONE	3													
1451D_264	CLAY														
1451D_265	SILTSTONE	1													
1451D_266	CARBONACEOUS SANDSTONE														
1451D_267	SANDSTONE														
1452D_268	CLAY		1												

Sample ID	Lithology	Ag	As	Ba	Be	Cd	Ce	Co	Cr	Cu	Hf	In	La	Mo	Mn
1452D_269	CLAYSTONE														
1452D_270	SILTSTONE					2					1				
1452D_271	SANDSTONE	1													
1452D_272	SILTSTONE														
1452D_273	MUDSTONE									1					
1453D_275	SOIL														
1453D_276	CLAYSTONE														
1453D_277	SANDSTONE														
1453D_278	CARBONACEOUS MUDSTONE	5													
1453D_279	CARBONACEOUS SANDSTONE														
1453D_280	SANDSTONE														
1453D_282	SANDSTONE	1													
1454D_284	SILTSTONE	1													
1454D_285	SILTSTONE														
1454D_286	SANDSTONE	2													
1454D_288	SILTSTONE	2						1							
1454D_289	CARBONACEOUS SHALE														
1454D_290	MUDSTONE	4													
1398X_1	SOIL														
1398X_2	SAND														
1398X_9	SAND														
1398X_14	SAND														
1398X_19	CLAY														
1398X_22	SAND														
1398X_28	SAND														
1398X_5032	SANDSTONE														
1398X_33	SANDSTONE														
1398X_34	COAL, undifferentiated														
1399X_2	SOIL														
1399X_6	SAND														
1399X_11	SAND														
1399X_19	SAND														
1399X_24	SAND														
1399X_31	CLAY														
1399X_32	CLAY											1			
1399X_34	SANDSTONE														
1399X_35	SANDSTONE														
1399X_36	SANDSTONE														
1400X_2	SOIL														
1400X_7	SAND														
1400X_11	SAND														
1400X_25	CLAY							1							
1400X_26	COALY SHALE	1				1									
1401X_2	SOIL														
1401X_3	SOIL														
1401X_15	SAND														
1401X_27	SANDSTONE														
1401X_28	SANDSTONE		2												
1404C_2	CLAY														
1404C_4	SANDSTONE														
1404C_8	SILTSTONE		1												
1404C_11	SILTSTONE														
1404C_18	SILTSTONE														
1404C_19	SILTSTONE														
1404C_20	SILTSTONE														
1404C_22	SILTSTONE														
1404C_24	SILTSTONE	2	1					1							

Sample ID	Lithology	Ag	As	Ba	Be	Cd	Ce	Co	Cr	Cu	Hf	In	La	Mo	Mn
1405C_1	CLAY														
1405C_6	SILTSTONE		1												
1405C_19	SANDSTONE														
1405C_20	SANDSTONE														
1405C_21	SANDSTONE														
1405C_22	SANDSTONE														
1405C_25	SANDSTONE														
1405C_26	SANDSTONE														
1405C_28	SANDSTONE														
1405C_30	SANDSTONE														
1405C_31	SANDSTONE														
1405C_32	SANDSTONE														
1405C_33	SANDSTONE														
1405C_36	SANDSTONE														
1405C_40	SANDSTONE														
1405C_42	SANDSTONE														
1405C_43	SANDSTONE														
1405C_44	SANDSTONE														
1405C_48	SANDSTONE														
1405C_49	SANDSTONE														
1405C_50	SANDSTONE														
1405C_51	SANDSTONE														
1405C_52	SANDSTONE														
1405C_53	SANDSTONE														
1405C_54	SANDSTONE														
1407C_78603	SAND														
1407C_78606	SILTSTONE														
1407C_78610	SILTSTONE														
1407C_78611	SILTSTONE														
1407C_78612	CLAY														
1407C_78614	CLAY			1											
1407C_78616	CLAY														
1407C_78619	CLAY														
1407C_78621	CLAY									1	1	1			
1407C_78624	SILTSTONE														
1407C_78627	SILTSTONE														
1407C_78628	SILTSTONE														
1407C_78630	SANDSTONE														
1407C_78631	SANDSTONE														
1407C_78632	SANDSTONE														
1407C_78633	SANDSTONE														
1408C_78650	SAND														
1408C_78704	SILTSTONE														
1408C_78708	SILTSTONE														
1408C_78712	CLAY														
1408C_78715	CLAY														
1408C_78717	CLAY									1	1	1			
1408C_78720	SILTSTONE														
1408C_78725	SILTSTONE														
1408C_78726	SANDSTONE														
1408C_78727	SANDSTONE														
1408C_78728	SANDSTONE								1						
1408C_78730	SANDSTONE														
1409C_5	SANDSTONE														
1409C_11	COAL WEATHERED		2												
1409C_12	COAL WEATHERED		1												

Sample ID	Lithology	Ag	As	Ba	Be	Cd	Ce	Co	Cr	Cu	Hf	In	La	Mo	Mn
1409C_13	COAL WEATHERED		1		1						1				
1409C_14	COAL, undifferentiated														
1409C_17	SANDSTONE														
1409C_19	SANDSTONE														
1409C_22	SANDSTONE														
1409C_23	SANDSTONE														
1409C_24	SANDSTONE														
1409C_25	MUDSTONE														
1409C_26	CARBONACEOUS MUDSTONE		3												
1409C_27	CARBONACEOUS MUDSTONE	3													
1409C_29	SANDSTONE														
1409C_30	SANDSTONE														
1409C_31	SANDSTONE														
1409C_32	SANDSTONE														
1409C_33	SANDSTONE														
1409C_34	SILTSTONE														
1410C_1	SAND														
1410C_2	LATERITE														
1410C_3	SANDSTONE														
1410C_8	SANDSTONE														
1410C_13	SANDSTONE														
1410C_17	SILTSTONE							1							
1410C_22	MUDSTONE														
1410C_28	COAL, undifferentiated	1	1												
1410C_29	COAL, undifferentiated														
1410C_30	COAL, undifferentiated	2													
1410C_31	COAL, undifferentiated			1											
1410C_35	SILTSTONE														
1410C_40	SANDSTONE														
1410C_46	SANDSTONE														
1410C_47	SANDSTONE														
1410C_48	SANDSTONE														
1410C_49	SANDSTONE														
1410C_50	SANDSTONE														
1410C_51	SANDSTONE														
1410C_57	SILTSTONE														
1410C_58	SANDSTONE														
1410C_59	SANDSTONE														
1410C_60	SANDSTONE														
1410C_65	SANDSTONE														
1410C_70	SANDSTONE														
1410C_74	SANDSTONE														
1410C_78	SANDSTONE														
1410C_84	SILTSTONE														
1412C_1	CLAY														
1412C_8	SANDSTONE														
1412C_17	SANDSTONE			1											
1412C_19	SANDSTONE														
1412C_20	SANDSTONE														
1412C_21	SANDSTONE														
1412C_22	SANDSTONE														
1412C_23	SANDSTONE														
1412C_27	SANDSTONE														
1412C_28	SANDSTONE														
1412C_51	SANDSTONE														
1412C_52	SANDSTONE														

Sample ID	Lithology	Ag	As	Ba	Be	Cd	Ce	Co	Cr	Cu	Hf	In	La	Mo	Mn
1412C_53	SANDSTONE														
1412C_56	SANDSTONE														
1414X_3	SANDSTONE														
1414X_8	SANDSTONE														
1414X_14	SANDSTONE														
1414X_25	SANDSTONE														
1429R_24	CLAYSTONE														
1429R_26	SILTSTONE														
1429R_31	MUDSTONE					2									
1429R_33	SANDSTONE														
1429R_38	SANDSTONE														
1429R_41	COAL, undifferentiated	3													
1429R_42	CLAY	4													
1429R_43	CARBONACEOUS SHALE	2													
1429R_44	CARBONACEOUS SHALE	2													
1429R_74	SILTSTONE														
1429R_80	SILTSTONE														
1429R_83	SILTSTONE														
1429R_84	SILTSTONE														
1429R_85	SILTSTONE														
1429R_88	SILTSTONE														
1429R_92	SILTSTONE	1													
1429R_95	SANDSTONE														
1429R_98	SANDSTONE														
1429R_119	SILTSTONE														
1429R_120	SILTSTONE														
1429R_121	SILTSTONE	2													
1429R_122	SILTSTONE														
1429R_129	SANDSTONE														
1429R_130	SANDSTONE	2													
1429R_131	COAL, undifferentiated	1													
1429R_132	MUDSTONE														
1429R_133	MUDSTONE														
1429R_139	COAL, undifferentiated	5													
1429R_140	COAL, undifferentiated														
1429R_141	COAL, undifferentiated	2													
1429R_142	COAL, undifferentiated														
1429R_143	COAL, undifferentiated														
1447L_34	SAND														
1447L_37	CLAY														
1447L_39	CLAY														
1447L_41	CLAY														
1447L_43	CLAY														
1447L_46	SILCRETE														
1447L_47	SILCRETE	1													
1447L_50	SILCRETE														
1447L_52	SILCRETE														
1447L_54	SANDSTONE														
1447L_60	CLAY			1											
1447L_63	CLAY			2											
1447L_66	CLAY														
1447L_70	CLAY														
1447L_77	CLAY														
Tailings -250	Tailings - 250														
Rejects +250	Rejects + 250		2												
Product +250	Product + 250														

Sample ID	Lithology	Pb	Re	S	Sb	Se	Te	Th	Tl	U	V	W	Y	Zn
1388R_95	SAND						3							
1388R_96	SANDSTONE		1				2							
1388R_97	SANDSTONE					1	3							
1388R_100	SANDSTONE		1				3							
1389R_102	SILTSTONE		1				3							
1389R_103	SILTSTONE						3							
1389R_104/105/106	COAL, undifferentiated		1				3							
1389R_107	SANDSTONE						3							
1397D_136	SAND													2
1397D_137	CLAY		1			2	4							
1397D_139	SANDSTONE		1											
1397D_146	SILTSTONE						2							
1402C_152	CLAY						3							
1402C_153	SILTSTONE		1				3							
1403D_159	SAND						3							
1403D_160	CLAY						3							
1403D_161	CLAY				3		3							
1403D_162	CLAYSTONE		2		10	2	4							
1403D_163	SILTSTONE						3							
1403D_164	PEBBLE CONGLOMERATE				5									
1403D_165	SANDSTONE		3											
1412C_166	LATERITE						3							
1412C_167	SILTSTONE		1				3							
1412C_168	SANDSTONE					1	3							
1412C_169	SANDSTONE		1			1	3							
1412C_170	SILTSTONE		2			1	3	1						
1412C_171	CARBONACEOUS MUDSTONE		1			1	4							
1412C_173	SANDSTONE		1				3							
1414X_175	CLAY						3							
1414X_177	SILTSTONE					2	4							
1414X_178	CARBONACEOUS MUDSTONE		3			3	5						1	
1429R_190	SOIL					1	3							
1429R_191	MUDSTONE					1	3							
1429R_192	CARBONACEOUS SHALE		1				3		1					
1429R_193	MUDSTONE		1			1	4							
1429R_194	COAL, undifferentiated		1			1	4							
1429R_196	COAL, undifferentiated						3							
1434D_205	SOIL					1	4							1
1434D_206	CLAYSTONE				1	1	3							
1434D_209	SANDSTONE						3							
1434D_210	SILTSTONE		1				3							
1434D_212	CARBONACEOUS SANDSTONE		1			1	4							
1434D_213	CARBONACEOUS SANDSTONE		1			1	4							
1444D_228	CARBONACEOUS SHALE					1	4							
1444D_229	SILTSTONE					1	2							
1445D_233	CARBONACEOUS SANDSTONE		1				4							
1445D_234	SILTSTONE		1			1	4							
1445D_235	CARBONACEOUS SHALE		2				3							
1445D_237	CARBONACEOUS SANDSTONE					1	3							
1445D_239	CARBONACEOUS SANDSTONE		1			2	4							
1445D_240	CARBONACEOUS SANDSTONE		1			1	4							
1445D_241	SILTSTONE		1			1	4							
1451D_264	CLAY						3							
1451D_265	SILTSTONE		1			1	3							
1451D_266	CARBONACEOUS SANDSTONE		1			2	4							
1451D_267	SANDSTONE					1	3							
1452D_268	CLAY					1	3							1

Sample ID	Lithology	Pb	Re	S	Sb	Se	Te	Th	Tl	U	V	W	Y	Zn
1452D_269	CLAYSTONE						3							
1452D_270	SILTSTONE					1	3							
1452D_271	SANDSTONE				3		3							
1452D_272	SILTSTONE		1			1	4							
1452D_273	MUDSTONE		1			2	4							
1453D_275	SOIL						3							
1453D_276	CLAYSTONE						3							1
1453D_277	SANDSTONE						2							
1453D_278	CARBONACEOUS MUDSTONE						3							
1453D_279	CARBONACEOUS SANDSTONE						2							
1453D_280	SANDSTONE					1	3							
1453D_282	SANDSTONE		1			1	4							
1454D_284	SILTSTONE					1	4							
1454D_285	SILTSTONE						3							
1454D_286	SANDSTONE						4							
1454D_288	SILTSTONE		1			1	5							
1454D_289	CARBONACEOUS SHALE					2	4							
1454D_290	MUDSTONE		1			1	4							
1398X_1	SOIL		3			1	3							
1398X_2	SAND		3				3							
1398X_9	SAND		3											
1398X_14	SAND		3				2							
1398X_19	CLAY		3									1		
1398X_22	SAND	1	3									1		
1398X_28	SAND		3											
1398X_5032	SANDSTONE		3				2					1		
1398X_33	SANDSTONE		3			1	3							
1398X_34	COAL, undifferentiated		3			1	3					1		
1399X_2	SOIL		3				3							
1399X_6	SAND		3			1	3							
1399X_11	SAND		3											
1399X_19	SAND		3				3					1		
1399X_24	SAND		3											
1399X_31	CLAY		1			2	4							
1399X_32	CLAY		1			2	4							
1399X_34	SANDSTONE		3			1	3							
1399X_35	SANDSTONE		3			2	3							
1399X_36	SANDSTONE		3									1		
1400X_2	SOIL		3			1	3							
1400X_7	SAND		3											
1400X_11	SAND		3				3							
1400X_25	CLAY		3			2	4							
1400X_26	COALY SHALE		2			1	4							1
1401X_2	SOIL		3				2					1		
1401X_3	SOIL		3											
1401X_15	SAND		3				3							
1401X_27	SANDSTONE		3				2					1		
1401X_28	SANDSTONE		3						1			1		
1404C_2	CLAY		3			1	3							
1404C_4	SANDSTONE		3											
1404C_8	SILTSTONE		3			3	4							
1404C_11	SILTSTONE		3			1	3							
1404C_18	SILTSTONE		1			1	3							
1404C_19	SILTSTONE		3			1	4							
1404C_20	SILTSTONE		1			1	4							
1404C_22	SILTSTONE		3			2	4							
1404C_24	SILTSTONE		3			2	4							

Sample ID	Lithology	Pb	Re	S	Sb	Se	Te	Th	Tl	U	V	W	Y	Zn
1405C_1	CLAY		3			1	3							
1405C_6	SILTSTONE		3			2	3							
1405C_19	SANDSTONE		1			1	2							
1405C_20	SANDSTONE		1			1	2							
1405C_21	SANDSTONE		1			1	3							
1405C_22	SANDSTONE		3			1	3							
1405C_25	SANDSTONE		3			1	3							
1405C_26	SANDSTONE		3			1	2							
1405C_28	SANDSTONE		3			1	3							
1405C_30	SANDSTONE		3			1	3							
1405C_31	SANDSTONE		3			1	3							
1405C_32	SANDSTONE		1			1	3							
1405C_33	SANDSTONE		1			1	3							
1405C_36	SANDSTONE		3			1	3							
1405C_40	SANDSTONE		3			1	3							
1405C_42	SANDSTONE		3			1	3							
1405C_43	SANDSTONE		3			1	3							
1405C_44	SANDSTONE		1			1	3							
1405C_48	SANDSTONE		2			1	4							
1405C_49	SANDSTONE		3			1	3							
1405C_50	SANDSTONE		3			1	3							
1405C_51	SANDSTONE		3			1	3							
1405C_52	SANDSTONE		3			1	3							
1405C_53	SANDSTONE		3			1	3							
1405C_54	SANDSTONE		1			2	4							
1407C_78603	SAND		3											
1407C_78606	SILTSTONE		3			2	3							
1407C_78610	SILTSTONE		3			1	3							
1407C_78611	SILTSTONE		3			2	3							
1407C_78612	CLAY		3			1	3							
1407C_78614	CLAY		3			1	4							
1407C_78616	CLAY		3			1	4							
1407C_78619	CLAY		1			2	4							
1407C_78621	CLAY		2			3	5			1	1			
1407C_78624	SILTSTONE		3			1	3					1		
1407C_78627	SILTSTONE		3				2					1		
1407C_78628	SILTSTONE		1				2							
1407C_78630	SANDSTONE		3			1	3							
1407C_78631	SANDSTONE		3				2					1		
1407C_78632	SANDSTONE		3											
1407C_78633	SANDSTONE		3											
1408C_78650	SAND		3			1	2							
1408C_78704	SILTSTONE		3			2	3							
1408C_78708	SILTSTONE		3			1	3							
1408C_78712	CLAY		3			1	4							
1408C_78715	CLAY		3			2	3							
1408C_78717	CLAY		3			3	5			1				
1408C_78720	SILTSTONE		3			1	3							
1408C_78725	SILTSTONE		3			1	3							
1408C_78726	SANDSTONE		3											
1408C_78727	SANDSTONE		3				2					1		
1408C_78728	SANDSTONE		3											
1408C_78730	SANDSTONE		3									1		
1409C_5	SANDSTONE		3											
1409C_11	COAL WEATHERED		3			1	3							
1409C_12	COAL WEATHERED		3			1	3							

Sample ID	Lithology	Pb	Re	S	Sb	Se	Te	Th	Tl	U	V	W	Y	Zn
1409C_13	COAL WEATHERED		3			2	4							
1409C_14	COAL, undifferentiated		3			1	3							
1409C_17	SANDSTONE		3			1								
1409C_19	SANDSTONE		3				3							
1409C_22	SANDSTONE		1			1	3							
1409C_23	SANDSTONE		1			1	4							
1409C_24	SANDSTONE		1			1	3							
1409C_25	MUDSTONE		3			1	3							
1409C_26	CARBONACEOUS MUDSTONE		1			1	3							
1409C_27	CARBONACEOUS MUDSTONE		2			1	3							
1409C_29	SANDSTONE		3			1	2							
1409C_30	SANDSTONE		3			1	3							
1409C_31	SANDSTONE		3			1	3							
1409C_32	SANDSTONE		1			1	3							
1409C_33	SANDSTONE		1			1	3							
1409C_34	SILTSTONE		1			1	3							
1410C_1	SAND		3			1	3							
1410C_2	LATERITE		3			2	4							
1410C_3	SANDSTONE		1			1	2							
1410C_8	SANDSTONE		3											
1410C_13	SANDSTONE		3			1	3							
1410C_17	SILTSTONE		3			1	3							
1410C_22	MUDSTONE		1			1	3							
1410C_28	COAL, undifferentiated		3				2							
1410C_29	COAL, undifferentiated		3			1	3							
1410C_30	COAL, undifferentiated		1			1	3							
1410C_31	COAL, undifferentiated		2		1		3							
1410C_35	SILTSTONE		1			1	3							
1410C_40	SANDSTONE		3			1								
1410C_46	SANDSTONE		3											
1410C_47	SANDSTONE		3				3							
1410C_48	SANDSTONE		1				2							
1410C_49	SANDSTONE		3			1	2							
1410C_50	SANDSTONE		3			1	3							
1410C_51	SANDSTONE		1			1	2							
1410C_57	SILTSTONE		1				3							
1410C_58	SANDSTONE		1			1	3							
1410C_59	SANDSTONE		3			1	3							
1410C_60	SANDSTONE		3			1	3							
1410C_65	SANDSTONE		1			1	3							
1410C_70	SANDSTONE		1			1	3							
1410C_74	SANDSTONE		1			1	3							
1410C_78	SANDSTONE		3			1	3							
1410C_84	SILTSTONE		1			1	4							
1412C_1	CLAY		3			1	3							
1412C_8	SANDSTONE		2			1	3							
1412C_17	SANDSTONE		1			1	3							
1412C_19	SANDSTONE		1			1	3							
1412C_20	SANDSTONE		2			1	3							
1412C_21	SANDSTONE		3			1	3							
1412C_22	SANDSTONE		1			1	3							
1412C_23	SANDSTONE		1			1	3							
1412C_27	SANDSTONE		1			1	3							
1412C_28	SANDSTONE		3			1	3							
1412C_51	SANDSTONE		3			1	3							
1412C_52	SANDSTONE		3				3							

Sample ID	Lithology	Pb	Re	S	Sb	Se	Te	Th	Tl	U	V	W	Y	Zn
1412C_53	SANDSTONE		3				3							
1412C_56	SANDSTONE		3			1	3					1		
1414X_3	SANDSTONE		3				2							
1414X_8	SANDSTONE		3											
1414X_14	SANDSTONE		3											
1414X_25	SANDSTONE		3									1		
1429R_24	CLAYSTONE		3			2	3							
1429R_26	SILTSTONE		3			1								
1429R_31	MUDSTONE		1			1	2							
1429R_33	SANDSTONE		2			1	3							
1429R_38	SANDSTONE		3			1	3							
1429R_41	COAL, undifferentiated		2			1	4							
1429R_42	CLAY		3				2							
1429R_43	CARBONACEOUS SHALE		1			1	4							
1429R_44	CARBONACEOUS SHALE		1				3							
1429R_74	SILTSTONE		3			1	3							
1429R_80	SILTSTONE		3			1	3							
1429R_83	SILTSTONE		1			1	3							
1429R_84	SILTSTONE		3			1	3							
1429R_85	SILTSTONE		3			1	3							
1429R_88	SILTSTONE		3			1	3							
1429R_92	SILTSTONE		3			1	3							
1429R_95	SANDSTONE		3			1	4							
1429R_98	SANDSTONE		1			1	3							
1429R_119	SILTSTONE		1			1	3							
1429R_120	SILTSTONE		3			1	3							
1429R_121	SILTSTONE		1			1	3							
1429R_122	SILTSTONE		3											
1429R_129	SANDSTONE		3				2							
1429R_130	SANDSTONE		1			2	5					1		
1429R_131	COAL, undifferentiated		1			2	4							
1429R_132	MUDSTONE		1			2	4							
1429R_133	MUDSTONE		1			2	4							
1429R_139	COAL, undifferentiated		1			2	4							
1429R_140	COAL, undifferentiated		3			1	4							
1429R_141	COAL, undifferentiated		3				3							
1429R_142	COAL, undifferentiated		3			1	3							
1429R_143	COAL, undifferentiated		3			1	3							
1447L_34	SAND		3											
1447L_37	CLAY		3			1	3							
1447L_39	CLAY		3				2							
1447L_41	CLAY		3				3							
1447L_43	CLAY		3				3							
1447L_46	SILCRETE		3			1	2							
1447L_47	SILCRETE		3			1	2					1		
1447L_50	SILCRETE		3											
1447L_52	SILCRETE		3											
1447L_54	SANDSTONE		3											
1447L_60	CLAY		3			1	3							
1447L_63	CLAY		1			1	3							
1447L_66	CLAY		3				3							
1447L_70	CLAY		2			1	3							
1447L_77	CLAY		1			2	3							
Tailings -250	Tailings - 250		3				3							
Rejects +250	Rejects + 250		1	2		3	4		1					
Product +250	Product + 250		1			1	3							

Appendix 7: Elemental Composition of Leachate

	Element	pH	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Ce	Cl
	Units	pH Unit	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	LOD	0.01	0.001	0.01	0.001	0.05	0.001	0.001	0.001	1	0.0001	0.001	1
Australian Drinking Water Guidelines	Human Health	-	0.1	-	0.007	4	0.7	-	-	-	0.002	-	-
	Aesthetic	6.5 - 8.5	-	0.2	-	-	-	-	-	-	-	-	250
	Stock Watering	-	-	5	0.5	5	-	-	-	1000	0.01	-	-
Sample ID	Lithology												
1388R_97	SANDSTONE	7.63	<0.001	0.51	0.005	0.8	0.675	<0.001	<0.001	<1	0.0001	<0.001	6
1397D_137	CLAY	6.49	<0.001	0.47	0.002	0.66	0.893	<0.001	<0.001	<1	0.0001	<0.001	13
1397D_139	SANDSTONE	6.78	<0.001	0.5	0.005	0.64	0.834	<0.001	<0.001	<1	<0.0001	0.001	12
1403D_159	SAND	6.12	<0.001	0.42	<0.001	0.54	0.415	<0.001	<0.001	<1	<0.0001	<0.001	7
1412C_166	LATERITE	6.96	<0.001	0.04	<0.001	0.97	1.49	<0.001	<0.001	10	0.0003	<0.001	194
1429R_190	SOIL	7.31	<0.001	0.75	0.002	0.4	0.121	<0.001	<0.001	6	<0.0001	<0.001	169
1429R_193	MUDSTONE	7.8	<0.001	0.76	0.002	0.27	0.181	<0.001	<0.001	2	<0.0001	0.001	58
1429R_194	COAL, undifferentiated	7.11	0.002	0.54	<0.001	0.09	0.038	<0.001	<0.001	9	<0.0001	<0.001	19
1429R_196	COAL, undifferentiated	7.75	<0.001	0.94	0.002	0.56	0.308	<0.001	<0.001	19	<0.0001	<0.001	26
1434D_206	CLAYSTONE	6.98	<0.001	0.58	<0.001	0.32	0.185	<0.001	<0.001	2	<0.0001	<0.001	161
1434D_211	SANDSTONE	6.94	<0.001	0.71	<0.001	0.22	0.239	<0.001	<0.001	6	<0.0001	<0.001	2
1434D_212	CARBONACEOUS SANDSTONE	7.33	<0.001	1.76	<0.001	0.3	0.346	<0.001	<0.001	<1	<0.0001	0.007	<1
1445D_240	CARBONACEOUS SANDSTONE	8.25	<0.001	1.62	0.004	0.37	0.387	<0.001	<0.001	<1	<0.0001	0.007	3
1451D_265	SILTSTONE	-	<0.001	1.27	0.069	0.26	0.254	<0.001	<0.001	<1	<0.0001	0.016	12
1451D_267	SANDSTONE	4.89	<0.001	1.7	0.003	0.29	0.305	0.005	<0.001	39	0.0051	0.004	4
1452D_268	CLAY	6.57	<0.001	0.64	<0.001	0.28	0.119	<0.001	<0.001	<1	<0.0001	<0.001	68
1453D_277	SANDSTONE	7.34	-	-	-	-	-	-	-	-	-	-	-
1453D_279	CARBONACEOUS SANDSTONE	7.59	<0.001	0.37	0.017	0.24	0.126	<0.001	<0.001	<1	<0.0001	<0.001	4
1454D_288	SILTSTONE	7.28	<0.001	1.25	0.002	0.3	0.219	<0.001	<0.001	4	<0.0001	0.001	3
1398X_1	SOIL	7.05	<0.001	1.68	<0.001	0.14	0.23	<0.001	<0.001	<1	<0.0001	0.002	1
1398X_2	SAND	6.96	<0.001	1.5	<0.001	0.17	0.365	<0.001	<0.001	<1	<0.0001	0.003	6
1400X_2	SOIL	7.5	<0.001	1.2	0.001	0.35	0.355	<0.001	<0.001	10	<0.0001	<0.001	94
1400X_25	CLAY	6.8	<0.001	0.3	<0.001	0.28	0.183	<0.001	<0.001	5	<0.0001	<0.001	234
1401X_28	SANDSTONE	3.36	<0.001	42.2	0.005	0.38	0.099	0.023	<0.001	27	0.0062	0.075	9
1405C_32	SANDSTONE	7.18	<0.001	0.67	<0.001	0.15	0.094	<0.001	<0.001	<1	<0.0001	<0.001	12
1408C_78725	SILTSTONE	6.36	<0.001	0.19	<0.001	0.19	0.154	<0.001	<0.001	14	0.0003	<0.001	5
1409C_5	SANDSTONE	6.8	<0.001	1.66	0.001	0.14	0.119	<0.001	<0.001	<1	<0.0001	0.002	4
1410C_28	COAL, undifferentiated	2.94	<0.001	4.01	0.013	3.02	0.214	0.035	<0.001	45	0.0022	0.015	2
1429R_42	CLAY	4.73	<0.001	1.44	0.008	2.65	0.178	0.006	<0.001	222	0.0016	0.012	32

		Cr	Cs	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Hf	Co
	Element	Cr	Cs	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Hf	Co
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	LOD	0.001	0.001	0.001	0.001	0.001	0.001	0.1	0.05	0.001	0.001	0.01	0.001
Australian Drinking Water Guidelines	Human Health	0.05[1]	-	2	-	-	-	1.5	-	-	-	-	-
	Aesthetic	-	-	1	-	-	-	-	0.3	-	-	-	-
	Stock Watering	1 [2]	-	0.5	-	-	-	2	-	-	-	-	1
Sample ID	Lithology												
1388R_97	SANDSTONE	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	0.5	0.17	<0.001	<0.001	<0.01	<0.001
1397D_137	CLAY	<0.001	<0.001	0.006	<0.001	<0.001	<0.001	0.9	0.1	<0.001	<0.001	<0.01	<0.001
1397D_139	SANDSTONE	0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.8	0.2	<0.001	<0.001	<0.01	<0.001
1403D_159	SAND	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.3	0.06	<0.001	<0.001	<0.01	<0.001
1412C_166	LATERITE	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.4	<0.05	<0.001	<0.001	<0.01	<0.001
1429R_190	SOIL	0.002	<0.001	0.003	<0.001	<0.001	<0.001	0.4	0.38	<0.001	<0.001	<0.01	<0.001
1429R_193	MUDSTONE	0.001	<0.001	0.003	<0.001	<0.001	<0.001	0.7	0.33	<0.001	<0.001	<0.01	<0.001
1429R_194	COAL, undifferentiated	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.2	0.19	<0.001	<0.001	<0.01	<0.001
1429R_196	COAL, undifferentiated	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	0.6	0.27	<0.001	<0.001	<0.01	<0.001
1434D_206	CLAYSTONE	0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.4	0.18	<0.001	<0.001	<0.01	0.002
1434D_211	SANDSTONE	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.3	0.14	<0.001	<0.001	<0.01	0.016
1434D_212	CARBONACEOUS SANDSTONE	0.003	<0.001	0.006	<0.001	<0.001	<0.001	0.6	1.86	<0.001	<0.001	<0.01	0.006
1445D_240	CARBONACEOUS SANDSTONE	0.002	<0.001	0.004	<0.001	<0.001	<0.001	0.9	2.17	<0.001	<0.001	<0.01	0.004
1451D_265	SILTSTONE	0.002	<0.001	0.004	<0.001	<0.001	<0.001		0.67	<0.001	<0.001	<0.01	0.003
1451D_267	SANDSTONE	0.003	<0.001	0.058	<0.001	<0.001	<0.001	0.6	5.14	<0.001	<0.001	<0.01	0.636
1452D_268	CLAY	0.002	<0.001	0.001	<0.001	<0.001	<0.001	0.2	0.26	<0.001	<0.001	<0.01	0.001
1453D_277	SANDSTONE	-	-	-	-	-	-	1.2	-	-	-	-	-
1453D_279	CARBONACEOUS SANDSTONE	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.3	0.2	<0.001	<0.001	<0.01	<0.001
1454D_288	SILTSTONE	0.002	<0.001	0.002	<0.001	<0.001	<0.001	0.4	0.47	<0.001	<0.001	<0.01	0.006
1398X_1	SOIL	0.002	<0.001	0.002	<0.001	<0.001	<0.001	-	0.88	<0.001	<0.001	<0.01	<0.001
1398X_2	SAND	0.002	<0.001	0.002	<0.001	<0.001	<0.001	-	0.69	<0.001	<0.001	<0.01	<0.001
1400X_2	SOIL	0.001	<0.001	0.002	<0.001	<0.001	<0.001	-	0.6	<0.001	<0.001	<0.01	<0.001
1400X_25	CLAY	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	0.17	<0.001	<0.001	<0.01	0.188
1401X_28	SANDSTONE	0.085	<0.001	0.075	0.011	0.006	0.002	-	24.6	0.001	0.011	<0.01	0.479
1405C_32	SANDSTONE	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	-	0.14	<0.001	<0.001	<0.01	<0.001
1408C_78725	SILTSTONE	0.001	<0.001	0.012	<0.001	<0.001	<0.001	-	0.21	<0.001	<0.001	<0.01	0.14
1409C_5	SANDSTONE	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	-	0.52	<0.001	<0.001	<0.01	0.001
1410C_28	COAL, undifferentiated	0.027	<0.001	0.016	0.004	0.003	<0.001	-	114	<0.001	0.004	<0.01	0.605
1429R_42	CLAY	<0.001	<0.001	0.002	0.002	0.001	<0.001	-	36.2	<0.001	0.002	<0.01	0.258

[1] As Cr (VI)

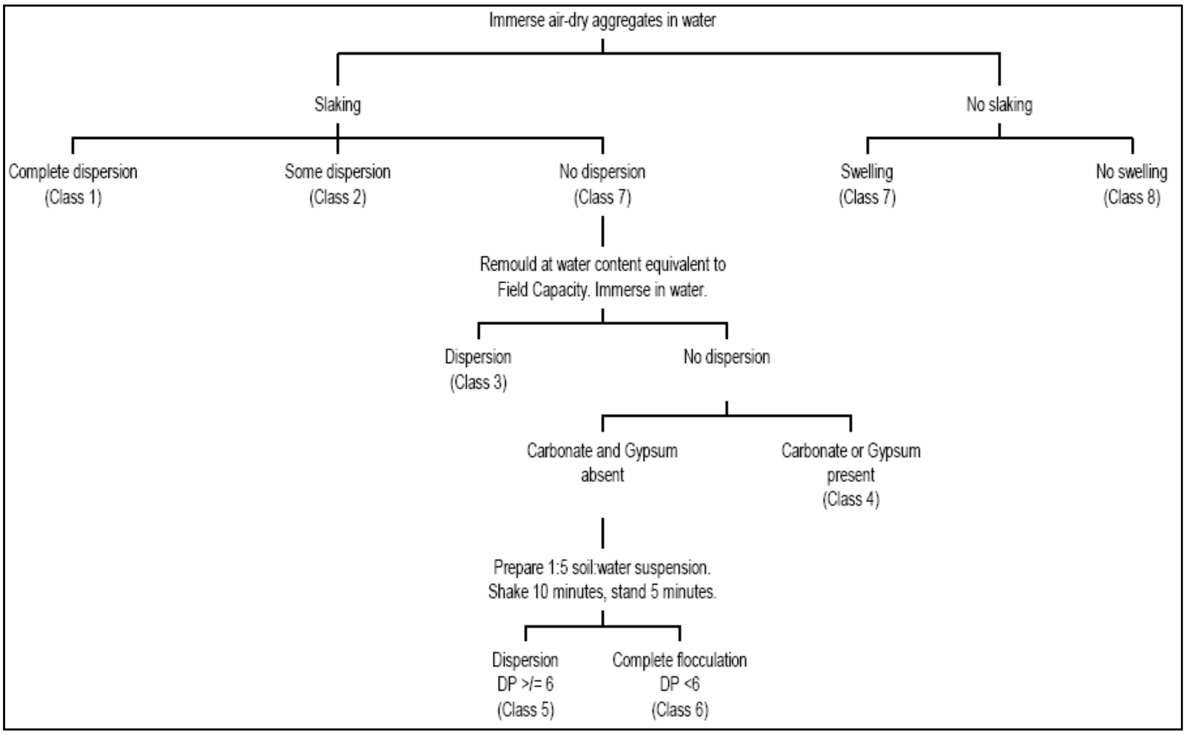
[2] Total Cr

		Hg	Ho	In	K	La	Li	Lu	Mg	Mn	Mo	Na	Nd
	Element	Hg	Ho	In	K	La	Li	Lu	Mg	Mn	Mo	Na	Nd
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	LOD	0.0001	0.001	0.001	1	0.001	0.001	0.001	1	0.001	0.001	1	0.001
Australian Drinking Water Guidelines	Human Health	0.001	-	-	-	-	-	-	-	0.5	0.05	-	-
	Aesthetic	-	-	-	-	-	-	-	-	0.1	-	180	-
	Stock Watering	0.002	-	-	-	-	-	-	-	-	0.15	-	-
Sample ID	Lithology												
1388R_97	SANDSTONE	<0.0001	<0.001	<0.001	<1	<0.001	<0.001	<0.001	<1	0.002	0.017	26	<0.001
1397D_137	CLAY	<0.0001	<0.001	<0.001	<1	<0.001	<0.001	<0.001	<1	0.001	0.001	15	<0.001
1397D_139	SANDSTONE	<0.0001	<0.001	<0.001	3	<0.001	0.006	<0.001	<1	0.003	0.012	27	<0.001
1403D_159	SAND	<0.0001	<0.001	<0.001	<1	<0.001	<0.001	<0.001	<1	<0.001	<0.001	9	<0.001
1412C_166	LATERITE	<0.0001	<0.001	<0.001	2	<0.001	0.002	<0.001	5	0.017	<0.001	116	<0.001
1429R_190	SOIL	<0.0001	<0.001	<0.001	9	<0.001	0.003	<0.001	3	0.006	<0.001	116	<0.001
1429R_193	MUDSTONE	<0.0001	<0.001	<0.001	4	<0.001	0.003	<0.001	<1	0.006	0.042	78	<0.001
1429R_194	COAL, undifferentiated	<0.0001	<0.001	<0.001	5	<0.001	<0.001	<0.001	6	0.002	0.01	17	<0.001
1429R_196	COAL, undifferentiated	<0.0001	<0.001	<0.001	3	<0.001	0.006	<0.001	3	0.059	0.01	61	<0.001
1434D_206	CLAYSTONE	<0.0001	<0.001	<0.001	5	<0.001	0.016	<0.001	6	0.043	<0.001	116	<0.001
1434D_211	SANDSTONE	<0.0001	<0.001	<0.001	9	<0.001	0.01	<0.001	2	0.306	<0.001	23	<0.001
1434D_212	CARBONACEOUS SANDSTONE	<0.0001	<0.001	<0.001	<1	0.002	0.002	<0.001	<1	0.038	0.001	17	0.003
1445D_240	CARBONACEOUS SANDSTONE	<0.0001	<0.001	<0.001	2	0.002	0.003	<0.001	<1	0.051	0.069	46	0.003
1451D_265	SILTSTONE	<0.0001	<0.001	<0.001	2	0.004	0.006	<0.001	<1	0.017	0.023	33	0.005
1451D_267	SANDSTONE	<0.0001	<0.001	<0.001	10	0.002	0.047	<0.001	18	4.72	<0.001	36	0.002
1452D_268	CLAY	<0.0001	<0.001	<0.001	1	<0.001	0.004	<0.001	<1	0.012	<0.001	55	<0.001
1453D_277	SANDSTONE	<0.0001	-	-	-	-	-	-	-	-	-	-	-
1453D_279	CARBONACEOUS SANDSTONE	<0.0001	<0.001	<0.001	<1	<0.001	<0.001	<0.001	<1	0.003	0.005	20	<0.001
1454D_288	SILTSTONE	<0.0001	<0.001	<0.001	4	<0.001	0.012	<0.001	<1	0.046	0.039	74	<0.001
1398X_1	SOIL	<0.0001	<0.001	<0.001	<1	0.001	<0.001	<0.001	<1	0.036	<0.001	5	0.001
1398X_2	SAND	<0.0001	<0.001	<0.001	<1	0.001	<0.001	<0.001	<1	0.012	<0.001	9	0.002
1400X_2	SOIL	<0.0001	<0.001	<0.001	2	<0.001	0.001	<0.001	5	0.005	0.003	100	<0.001
1400X_25	CLAY	<0.0001	<0.001	<0.001	6	<0.001	0.011	<0.001	7	0.061	<0.001	195	<0.001
1401X_28	SANDSTONE	<0.0001	0.002	<0.001	4	0.031	0.143	<0.001	38	24.6	<0.001	13	0.041
1405C_32	SANDSTONE	<0.0001	<0.001	<0.001	<1	<0.001	0.001	<0.001	<1	0.004	0.004	17	<0.001
1408C_78725	SILTSTONE	<0.0001	<0.001	<0.001	9	<0.001	0.027	<0.001	12	0.273	<0.001	22	<0.001
1409C_5	SANDSTONE	<0.0001	<0.001	<0.001	<1	0.001	0.002	<0.001	<1	0.005	<0.001	8	0.001
1410C_28	COAL, undifferentiated	<0.0001	<0.001	<0.001	3	0.008	0.029	<0.001	44	2.51	<0.001	25	0.01
1429R_42	CLAY	<0.0001	<0.001	<0.001	10	0.007	0.022	<0.001	53	2.26	<0.001	197	0.007

	Element	Ni	P	Pb	Pr	Rb	Sb	Se	Sm	Sn	SO4	Sr
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	LOD	0.001	0.01	0.001	0.001	0.001	0.001	0.01	0.001	0.001	1	0.001
Australian Drinking Water Guidelines	Human Health	0.02	-	0.01	-	-	0.003	0.01	-	-	500	-
	Aesthetic	-	-	-	-	-	-	-	-	-	250	-
	Stock Watering	1		0.1	-	-	-	0.02	-	-	1000	-
Sample ID	Lithology											
1388R_97	SANDSTONE	<0.001	0.01	0.004	<0.001	0.002	<0.001	<0.01	<0.001	<0.001	12	0.018
1397D_137	CLAY	0.002	<0.01	0.006	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	1	0.018
1397D_139	SANDSTONE	0.002	0.06	0.003	<0.001	0.004	0.002	<0.01	<0.001	<0.001	32	0.02
1403D_159	SAND	<0.001	0.02	0.006	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	2	0.011
1412C_166	LATERITE	0.001	<0.01	0.003	<0.001	0.003	<0.001	<0.01	<0.001	<0.001	20	0.18
1429R_190	SOIL	<0.001	<0.05	<0.001	<0.001	0.002	<0.001	<0.01	<0.001	<0.001	34	0.072
1429R_193	MUDSTONE	<0.001	0.38	<0.001	<0.001	0.003	<0.001	0.03	<0.001	<0.001	46	0.062
1429R_194	COAL, undifferentiated	<0.001	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	25	0.013
1429R_196	COAL, undifferentiated	<0.001	<0.01	<0.001	<0.001	0.004	<0.001	0.01	<0.001	<0.001	73	0.347
1434D_206	CLAYSTONE	0.002	<0.05	<0.001	<0.001	0.005	<0.001	<0.01	<0.001	<0.001	65	0.049
1434D_211	SANDSTONE	0.024	<0.01	<0.001	<0.001	0.008	<0.001	<0.01	<0.001	<0.001	71	0.148
1434D_212	CARBONACEOUS SANDSTONE	0.008	<0.05	0.005	<0.001	0.005	<0.001	0.02	<0.001	<0.001	20	0.024
1445D_240	CARBONACEOUS SANDSTONE	0.005	<0.01	0.004	<0.001	0.004	0.007	0.03	<0.001	<0.001	40	0.023
1451D_265	SILTSTONE	0.006	<0.01	0.005	0.001	0.005	0.004	0.01	0.001	<0.001	31	0.02
1451D_267	SANDSTONE	1.19	<0.01	0.005	<0.001	0.045	<0.001	0.01	<0.001	<0.001	272	0.663
1452D_268	CLAY	0.002	<0.01	<0.001	<0.001	0.002	<0.001	<0.01	<0.001	<0.001	17	0.011
1453D_277	SANDSTONE	-	-	-	-	-	-	-	-	-	-	-
1453D_279	CARBONACEOUS SANDSTONE	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	9	0.005
1454D_288	SILTSTONE	0.008	<0.01	0.002	<0.001	0.005	0.002	0.09	<0.001	<0.001	146	0.091
1398X_1	SOIL	0.001	1.14	0.001	<0.001	0.002	<0.001	<0.01	<0.001	<0.001	4	0.012
1398X_2	SAND	<0.001	1.57	0.001	<0.001	0.002	<0.001	<0.01	<0.001	<0.001	5	0.021
1400X_2	SOIL	<0.001	4.54	<0.001	<0.001	0.002	<0.001	<0.01	<0.001	<0.001	88	0.161
1400X_25	CLAY	0.163	<0.01	<0.001	<0.001	0.007	<0.001	0.02	<0.001	<0.001	103	0.162
1401X_28	SANDSTONE	1.31	<0.01	0.006	0.01	0.018	<0.001	<0.01	0.009	<0.001	550	0.196
1405C_32	SANDSTONE	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	9	0.019
1408C_78725	SILTSTONE	0.222	<0.01	<0.001	<0.001	0.015	<0.001	<0.01	<0.001	<0.001	130	0.351
1409C_5	SANDSTONE	0.002	0.02	<0.001	<0.001	0.002	<0.001	<0.01	<0.001	<0.001	9	0.008
1410C_28	COAL, undifferentiated	0.259	<0.01	0.019	0.002	0.013	<0.001	<0.01	0.003	<0.001	628	0.972
1429R_42	CLAY	0.112	<0.01	0.004	0.002	0.026	<0.001	<0.01	0.002	<0.001	1180	3.95

	Element	Tb	Te	Th	Ti	Tl	Tm	U	V	Y	Yb	Zn	Zr
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	LOD	0.001	0.005	0.001	0.01	0.001	0.001	0.001	0.01	0.001	0.001	0.005	0.005
Australian Drinking Water Guidelines	Human Health	-	-	-	-	-	-	0.02	-	-	-	-	-
	Aesthetic	-	-	-	-	-	-	-	-	-	-	3	-
	Stock Watering	-	-	-	-	-	-	0.2	-	-	-	20	-
Sample ID	Lithology												
1388R_97	SANDSTONE	<0.001	<0.005	<0.001	0.02	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.026	<0.005
1397D_137	CLAY	<0.001	<0.005	<0.001	0.09	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.05	<0.005
1397D_139	SANDSTONE	<0.001	<0.005	<0.001	0.02	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.051	<0.005
1403D_159	SAND	<0.001	<0.005	<0.001	0.02	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.031	<0.005
1412C_166	LATERITE	<0.001	<0.005	<0.001	<0.01	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.114	<0.005
1429R_190	SOIL	<0.001	<0.005	<0.001	0.02	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.02	<0.005
1429R_193	MUDSTONE	<0.001	<0.005	<0.001	0.04	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.025	<0.005
1429R_194	COAL, undifferentiated	<0.001	<0.005	<0.001	0.02	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.009	<0.005
1429R_196	COAL, undifferentiated	<0.001	<0.005	<0.001	0.08	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.027	<0.005
1434D_206	CLAYSTONE	<0.001	<0.005	<0.001	0.02	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.015	<0.005
1434D_211	SANDSTONE	<0.001	<0.005	<0.001	0.04	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.012	<0.005
1434D_212	CARBONACEOUS SANDSTONE	<0.001	<0.005	0.002	0.06	<0.001	<0.001	<0.001	<0.01	0.002	<0.001	0.055	<0.005
1445D_240	CARBONACEOUS SANDSTONE	<0.001	<0.005	0.002	0.06	<0.001	<0.001	<0.001	0.01	0.002	<0.001	0.041	<0.005
1451D_265	SILTSTONE	<0.001	<0.005	0.006	0.05	<0.001	<0.001	<0.001	0.01	0.001	<0.001	0.064	0.005
1451D_267	SANDSTONE	<0.001	<0.005	<0.001	0.03	<0.001	<0.001	<0.001	<0.01	0.003	<0.001	3.06	<0.005
1452D_268	CLAY	<0.001	<0.005	<0.001	0.03	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.024	<0.005
1453D_277	SANDSTONE	-	-	-	-	-	-	-	-	-	-	-	-
1453D_279	CARBONACEOUS SANDSTONE	<0.001	<0.005	<0.001	0.03	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.031	<0.005
1454D_288	SILTSTONE	<0.001	<0.005	<0.001	0.09	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.034	<0.005
1398X_1	SOIL	<0.001	<0.005	<0.001	0.06	<0.001	<0.001	<0.001	<0.01	0.001	<0.001	0.03	<0.005
1398X_2	SAND	<0.001	<0.005	<0.001	0.04	<0.001	<0.001	<0.001	<0.01	0.001	<0.001	0.033	<0.005
1400X_2	SOIL	<0.001	<0.005	<0.001	0.06	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.024	<0.005
1400X_25	CLAY	<0.001	<0.005	<0.001	0.01	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.015	<0.005
1401X_28	SANDSTONE	0.002	<0.005	0.001	0.03	<0.001	<0.001	0.011	<0.01	0.055	0.005	2.18	<0.005
1405C_32	SANDSTONE	<0.001	<0.005	<0.001	0.03	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.022	<0.005
1408C_78725	SILTSTONE	<0.001	<0.005	<0.001	<0.01	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.552	<0.005
1409C_5	SANDSTONE	<0.001	<0.005	<0.001	0.09	<0.001	<0.001	<0.001	<0.01	0.001	<0.001	0.017	<0.005
1410C_28	COAL, undifferentiated	<0.001	<0.005	<0.001	<0.01	0.004	<0.001	<0.001	0.01	0.032	0.002	0.878	<0.005
1429R_42	CLAY	<0.001	<0.005	<0.001	<0.01	0.002	<0.001	<0.001	<0.01	0.018	0.001	1.03	<0.005

Appendix 8: Emerson Test Classification



Flow Diagram for Determining the Emerson Class Number

Example of Emerson Tests showing (from left to right) Highly Dispersive (Class 1), Slightly Dispersive (Class 2 or 3) and Non-dispersive (Class 4, 5 or 6) Results.

Appendix 9: Dispersivity Data

Dispersivity Testing: Laboratory Testing Results

HCK003: Laboratory Test Data
Raw Data: Kevin's Corner

Sample ID	SRK Group	Lithology	Weathering	BHID	From	To	Emerson Class	EC µS/cm	CEC meq/100g	ESP %
194	Coal	Coal	FR	1429R	107.0	118.0	2	729	40.5	22.3
196	Coal	Coal	FR	1429R	135.0	139.0	6			
171	Carbonaceous	Carb. Mudstone	FR	1412C	62.8	65.7	6	462	7.5	17.8
278	Carbonaceous	Carb. Mudstone	FR	1453D	58.3	58.8	2			
213	Carbonaceous	Carb. Sandstone	FR	1434D	147.4	148.1	3			
240	Carbonaceous	Carb. Sandstone	FR	1445D	160.8	161.5	3			
192	Carbonaceous	Carb. Shale	FR	1429R	46.0	47.0	2			
235	Carbonaceous	Carb. Shale	FR	1445D	78.8	80.3	4	687	40.5	20.8
288	Carbonaceous	Carb. Shale	FR	1454D	172.6	173.1	2	419	11.6	21
137	Clay/Soil	Clay	HW	1397D	17.9	19.3	1	---	37.8	28.7
152	Clay/Soil	Clay	HW	1402C	4.0	7.0	2			
160	Clay/Soil	Clay	MW	1403D	11.6	12.5	1			
161	Clay/Soil	Clay	SW	1403D	21.4	21.9	2			
175	Clay/Soil	Clay	CW	1414X	0.0	1.0	1			
264	Clay/Soil	Clay	CW	1451D	3.3	6.0	2	992	12.4	37
151	Clay/Soil	Soil	CW	1402C	0.0	2.0	5			
275	Clay/Soil	Soil	CW	1453D	0.9	1.7	6	749	33.5	9.4
166	Remaining	Laterite	CW	1412C	2.0	3.0	2			
102	Remaining	Siltstone	CW	1389R	9.0	12.0	1			
177	Remaining	Siltstone	CW	1414X	29.0	31.0	1	2430	15.3	61.2
206	Remaining	Claystone	HW	1434D	13.2	13.8	2	754	16.5	24.2
167	Remaining	Siltstone	HW	1412C	11.0	14.0	2	2270	66.9	33.7
96	Remaining	Sandstone	HW	1388R	16.0	19.0	1			
191	Remaining	Mudstone	MW	1429R	29.0	30.0	1	1130	47.1	42.8
138	Remaining	Siltstone	MW	1397D	24.6	25.1	2			
207	Remaining	Sandstone	MW	1434D	33.5	34.8	2			
141	Remaining	Sandstone	SW	1397D	36.9	38.4	2	---	0.8	32.4
193	Remaining	Mudstone	FR	1429R	105.0	107.0	3	679	30	15.4
289	Remaining	Mudstone	FR	1454D	173.3	173.9	3			
107	Remaining	Sandstone	FR	1389R	81.0	85.0	6	---	6.9	14.7
279	Remaining	Sandstone	FR	1453D	85.5	86.8	2	451	33.2	19.4
170	Remaining	Siltstone	FR	1412C	59.6	60.4	3	79	4.1	17.5
265	Remaining	Siltstone	FR	1451D	28.4	29.8	3			
286	Remaining	Siltstone	FR	1454D	94.2	95.0	5	476	18.4	24.7

Appendix 10: Location of PAF samples

Drill Log Locations – Potentially Acid Forming Samples

The following samples were classified according to the Net Potential Ratio (NPR) as potentially acid forming – low capacity (PAF-LC). For these samples the Net Acid Production Potential (NAPP) was less than 5 kgH_2SO_4/t. The acid potential used to calculate the NAPP was determined from the chromium reducible sulphur content.

PAF-LC Samples

Sample 1388R_100

Depth range 89 to 91.4 m (adjacent to coal seam)

NAPP = 0.4 kgH_2SO_4/t

HOLEID	blank	CONT.	DEPTH FROM	DEPTH TO	SAMPLE LENGTH	SAMPLE I.D	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1388R			64	66	2			ZM	COALY MUDSTONE	COAL GROUP
1388R			66	87.41	21.41			SS	SANDSTONE	REMAINING
1388R			87.41	89	1.59		DU	CO	COAL, undifferentiated	COAL GROUP
1388R			89	91.4	2.4			SS	SANDSTONE	REMAINING
1388R			91.4	92.22	0.82		DLM1	CO	COAL, undifferentiated	COAL GROUP
1388R			92.22	92.35	0.13			SS	SANDSTONE	REMAINING
1388R			92.35	92.97	0.62		DLM2	CO	COAL, undifferentiated	COAL GROUP
1388R			92.97	93.18	0.21			SS	SANDSTONE	REMAINING
1388R			93.18	93.7	0.52		DL1	CO	COAL, undifferentiated	COAL GROUP
1388R			93.7	94.22	0.52		DL2	CO	COAL, undifferentiated	COAL GROUP
1388R			94.22	102	7.78			SS	SANDSTONE	REMAINING

PAF-LC Samples

Sample 1389R_107

Depth range 81.03 to 83.44 m (adjacent to coal seam)

NAPP = 2.5 kgH_2SO_4/t

HOLEID	blank	CONT.	DEPTH FROM	DEPTH TO	SAMPLE LENGTH	SAMPLE I.D	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1389R			53.17	55.95	2.78		CU	CO	COAL, undifferentiated	COAL GROUP
1389R			55.95	58.9	2.95			SL	SILTSTONE	REMAINING
1389R			58.9	60.52	1.62		C1	CO	COAL, undifferentiated	COAL GROUP
1389R			60.52	60.56	0.04			SL	SILTSTONE	REMAINING
1389R			60.56	62.36	1.8		C2	CO	COAL, undifferentiated	COAL GROUP
1389R			62.36	62.4	0.04			SL	SILTSTONE	REMAINING
1389R			62.4	64.44	2.04		C3	CO	COAL, undifferentiated	COAL GROUP
1389R			64.44	79.34	14.9			SS	SANDSTONE	REMAINING
1389R			79.34	81.03	1.69		DU	CO	COAL, undifferentiated	COAL GROUP
1389R			81.03	83.44	2.41			SS	SANDSTONE	REMAINING
1389R			83.44	84.49	1.05		DLM1	CO	COAL, undifferentiated	COAL GROUP
1389R			84.49	84.54	0.05			SS	SANDSTONE	REMAINING
1389R			84.54	85.34	0.8		DLM2	CO	COAL, undifferentiated	COAL GROUP
1389R			85.34	85.54	0.2			SS	SANDSTONE	REMAINING
1389R			85.54	86.23	0.69		DL1	CO	COAL, undifferentiated	COAL GROUP
1389R			86.23	86.28	0.05			ZM	COALY MUDSTONE	COAL GROUP
1389R			86.28	86.6	0.32		DL2	CO	COAL, undifferentiated	COAL GROUP
1389R			86.6	96	9.4			SS	SANDSTONE	REMAINING

Sample 1434D_211

Depth range 135.15 to 137.89 m (distant from coal seam)

NAPP = 3.9 kgH_2SO_4/t

HOLEID	blank	CONT.	DEPTH FROM	DEPTH TO	SAMPLE LENGTH	SAMPLE I.D	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1434D			132.16	132.57	0.41			SL	SILTSTONE	REMAINING
1434D			132.57	133.9	1.33			SS	SANDSTONE	REMAINING
1434D			133.9	134.01	0.11			MS	MUDSTONE	REMAINING
1434D			134.01	135.16	1.15			SS	SANDSTONE	REMAINING
1434D			135.16	137.89	2.73			SS	SANDSTONE	REMAINING
1434D			137.89	139.04	1.15			SS	SANDSTONE	REMAINING
1434D			139.04	139.43	0.39			SS	SANDSTONE	REMAINING
1434D			139.43	139.73	0.3	1434D_GT028		SS	SANDSTONE	REMAINING
1434D			139.73	140.9	1.17			SS	SANDSTONE	REMAINING
1434D			140.9	140.99	0.09			SS	SANDSTONE	REMAINING
1434D			140.99	142.34	1.35			SS	SANDSTONE	REMAINING

PAF-LC Samples

Sample 1451D_267

Depth range 46.88 to 47.96 m (distant from coal seam)

NAPP = 3 kgH_2SO_4/t

HOLEID	blank	CONT.	DEPTH FROM	DEPTH TO	SAMPLE LENGTH	SAMPLE I.D	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1451D			45.28	45.41	0.13			SL	SILTSTONE	REMAINING
1451D			45.41	45.9	0.49			SS	SANDSTONE	REMAINING
1451D			45.9	46.21	0.31	1451D_G‾		SS	SANDSTONE	REMAINING
1451D			46.21	46.6	0.39			SS	SANDSTONE	REMAINING
1451D			46.6	46.88	0.28	1451D_G‾		SS	SANDSTONE	REMAINING
1451D			46.88	47.96	1.08			SS	SANDSTONE	REMAINING
1451D			47.96	48.86	0.9			SS	SANDSTONE	REMAINING
1451D			48.86	49.08	0.22	1451D_G‾		SS	SANDSTONE	REMAINING
1451D			49.08	49.56	0.48			SS	SANDSTONE	REMAINING
1451D			49.56	49.86	0.3	1451D_CF		SS	SANDSTONE	REMAINING

Sample 1398x_28

Depth range 26 to 28 m (distant from coal seam)

NAPP = 3 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1398X	22		22	21	22	1				SA	SAND	SAND AND GRAVEL GR(
1398X	23			22	23	1				CL	CLAY	CLAY AND SOIL GROUP
1398X	24		24	23	24	1				CL	CLAY	CLAY AND SOIL GROUP
1398X	25			24	25	1				SA	SAND	SAND AND GRAVEL GR(
1398X	26			25	26	1				SA	SAND	SAND AND GRAVEL GR(
1398X	27			26	27	1				SA	SAND	SAND AND GRAVEL GR(
1398X	28		28	27	28	1				SA	SAND	SAND AND GRAVEL GR(
1398X	29			28	29	1				SA	SAND	SAND AND GRAVEL GR(
1398X	30			29	30	1				SA	SAND	SAND AND GRAVEL GR(
1398X	31		31	30	31	1				SA	SAND	SAND AND GRAVEL GR(

PAF-LC Samples

Sample 1398X_33

Depth range 41 to 42 m (adjacent to coal seam)

NAPP = 2.1 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1398X	31		31	30	31	1				SA	SAND	SAND AND GRAVEL GROUP
1398X	32		32	31	32	1				SS	SANDSTONE	REMAINING
1398X	33		33	32	33	1	LP	1		CW	COAL WEATHERED	COAL GROUP
1398X	34		34	33	34	1	LP	2		CW	COAL WEATHERED	COAL GROUP
1398X	35		35	34	35	1	LP	3		CW	COAL WEATHERED	COAL GROUP
1398X	36		36	35	36	1	LP	4		CO	COAL, undifferentiated	COAL GROUP
1398X	37		37	36	37	1	LP	5		CO	COAL, undifferentiated	COAL GROUP
1398X	38			37	38	1				SS	SANDSTONE	REMAINING
1398X	39			38	39	1				SS	SANDSTONE	REMAINING
1398X	40			39	40	1				SS	SANDSTONE	REMAINING
1398X	41			40	41	1				SS	SANDSTONE	REMAINING
1398X	42		42	41	42	1	EA	33		SS	SANDSTONE	REMAINING
1398X	43	$	43	42	43	1			D	CO	COAL, undifferentiated	COAL GROUP
1398X	44		44	43	44	1			D	CO	COAL, undifferentiated	COAL GROUP
1398X	45		45	44	45	1			D	CO	COAL, undifferentiated	COAL GROUP
1398X	46		47	45	47	2			D	CO	COAL, undifferentiated	COAL GROUP

Sample 1429R_140

Depth range 139 to 140 m (coal sample)

NAPP = 4.8 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1429R	133			132	133	1				MS	MUDSTONE	REMAINING
1429R	134		134	133	134	1				MS	MUDSTONE	REMAINING
1429R	135			134	135	1				MS	MUDSTONE	REMAINING
1429R	136			135	136	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	137			136	137	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	138			137	138	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	139			138	139	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	140			139	140	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	141		141	140	141	1			DUM	CO	COAL, undifferentiated	COAL GROUP

PAF-LC Samples

Sample 1400x_26

Depth range 25 to 26 m (coal sample)

NAPP = 2.3 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1400X	15		15	14	15	1				SA	SAND	SAND AND GRAVEL GROUP
1400X	16		16	15	16	1				SA	SAND	SAND AND GRAVEL GROUP
1400X	17		17	16	17	1				SA	SAND	SAND AND GRAVEL GROUP
1400X	18		18	17	18	1				CL	CLAY	CLAY AND SOIL GROUP
1400X	19		19	18	19	1				SA	SAND	SAND AND GRAVEL GROUP
1400X	20			19	20	1				SA	SAND	SAND AND GRAVEL GROUP
1400X	21			20	21	1				SA	SAND	SAND AND GRAVEL GROUP
1400X	22		22	21	22	1				SA	SAND	SAND AND GRAVEL GROUP
1400X	23		23	22	23	1				SA	SAND	SAND AND GRAVEL GROUP
1400X	24		24	23	24	1				CL	CLAY	CLAY AND SOIL GROUP
1400X	25		25	24	25	1				CL	CLAY	CLAY AND SOIL GROUP
1400X	26		26	25	26	1				ZH	COALY SHALE	COAL GROUP
1400X	27			26	27	1				CO	COAL, undifferentiated	COAL GROUP

Sample 1408C_78725

Depth range 27 to 28 m (distant from coal seam)

NAPP = 3.1 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1408C	22			21	22	1				SL	SILTSTONE	REMAINING
1408C	23			22	23	1				SL	SILTSTONE	REMAINING
1408C	24			23	24	1				SL	SILTSTONE	REMAINING
1408C	25			24	25	1				SL	SILTSTONE	REMAINING
1408C	26			25	26	1				SL	SILTSTONE	REMAINING
1408C	27			26	27	1				SL	SILTSTONE	REMAINING
1408C	28		28	27	28	1				SL	SILTSTONE	REMAINING
1408C	29			28	29	1				SS	SANDSTONE	REMAINING
1408C	30			29	30	1				SS	SANDSTONE	REMAINING
1408C	31			30	31	1				SS	SANDSTONE	REMAINING
1408C	32			31	32	1				SS	SANDSTONE	REMAINING
1408C	33		33	32	33	1			BHTE	SS	SANDSTONE	REMAINING
1408C	34		34	33	34	1				SS	SANDSTONE	REMAINING
1408C	35			34	35	1				SS	SANDSTONE	REMAINING
1408C	36			35	36	1				SS	SANDSTONE	REMAINING
1408C	37			36	37	1				SS	SANDSTONE	REMAINING

PAF-LC Samples

Sample 1429R_196

Depth range 135.5 to 138.02 m (adjacent to coal seam)

NAPP = 1.2 kgH_2SO_4/t

HOLEID	blank	CONT.	DEPTH FROM	DEPTH TO	SAMPLE LENGTH	SAMPLE I.D	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1429R			121	124	3			SS	SANDSTONE	REMAINING
1429R			124	128.98	4.98			SS	SANDSTONE	REMAINING
1429R			128.98	129.26	0.28		DU	CO	COAL, undifferentiated	COAL GROUP
1429R			129.26	134.18	4.92			MS	MUDSTONE	REMAINING
1429R			134.18	135.45	1.27		DLM1	CO	COAL, undifferentiated	COAL GROUP
1429R			135.45	135.5	0.05			TF	TUFF	REMAINING
1429R			135.5	138.02	2.52		DLM2	CO	COAL, undifferentiated	COAL GROUP
1429R			138.02	138.05	0.03			TF	TUFF	REMAINING
1429R			138.05	139.58	1.53		DLL	CO	COAL, undifferentiated	COAL GROUP
1429R		$	139.58	148	8.42			SS	SANDSTONE	REMAINING
1429R			148	150	2			PC	PEBBLE CONGLOMERATE	REMAINING

Sample 1429R_119

Depth range 118 to 119 m (1m from coal seam)

NAPP = 2.7 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1429R	103			102	103	1				SS	SANDSTONE	REMAINING
1429R	104			103	104	1				SS	SANDSTONE	REMAINING
1429R	105		105	104	105	1				SS	SANDSTONE	REMAINING
1429R	106			105	106	1				SS	SANDSTONE	REMAINING
1429R	107		107	106	107	1				MS	MUDSTONE	REMAINING
1429R	108			107	108	1				MS	MUDSTONE	REMAINING
1429R	109			108	109	1			CU	CO	COAL, undifferentiated	COAL GROUP
1429R	110			109	110	1			CU	CO	COAL, undifferentiated	COAL GROUP
1429R	111			110	111	1			CU	CO	COAL, undifferentiated	COAL GROUP
1429R	112		112	111	112	1			CU	CO	COAL, undifferentiated	COAL GROUP
1429R	113			112	113	1			CU	CO	COAL, undifferentiated	COAL GROUP
1429R	114			113	114	1			C	CO	COAL, undifferentiated	COAL GROUP
1429R	115			114	115	1			C	CO	COAL, undifferentiated	COAL GROUP
1429R	116		116	115	116	1			C	CO	COAL, undifferentiated	COAL GROUP
1429R	117			116	117	1			C	CO	COAL, undifferentiated	COAL GROUP
1429R	118			117	118	1				SL	SILTSTONE	REMAINING
1429R	119		119	118	119	1				SL	SILTSTONE	REMAINING
1429R	120			119	120	1				SL	SILTSTONE	REMAINING
1429R	121		121	120	121	1				SL	SILTSTONE	REMAINING
1429R	122			121	122	1				SL	SILTSTONE	REMAINING

PAF Samples

The following samples were classified as PAF, where the NAPP was greater than 5 kgH_2SO_4/t.

Sample 1429R_42

Depth range 41 to 42 m (adjacent to coal seam)

NAPP = 5.3 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1429R	33			32	33	1				SS	SANDSTONE	REMAINING
1429R	34			33	34	1				SS	SANDSTONE	REMAINING
1429R	35			34	35	1				SS	SANDSTONE	REMAINING
1429R	36			35	36	1				SS	SANDSTONE	REMAINING
1429R	37		37	36	37	1				SS	SANDSTONE	REMAINING
1429R	38			37	38	1				SS	SANDSTONE	REMAINING
1429R	39		39	38	39	1				SS	SANDSTONE	REMAINING
1429R	40		40	39	40	1				SS	SANDSTONE	REMAINING
1429R	41		41	40	41	1				CO	COAL, undifferentiated	COAL GROUP
1429R	42			41	42	1				CL	CLAY	CLAY AND SOIL GROUP
1429R	43		43	42	43	1				XH	CARBONACEOUS SHALE	CARBONACEOUS GROUP
1429R	44		44	43	44	1				XH	CARBONACEOUS SHALE	CARBONACEOUS GROUP
1429R	45			44	45	1			BB	CY	SOOTY COAL	COAL GROUP
1429R	46		46	45	46	1			B?	CY	SOOTY COAL	COAL GROUP
1429R	47			46	47	1			B?	CY	SOOTY COAL	COAL GROUP
1429R	48		48	47	48	1				XH	CARBONACEOUS SHALE	CARBONACEOUS GROUP
1429R	49			48	49	1				XH	CARBONACEOUS SHALE	CARBONACEOUS GROUP

Sample 1429R_120

Depth range 119 to 120 m (2m distant from coal seam)

NAPP = 8.5 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1429R	114			113	114	1			C	CO	COAL, undifferentiated	COAL GROUP
1429R	115			114	115	1			C	CO	COAL, undifferentiated	COAL GROUP
1429R	116		116	115	116	1			C	CO	COAL, undifferentiated	COAL GROUP
1429R	117			116	117	1			C	CO	COAL, undifferentiated	COAL GROUP
1429R	118			117	118	1				SL	SILTSTONE	REMAINING
1429R	119		119	118	119	1				SL	SILTSTONE	REMAINING
1429R	120			119	120	1				SL	SILTSTONE	REMAINING
1429R	121		121	120	121	1				SL	SILTSTONE	REMAINING
1429R	122			121	122	1				SL	SILTSTONE	REMAINING

PAF Samples

Sample 1429R_142

Depth range 141 to 142 m (coal sample)

NAPP = 9.3 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1429R	133			132	133	1				MS	MUDSTONE	REMAINING
1429R	134		134	133	134	1				MS	MUDSTONE	REMAINING
1429R	135			134	135	1				MS	MUDSTONE	REMAINING
1429R	136			135	136	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	137			136	137	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	138			137	138	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	139			138	139	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	140			139	140	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	141		141	140	141	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	142		142	141	142	1			DUM	CO	COAL, undifferentiated	COAL GROUP
1429R	143			142	143	1			DLL	CO	COAL, undifferentiated	COAL GROUP
1429R	144			143	144	1				SS	SANDSTONE	REMAINING
1429R	145			144	145	1				SS	SANDSTONE	REMAINING
1429R	146			145	146	1				SS	SANDSTONE	REMAINING

Sample 1410c_28

Depth range 27 to 28 m (coal sample)

NAPP = 31 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1410C	23			22	23	1				MS	MUDSTONE	REMAINING
1410C	24			23	24	1				MS	MUDSTONE	REMAINING
1410C	25			24	25	1				MS	MUDSTONE	REMAINING
1410C	26			25	26	1				MS	MUDSTONE	REMAINING
1410C	27		27	26	27	1				MS	MUDSTONE	REMAINING
1410C	28			27	28	1				CO	COAL, undifferentiated	COAL GROUP
1410C	29			28	29	1				CO	COAL, undifferentiated	COAL GROUP
1410C	30			29	30	1				CO	COAL, undifferentiated	COAL GROUP
1410C	31		31	30	31	1				CO	COAL, undifferentiated	COAL GROUP
1410C	32			31	32	1				SL	SILTSTONE	REMAINING
1410C	33			32	33	1				SL	SILTSTONE	REMAINING
1410C	34			33	34	1				SL	SILTSTONE	REMAINING
1410C	35			34	35	1				SL	SILTSTONE	REMAINING
1410C	36			35	36	1				SL	SILTSTONE	REMAINING
1410C	37		37	36	37	1				SL	SILTSTONE	REMAINING
1410C	38			37	38	1				SS	SANDSTONE	REMAINING
1410C	39			38	39	1				SS	SANDSTONE	REMAINING

PAF Samples

Sample 1400x_25

Depth range 24 to 25 m (adjacent to coal seam)

NAPP = 20.4 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1400X	15		15	14	15	1				SA	SAND	SAND AND GRAVEL GRC
1400X	16		16	15	16	1				SA	SAND	SAND AND GRAVEL GRC
1400X	17		17	16	17	1				SA	SAND	SAND AND GRAVEL GRC
1400X	18		18	17	18	1				CL	CLAY	CLAY AND SOIL GROUP
1400X	19		19	18	19	1				SA	SAND	SAND AND GRAVEL GRC
1400X	20			19	20	1				SA	SAND	SAND AND GRAVEL GRC
1400X	21			20	21	1				SA	SAND	SAND AND GRAVEL GRC
1400X	22		22	21	22	1				SA	SAND	SAND AND GRAVEL GRC
1400X	23		23	22	23	1				SA	SAND	SAND AND GRAVEL GRC
1400X	24		24	23	24	1				CL	CLAY	CLAY AND SOIL GROUP
1400X	25		25	24	25	1				CL	CLAY	CLAY AND SOIL GROUP
1400X	26		26	25	26	1				ZH	COALY SHALE	COAL GROUP
1400X	27			26	27	1				CO	COAL, undifferentiated	COAL GROUP

Sample 1401x_28

Depth range 27 to 28 m (adjacent to coal seam)

NAPP = 54.2 kgH_2SO_4/t

HoleID	CHECK DEPTH	CONT.	BASE DEPTH	FROM	TO	SAMPLE LENGTH	SAMPLE ID	SAMPLE NUMBER	SEAM	ROCK TYPE	DESCRIPTION	SRK GROUP
1401X	15		15	14	15	1				SA	SAND	SAND AND GRAVEL GR
1401X	16		16	15	16	1				SA	SAND	SAND AND GRAVEL GR
1401X	17		17	16	17	1				SA	SAND	SAND AND GRAVEL GR
1401X	18			17	18	1				SA	SAND	SAND AND GRAVEL GR
1401X	19		19	18	19	1				SA	SAND	SAND AND GRAVEL GR
1401X	20		20	19	20	1				CL	CLAY	CLAY AND SOIL GROUP
1401X	21		21	20	21	1				SS	SANDSTONE	REMAINING
1401X	22		22	21	22	1				SS	SANDSTONE	REMAINING
1401X	23			22	23	1				SS	SANDSTONE	REMAINING
1401X	24		24	23	24	1				SS	SANDSTONE	REMAINING
1401X	25			24	25	1				SS	SANDSTONE	REMAINING
1401X	26			25	26	1				SS	SANDSTONE	REMAINING
1401X	27			26	27	1				SS	SANDSTONE	REMAINING
1401X	28		28	27	28	1				SS	SANDSTONE	REMAINING
1401X	29		29	28	29	1	LP		1	CO	COAL, undifferentiated	COAL GROUP
1401X	30		30	29	30	1	LP		2	CO	COAL, undifferentiated	COAL GROUP
1401X	31		31	30	31	1	LP		3	CO	COAL, undifferentiated	COAL GROUP
1401X	32		32	31	32	1	LP		4	CO	COAL, undifferentiated	COAL GROUP

ADDENDUM TO APPENDIX Q

RGS

Geochemical Assessment of Coal and Mining Waste Materials: Kevin's Corner Project

Interim report prepared for:

Hancock Galilee Pty Limited
Level 8, 307 Queen Street
Brisbane QLD 4000

Date: April 2011
Project Number: 101140
Report Number: R001_A

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19 April 2011

RGS Interim Report Number 091040

Geochemical Assessment of Coal and Mining Waste Materials
Kevin's Corner Project

Dear Paul,

This Interim Report provides the findings of a geochemical assessment of coal and mining waste materials at the Kevin's Corner Coal Project (the Project). The report also includes a review and interpretation of the static geochemical dataset relied upon by SRK Consulting (Australasia) Pty Ltd (SRK) to complete their assessment of the geochemical characteristics of coal and mining waste materials at the Project.

1.0 BACKGROUND

The Project is a proposed large-scale open-cut and underground coal mine owned by Hancock Galilee Pty Ltd. An Environmental Impact Statement (EIS) for the Project is being completed by HGPL and is being coordinated by URS Australia Pty Ltd (URS). The EIS will be submitted to the Queensland Government for assessment in April 2011.

The Project proposes to mine a thermal coal deposit located within the Galilee Basin, about 56 km north of Alpha, 130 km southwest of the township of Clermont and some 360 km southwest of Mackay in Central Queensland. The Project is expected to generate up to 30 million tonnes per annum (Mtpa) run of mine (ROM) coal from the open cut and underground longwall operations, with a projected life of mine (LOM) of 30 years. The Central and Northern open pits would cover an area of approximately 21 km^2. It is expected that 3.15 billion tonnes of overburden is expected to be generated from the open pits over the life of mine. In addition, coarse reject and tailings products for on-site disposal would also be generated from the coal handling and preparation plant (CHPP) from both open pit and underground operations. The majority of ROM coal (695.6 Mt or 79%) will be produced from the underground operations with 184.3 Mt (21%) being produced from the open cut pits. For every 100 t of ROM coal approximately 75 t of product coal, 17 t of coarse reject and 8 t of tailings will be produced. This amounts to approximately 150 and 70 Mt of coarse and fine reject, respectively, generated over the LOM.

The bulk of the geochemical assessment work on the Project for the EIS submission has been completed by SRK and Peer Reviewed by RGS. Geochemical aspects of the nearby Alpha Coal Project and the Alpha Bulk Sample Project have previously been investigated by SRK (SRK, 2010a and b) and RGS-Terrenus Earth Sciences (RGS-Terrenus, 2011).

This Interim Report describes the geochemical assessment work completed by RGS, to date, on coal and coal reject materials from the Project. It also includes a review and interpretation of the static geochemical dataset relied upon by SRK Consulting (Australasia) Pty Ltd (SRK) to complete an assessment of the geochemical characteristics of coal and mining waste materials at the Project. The RGS work program primarily focuses on kinetic leach column (KLC) testing of coal and coal reject materials, although the program is currently being expanded to incorporate KLC tests on representative samples of overburden materials from the Project. The RGS work program is designed to:

1. Build upon existing knowledge of the geochemical characteristics of overburden and potential coal rejects at both the Project site itself and the nearby Alpha Coal Project (HGPL, 2010; SRK, 2010a,b, RGS-Terrenus, 2011);
2. Fill any knowledge gaps and address specific commitments proposed in the forthcoming Project EIS document submission to the Queensland Government;

The agreed scope of work was targeted towards:

- Improving the working knowledge of the likely geochemical characteristics of the Project overburden, coal and coal reject materials;
- Understanding and managing potential environmental geochemical risks associated with overburden, coal and coal reject materials; and
- Developing appropriate management and ongoing sampling strategies for coal and mining waste materials at the Project.

2.0 SCOPE OF WORK AND METHODOLOGY

2.1 Scope of Work

RGS has been commissioned by HGPL to complete the scope of work described in Tasks 1 to 3.

Task 1: EIS – Technical Assistance

RGS has provided technical assistance to HGPL with geochemical aspects of its EIS preparation for the Project. Three of the main areas where RGS is providing technical assistance are.

- Completing a targeted review of the geochemical data used for classifying overburden materials;
- Development of a geochemical sampling and testing program for HGPL infill drilling and future drilling programs; and
- Development of geological cross-sections to illustrate the geochemical nature overburden materials with respect to the Project geological units.

Task 2: Address EIS Commitments.

The forthcoming EIS for the Project contains a number of HGPL commitments regarding ongoing and additional geochemical testing of coal and mining waste materials. One of these commitments relates to static and kinetic geochemical tests, which have commenced and are progressing through the planned test program schedule. RGS is working closely with HGPL geological and contract drilling personnel (Salva Resources Pty Ltd) and coal quality contract personnel (Sedgman Limited) to select representative samples of coal and coal reject materials for inclusion in the geochemical test program. The static and kinetic geochemical test program is currently being expanded to incorporate KLC tests on representative samples of overburden materials from the Project.

Current KLC Tests - Coal and Coal Reject Samples: The geochemical sampling program for the Project EIS has generated a large number of overburden samples, however at the time of compiling this Interim Report only a limited number of coal and coal reject samples (nine samples from four drill-holes including raw coal, washed coal, coarse coal reject and tailings) have been received by RGS from the coal quality laboratory. The samples, although not a complete dataset, are considered for the purposes of this Interim Report to adequately represent the coal and coal reject materials expected to be produced at the Project. The assessment of the remaining samples will be included in the complete Draft Geochemical Report proposed for the second half of 2011, when all of the geochemical test results are available.

Static geochemical testing of six of the nine samples has been completed and KLC tests for these samples has commenced. Static and kinetic testing of a further nine coal and coal reject samples from an additional three drill holes is planned as soon as these samples are received from the coal quality laboratory (expected in May 2011). To date, six of the nine coal and coal reject samples have been subjected to a series of static geochemical tests at ALS Brisbane including: pH, electrical conductivity (EC), total sulfur and Acid Neutralising Capacity (ANC) and Chromium Reducible Sulfur (S_{CR}), and multi-element analysis on solids and distilled water extracts as described in **Section 2.2**.

KLC tests on three of the coal and coal reject samples (from drill holes 1302L/1303L and 1492L) commenced in December 2010 and February 2011, respectively. The first three samples from Holes 1302L and 1303L (also called '250' samples in the SRK geochemical assessment report (SRK, 2011)) were prepared from coal material derived from the A, B and C seams at the Project whereas the second three samples from Hole 1492L, were derived solely from the D seam[1]. The core samples, all from large diameter drill holes, were collected using controlled roof and floor dilution (approximately 50 mm and 100 mm, respectively) and are expected to provide an indication of the likely dilution and geochemical characteristics of coal and coal reject materials at the Project.

Planned KLC Tests – Overburden Samples: For overburden, RGS has selected a total of 16 samples for KLC test, which represent the most abundant rock types (lithologies) present at the Project open pit areas and a range of oxidisable sulphur contents. The samples were selected based upon recommendations provided in the SRK geochemical assessment report for the Project EIS, Peer Reviewed by RGS in April 2011. These KLC tests will commence in April 2011 and be completed at the ALS Brisbane leaching laboratory over an estimated four month (18 week) period[2], with fortnightly column leaching over the test period (*ie.* 10 leaching events). Collected KLC test leachate will be tested at ALS Brisbane for a range of analysis including pH, EC, acidity/alkalinity, major soluble cations and anions, and soluble trace metals.

Task 3: Reporting

RGS is providing summary and other geochemistry reports on the Project to HGPL, as required. A more complete version of this Interim Report will be prepared as a Draft Report and submitted to HGPL in the second half of 2011, when all of the geochemical test results are available.

2.2 Methodology

Current Samples: The six coal and coal reject samples for which there is geochemical data currently available were generated from simulated processing (crushing and washing) of coal from large diameter drill core at the coal quality laboratory (Preplab Testing Services Pty Ltd in Gladstone). The Raw Coal sample required no processing other than required for geochemical analysis at ALS Brisbane laboratory. The six samples comprise:

- Product Coal (from drill holes 1302L/1303L);
- Raw Coal (from drill hole1492L);
- Coarse Reject (from drill holes 1302L/1303L);
- Coarse Reject (from drill hole1492L);
- Tailings (from drill holes 1302L/1303L); and
- Tailings (from drill hole1492L).

Static Tests: The samples listed above were sent to ALS Brisbane laboratory for sample preparation (crushing and pulverising (to pass 75 μm), as appropriate for each test). All samples were subjected to a series of geochemical tests comprising:

- pH and electrical conductivity (EC) on 1:5 w/v distilled water extracts;
- Total sulphur [Leco method];
- Chromium reducible sulfur (S_{CR}) [AS4969.7-2008 method];
- Acid Neutralising Capacity (ANC) [AMIRA 2002 method];
- Acid Buffering Characterisation Curve (ABCC) tests [AMIRA 2002 method];
- Total metal and metalloids [HF-HNO_3-$HClO_4$ acid digestion, HCl leach and combination of ICP-MS and ICP-AES analyses]; and
- Soluble major ions, metals and metalloids on 1:5 w/v distilled water extracts [ICP-AES; ICP-MS].

All analyses, except total metals and metalloids, were undertaken by Australian Laboratory Services (ALS) Environmental, Brisbane. Total metals and metalloids were undertaken by ALS Chemex, Brisbane.

[1] The D Seam will comprise 93% of the coal generated at the Project over the life of mine.
[2] The program would be assessed after four months and a decision made by RGS and HGPL on whether the KLC program would need to continue beyond four months. It is currently assumed by RGS that four months will likely be satisfactory, however the program will be continued if deemed necessary.

Kinetic Tests: Static geochemical tests provides an indication of the geochemical characteristics of coal and mining waste materials, but does not provide information on the reaction kinetics, such as the time preceding any acid generation, duration, or the rates at which a material may leach acid, metals and salts when subjected to day-to-day weather conditions (rain and sunshine).

KLC tests on the six coal, coarse reject and tailing samples are being completed at the RGSs in-house leaching laboratory in Brisbane and are based on standard Australian mining industry methodology (AMIRA, 2002). In general, approximately 1-2 kg of material (sample) was loosely packed into a Buchner column, connected above a Buchner funnel. The base of the column (above the funnel) was lined with a glass-fibre filter paper. The entire unit was supported on a shelf to allow a collection bottle to sit under the funnel. A heat lamp was mounted above the column. The column was subjected to routine de-ionised water addition and subsequent heating to simulate the effects of rainfall and sunshine. During leaching events, typically 1 L of distilled water was applied at fortnightly intervals and allowed to free-drain through the solids for collection and analysis.

The six KLC tests commenced in two stages: December 2010 (1302L/1303L samples) and February 2011 (1492L samples). The KLC tests are proposed to operate over an estimated 18 week period, with fortnightly column leaching during this period (*ie*. 10 leaching events).

Collected KLC test leachate have been sent to ALS Environmental (Brisbane) for analysis including pH, EC, acidity, alkalinity, major soluble cations and anions, and soluble trace metals.

The coarse reject and coal samples used in the KLC program had a particle size greater than 250 µm and the tailings samples were less than 250 µm.

3.0 EIS TECHNICAL ASSISTANCE

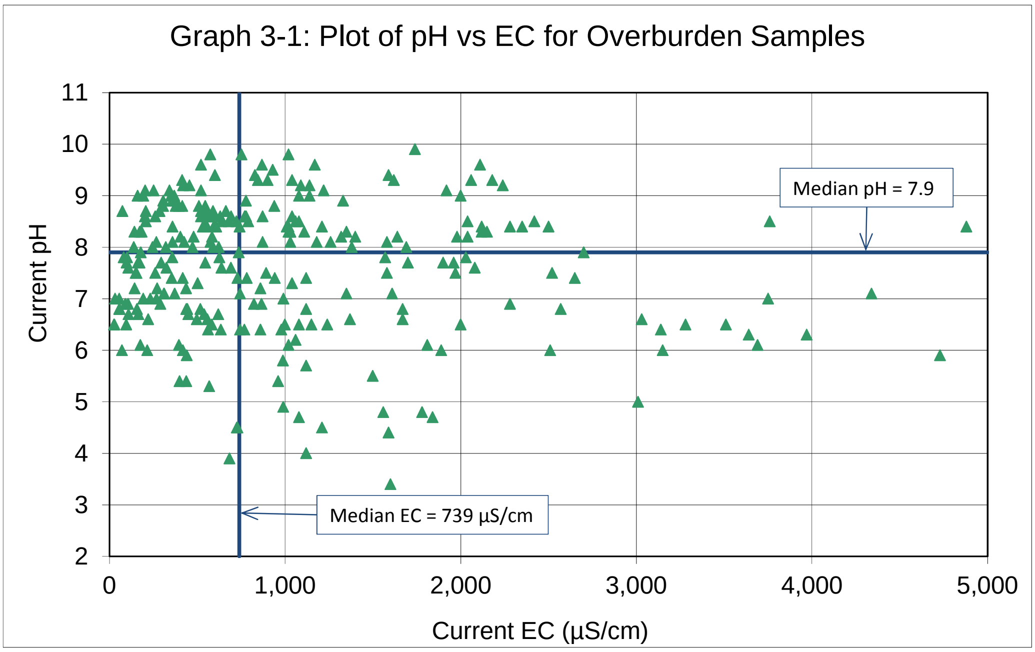
This Section describes the work completed to date on three of the main areas where RGS is providing technical assistance to HGPL with geochemical aspects of its EIS preparation for the Project.

3.1 Geochemical Nature of Overburden Materials

Acid Base Account

The results of Acid Base Account (ABA) geochemical testing of 266 overburden samples from 26 drill-holes at the Project, relied upon in the geochemical assessment program completed for the EIS (SRK, 2011) are provided at **Table 3-1**. These results are also summarised and reported in the EIS document at Volume 2 Section 16 and Volume 5 Appendix Q, respectively.

pH: Based on the geochemical data presented at **Table 3-1**, the pH of surface runoff and seepage from bulk overburden materials is expected to be circum-neutral in the range pH 7 to 8 as illustrated at **Graph 3-1.** Whilst the samples show a range of pH values, the median pH value is 7.9. The two samples with pH values less than 4 are samples closely associated with coal units.



Salinity: The salinity of leachate from overburden (as represented by EC value) is provided at **Graph 3-1**. The data illustrate that there is a wide range of salinity values and some overburden materials are likely to be saline (*eg*. salinity values for some siltstone and clay materials tend to be more elevated than other rock types). The samples span a large range of EC values from 26 µS/cm to over 4,800 µS/cm; with a broad statistical distribution (25^{th} and 75^{th} percentile values of 382 and 1,345 µS/cm, respectively). Most samples are generally evenly distributed between the 'Low', 'Medium' and 'High' categories as described in Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland (DME, 1995), reproduced at **Table 3-2**. Approximately 14% of overburden samples are classified as having 'very high" salinity criteria.

The EC tests were completed on pulverised samples with a large surface area in contact with the leaching solution and represent an assumed 'worst case' scenario. It should also be noted that the guidelines are for EC values obtained for a 1:5 (sample:water) extract, whereas the overburden EC results were obtained for a more concentrated 1:3 (sample:water) extract. It is also expected that the salinity of leachate from overburden materials will diminish with time as salts are flushed from the rock matrix and a state of equilibrium develops. At this point the salinity of seepage/runoff should stabilise at a lower asymptotic concentration relative to the weathering/erosion of the materials. The salinity of surface runoff and seepage from roof and floor materials is expected to be similar to overburden materials based on the samples tested to date.

Table 3-1: Acid-base Results for Overburden Materials - Kevins Corner Project

ALS Laboratory Sample ID	Drill Hole ID	Lithology	pH[1]	EC[1]	Total Sulfur	CRS	MPA[2]	ANC[2]	NAPP[2]	ANC/MPA ratio	Sample Classification[3]
				(µS/cm)	(%)		(kg H_2SO_4/t)				
Overburden											
EB1019995001	1388R_95	SAND	8.6	261	0.005		0.2	11.5	-11.3	75.1	Non-Acid Forming (Barren)
EB1019995002	1388R_96	SANDSTONE	9.0	2,000	0.04		1.2	73.1	-71.9	59.7	Non-Acid Forming (Barren)
EB1019995004	1388R_100	SANDSTONE	7.0	991	0.37	0.221	6.8	6.4	0.4	0.9	Uncertain
EB1019995005	1389R_102	SILTSTONE	5.4	399	0.07	0.005	0.2	5.6	-5.4	36.6	Non-Acid Forming (Barren)
EB1019995008	1389R_107	SANDSTONE	7.3	1,040	0.38	0.244	7.5	5.0	2.5	0.7	Uncertain
EB1019995009	1397D_134	CLAY	8.8	939	0.005		0.2	23.1	-22.9	150.9	Non-Acid Forming (Barren)
EB1019995010	1397D_135	CLAY	7.2	860	0.005		0.2	4.3	-4.1	28.1	Non-Acid Forming (Barren)
EB1019995011	1397D_136	SAND	7.7	1,960	0.005		0.2	3.4	-3.2	22.2	Non-Acid Forming (Barren)
EB1019995012	1397D_137	CLAY	8.1	1,580	0.01		0.3	13.5	-13.2	44.1	Non-Acid Forming (Barren)
EB1019995013	1397D_138	SILTSTONE	7.1	744	0.08	0.053	1.6	2.5	-0.9	1.5	Non-Acid Forming (Barren)
EB1019995014	1397D_139	SANDSTONE	7.1	372	0.04		1.2	2.4	-1.2	2.0	Non-Acid Forming (Barren)
EB1019995015	1397D_140	SANDSTONE	8.0	246	0.01		0.3	0.8	-0.5	2.6	Non-Acid Forming (Barren)
EB1019995016	1397D_141	SANDSTONE	8.3	183	0.005		0.2	1.0	-0.8	6.5	Non-Acid Forming (Barren)
EB1019995018	1402C_151	SOIL	6.5	26	0.005		0.2	1.6	-1.4	10.4	Non-Acid Forming (Barren)
EB1019995019	1402C_152	CLAY	6.9	91	0.005		0.2	5.0	-4.8	32.7	Non-Acid Forming (Barren)
EB1019995020	1402C_153	SILTSTONE	9.2	1,140	0.04		1.2	191.0	-189.8	155.9	Non-Acid Forming (Barren)
EB1019995021	1403D_159	SAND	4.8	1,560	0.03		0.9	6.2	-5.3	6.7	Non-Acid Forming (Barren)
EB1019995022	1403D_160	CLAY	5.0	3,010	0.01		0.3	4.6	-4.3	15.0	Non-Acid Forming (Barren)
EB1019995023	1403D_161	CLAY	5.5	1,500	0.01		0.3	23.7	-23.4	77.4	Non-Acid Forming (Barren)
EB1019995024	1403D_162	CLAYSTONE	7.1	1,610	0.06	0.026	0.8	4.3	-3.5	5.4	Non-Acid Forming (Barren)
EB1019995025	1403D_163	SILTSTONE	7.5	261	0.02		0.6	3.7	-3.1	6.0	Non-Acid Forming (Barren)
EB1019995026	1403D_164	PEBBLE CONGLOMERATE	7.7	171	0.005		0.2	0.3	-0.1	1.6	Non-Acid Forming (Barren)
EB1019995027	1403D_165	SANDSTONE	6.5	583	0.05		1.5	0.8	0.7	0.5	Non-Acid Forming (Barren)
EB1019995028	1412C_166	LATERITE	6.1	3,690	0.02		0.6	9.6	-9.0	15.7	Non-Acid Forming (Barren)
EB1019995029	1412C_167	SILTSTONE	8.4	4,880	0.03		0.9	39.1	-38.2	42.6	Non-Acid Forming (Barren)
EB1019995030	1412C_168	SANDSTONE	8.5	3,760	0.03		0.9	33.3	-32.4	36.2	Non-Acid Forming (Barren)
EB1019995031	1412C_169	SANDSTONE	7.5	1,580	0.09	0.057	1.7	4.6	-2.9	2.6	Non-Acid Forming (Barren)
EB1019995032	1412C_170	SILTSTONE	7.5	154	0.02		0.6	2.4	-1.8	3.9	Non-Acid Forming (Barren)
EB1019995033	1412C_171	CARBONACEOUS MUDSTONE	4.9	989	0.19	0.051	1.6	5.0	-3.4	3.2	Non-Acid Forming (Barren)
EB1019995034	1412C_173	SANDSTONE	5.3	568	0.11	0.064	2.0	1.0	1.0	0.5	Non-Acid Forming (Barren)
EB1019995035	1414X_175	CLAY	8.0	1,380	0.01		0.3	37.8	-37.5	123.4	Non-Acid Forming (Barren)
EB1019995036	1414X_176	CONGLOMERATE	7.8	2,030	0.005		0.2	6.0	-5.8	39.2	Non-Acid Forming (Barren)
EB1019995037	1414X_177	SILTSTONE	7.0	3,750	0.02		0.6	5.1	-4.5	8.3	Non-Acid Forming (Barren)
EB1019995038	1414X_178	CARBONACEOUS MUDSTONE	6.3	3,970	0.08		2.5	7.7	-5.3	3.1	Non-Acid Forming (Barren)
EB1019995039	1429R_190	SOIL	6.8	2,570	0.02		0.6	9.3	-8.7	15.2	Non-Acid Forming (Barren)
EB1019995040	1429R_191	MUDSTONE	9.2	2,240	0.01		0.3	14.2	-13.9	46.4	Non-Acid Forming (Barren)
EB1019995041	1429R_192	CARBONACEOUS SHALE	7.1	4,340	0.96	0.434	13.3	19.4	-6.1	1.5	Non-Acid Forming
EB1019995046	1434D_205	SOIL	7.0	193	0.005		0.2	3.7	-3.5	24.2	Non-Acid Forming (Barren)
EB1019995047	1434D_206	CLAYSTONE	4.8	1,780	0.03		0.9	2.4	-1.5	2.6	Non-Acid Forming (Barren)
EB1019995048	1434D_207	SANDSTONE	6.6	558	0.005		0.2	2.6	-2.4	17.0	Non-Acid Forming (Barren)
EB1019995049	1434D_208	SILTSTONE	9.6	521	0.03		0.9	11.8	-10.9	12.8	Non-Acid Forming (Barren)
EB1019995050	1434D_209	SANDSTONE	9.8	574	0.04		1.2	0.3	1.0	0.2	Non-Acid Forming (Barren)
EB1019995051	1434D_210	SILTSTONE	9.4	601	0.04		1.2	21.2	-20.0	17.3	Non-Acid Forming (Barren)
EB1019995052	1434D_211	SANDSTONE	7.9	178	0.16	0.16	4.9	1.0	3.9	0.2	Uncertain
EB1019995053	1434D_212	CARBONACEOUS SANDSTONE	8.1	267	0.07		2.1	7.0	-4.9	3.3	Non-Acid Forming (Barren)
EB1019995054	1434D_213	CARBONACEOUS SANDSTONE	8.7	285	0.06		1.8	8.9	-7.1	4.8	Non-Acid Forming (Barren)
EB1019995055	1444D_227	SANDSTONE	8.0	139	0.01		0.3	1.4	-1.1	4.6	Non-Acid Forming (Barren)
EB1019995056	1444D_228	CARBONACEOUS SHALE	8.0	622	0.18	0.058	1.8	8.9	-7.1	5.0	Non-Acid Forming (Barren)
EB1019995057	1444D_229	SILTSTONE	8.3	142	0.02		0.6	3.7	-3.1	6.0	Non-Acid Forming (Barren)
EB1019995058	1445D_233	CARBONACEOUS SANDSTONE	8.2	1,640	0.35	0.188	5.8	26.3	-20.5	4.6	Non-Acid Forming
EB1019995059	1445D_234	SILTSTONE	9.9	1,740	0.04		1.2	30.8	-29.6	25.1	Non-Acid Forming (Barren)
EB1019995061	1445D_237	CARBONACEOUS SANDSTONE	9.0	193	0.02		0.6	2.4	-1.8	3.9	Non-Acid Forming (Barren)
EB1019995062	1445D_238	SANDSTONE	8.0	321	0.005		0.2	4.6	-4.4	30.0	Non-Acid Forming (Barren)
EB1019995063	1445D_239	CARBONACEOUS SANDSTONE	9.2	456	0.11	0.074	2.3	8.9	-6.6	3.9	Non-Acid Forming (Barren)
EB1019995064	1445D_240	CARBONACEOUS SANDSTONE	9.1	204	0.05		1.5	11.4	-9.9	7.4	Non-Acid Forming (Barren)
EB1019995065	1445D_241	SILTSTONE	8.6	202	0.06		1.8	8.3	-6.5	4.5	Non-Acid Forming (Barren)
EB1019995066	1451D_264	CLAY	6.0	2,510	0.005		0.2	3.7	-3.5	24.2	Non-Acid Forming (Barren)
EB1019995067	1451D_265	SILTSTONE	7.8	358	0.03		0.9	3.4	-2.5	3.7	Non-Acid Forming (Barren)
EB1019995068	1451D_266	CARBONACEOUS SANDSTONE	7.4	417	0.06	0.016	0.5	3.7	-3.2	7.6	Non-Acid Forming (Barren)
EB1019995069	1451D_267	SANDSTONE	4.0	1,120	0.24		7.4	4.3	3.1	0.6	Uncertain
EB1019995070	1452D_268	CLAY	4.7	1,840	0.01		0.3	3.4	-3.1	11.1	Non-Acid Forming (Barren)
EB1019995071	1452D_269	CLAYSTONE	6.8	443	0.02		0.6	8.9	-8.3	14.5	Non-Acid Forming (Barren)
EB1019995072	1452D_270	SILTSTONE	9.4	829	0.02		0.6	14.7	-14.1	24.0	Non-Acid Forming (Barren)
EB1019995073	1452D_271	SANDSTONE	7.6	638	0.04		1.2	36.5	-35.3	29.8	Non-Acid Forming (Barren)
EB1019995074	1452D_272	SILTSTONE	9.3	413	0.04		1.2	30.1	-28.9	24.6	Non-Acid Forming (Barren)
EB1019995075	1452D_273	MUDSTONE	9.8	752	0.08		2.5	14.2	-11.8	5.8	Non-Acid Forming (Barren)
EB1019995076	1452D_274	SANDSTONE	5.4	437	0.07	0.067	2.1	0.7	1.4	0.3	Non-Acid Forming (Barren)

Table 3-1: Acid-base Results for Overburden Materials - Kevins Corner Project

ALS Laboratory Sample ID	Drill Hole ID	Lithology	pH[1]	EC[1]	Total Sulfur	CRS	MPA[2]	ANC[2]	NAPP[2]	ANC/MPA ratio	Sample Classification[3]
				(µS/cm)	(%)		(kg H_2SO_4/t)				
EB1019995077	1453D_275	SOIL	7.7	1,900	0.01		0.3	18.6	-18.3	60.7	Non-Acid Forming (Barren)
EB1019995078	1453D_276	CLAYSTONE	7.4	2,650	0.01		0.3	5.0	-4.7	16.3	Non-Acid Forming (Barren)
EB1019995079	1453D_277	SANDSTONE	9.6	2,110	0.03		0.9	62.2	-61.3	67.7	Non-Acid Forming (Barren)
EB1019995080	1453D_278	CARBONACEOUS MUDSTONE	9.4	1,590	0.35	0.024	0.7	16.4	-15.7	22.3	Non-Acid Forming
EB1019995081	1453D_279	CARBONACEOUS SANDSTONE	9.6	868	0.02		0.6	65.4	-64.8	106.8	Non-Acid Forming (Barren)
EB1019995082	1453D_280	SANDSTONE	9.6	1,170	0.03		0.9	52.6	-51.7	57.3	Non-Acid Forming (Barren)
EB1019995083	1453D_281	SILTSTONE	8.7	207	0.01		0.3	1.6	-1.3	5.2	Non-Acid Forming (Barren)
EB1019995084	1453D_282	SANDSTONE	9.0	161	0.04		1.2	8.9	-7.7	7.3	Non-Acid Forming (Barren)
EB1019995085	1454D_284	SILTSTONE	9.5	930	0.03		0.9	12.2	-11.3	13.3	Non-Acid Forming (Barren)
EB1019995086	1454D_285	SILTSTONE	9.8	1,020	0.03		0.9	39.7	-38.8	43.2	Non-Acid Forming (Barren)
EB1019995087	1454D_286	SANDSTONE	8.9	777	0.22	0.02	0.6	8.9	-8.3	14.5	Non-Acid Forming (Barren)
EB1019995088	1454D_288	SILTSTONE	7.4	729	0.17	0.074	2.3	10.2	-7.9	4.5	Non-Acid Forming (Barren)
EB1019995089	1454D_289	CARBONACEOUS SHALE	8.8	305	0.08		2.5	8.9	-6.5	3.6	Non-Acid Forming (Barren)
EB1019995090	1454D_290	MUDSTONE	8.5	207	0.07	0.016	0.5	4.1	-3.6	8.4	Non-Acid Forming (Barren)
EB1100364001	1398X_1	SOIL	6.8	56	0.005		0.2	3.2	-3.0	20.9	Non-Acid Forming (Barren)
EB1100364002	1398X_2	SAND	6.9	107	0.005		0.2	1.0	-0.8	6.5	Non-Acid Forming (Barren)
EB1100364003	1398X_9	SAND	6.6	498	0.005		0.2	1.0	-0.8	6.5	Non-Acid Forming (Barren)
EB1100364004	1398X_14	SAND	7.1	1,350	0.005		0.2	0.5	-0.3	3.3	Non-Acid Forming (Barren)
EB1100364005	1398X_19	CLAY	6.8	1,670	0.005		0.2	0.3	-0.1	1.63	Non-Acid Forming (Barren)
EB1100364006	1398X_22	SAND	6.9	2,280	0.005		0.2	0.3	-0.1	1.6	Non-Acid Forming (Barren)
EB1100364007	1398X_28	SAND	5.7	1,120	0.26	0.138	4.2	1.2	3.0	0.3	Uncertain
EB1100364008	1398X_5032	SANDSTONE	6.7	540	0.11	0.048	1.5	2.3	-0.8	1.6	Non-Acid Forming (Barren)
EB1100364011	1399X_2	SOIL	6.7	165	0.005		0.2	1.7	-1.5	11.1	Non-Acid Forming (Barren)
EB1100364012	1399X_6	SAND	8.5	1,060	0.005		0.2	9.9	-9.7	64.7	Non-Acid Forming (Barren)
EB1100364013	1399X_11	SAND	7.5	892	0.005		0.2	2.7	-2.5	17.6	Non-Acid Forming (Barren)
EB1100364014	1399X_19	SAND	7.6	692	0.005		0.2	1.5	-1.3	9.8	Non-Acid Forming (Barren)
EB1100364015	1399X_24	SAND	8.1	425	0.005		0.2	1.4	-1.2	9.1	Non-Acid Forming (Barren)
EB1100364016	1399X_31	CLAY	7.6	2,080	0.02		0.6	2.6	-2.0	4.2	Non-Acid Forming (Barren)
EB1100364017	1399X_32	CLAY	7.5	1,970	0.005		0.2	2.0	-1.8	13.1	Non-Acid Forming (Barren)
EB1100364018	1399X_34	SANDSTONE	6.9	866	0.05		1.5	3.2	-1.7	2.1	Non-Acid Forming (Barren)
EB1100364019	1399X_35	SANDSTONE	4.4	1,590	0.11	0.005	0.2	0.3	-0.1	1.6	Non-Acid Forming (Barren)
EB1100364020	1399X_36	SANDSTONE	4.7	1,080	0.12	0.005	0.2	0.3	-0.1	1.6	Non-Acid Forming (Barren)
EB1100364021	1400X_2	SOIL	7.8	1,570	0.03		0.9	4.5	-3.6	4.9	Non-Acid Forming (Barren)
EB1100364022	1400X_7	SAND	6.5	1,080	0.005		0.2	1.0	-0.8	6.5	Non-Acid Forming (Barren)
EB1100364023	1400X_11	SAND	7.4	1,120	0.005		0.2	2.9	-2.7	18.9	Non-Acid Forming (Barren)
EB1100364024	1400X_25	CLAY	6.0	3,150	0.7		21.4	1.0	20.4	0.05	Potentially Acid Forming
EB1100364026	1401X_2	SOIL	6.5	96	0.005		0.2	0.3	-0.1	1.6	Non-Acid Forming (Barren)
EB1100364027	1401X_3	SOIL	6.8	58	0.005		0.2	1.0	-0.8	6.5	Non-Acid Forming (Barren)
EB1100364028	1401X_15	SAND	7.3	502	0.005		0.2	0.8	-0.6	5.2	Non-Acid Forming (Barren)
EB1100364029	1401X_27	SANDSTONE	4.5	726	0.19	0.028	0.9	0.8	0.1	0.9	Non-Acid Forming (Barren)
EB1100364030	1401X_28	SANDSTONE	3.4	1,600	2.36	1.78	54.5	0.3	54.3	0.005	Potentially Acid Forming
EB1100364031	1404C_2	CLAY	6.0	1,890	0.005		0.2	2.9	-2.7	18.9	Non-Acid Forming (Barren)
EB1100364032	1404C_4	SANDSTONE	6.1	1,020	0.01		0.3	2.0	-1.7	6.5	Non-Acid Forming (Barren)
EB1100364033	1404C_8	SILTSTONE	6.5	3,510	0.03		0.9	2.6	-1.7	2.8	Non-Acid Forming (Barren)
EB1100364034	1404C_11	SILTSTONE	6.5	28	0.03		0.9	3.6	-2.7	3.9	Non-Acid Forming (Barren)
EB1100364035	1404C_18	SILTSTONE	6.5	3,280	0.02		0.6	2.9	-2.3	4.7	Non-Acid Forming (Barren)
EB1100364036	1404C_19	SILTSTONE	6.4	3,140	0.02		0.6	2.9	-2.3	4.7	Non-Acid Forming (Barren)
EB1100364037	1404C_20	SILTSTONE	6.3	3,640	0.02		0.6	2.0	-1.4	3.3	Non-Acid Forming (Barren)
EB1100364038	1404C_22	SILTSTONE	6.6	3,030	0.02		0.6	2.0	-1.4	3.3	Non-Acid Forming (Barren)
EB1100364039	1404C_24	SILTSTONE	5.9	4,730	0.32	0.057	1.7	4.2	-2.5	2.4	Non-Acid Forming (Barren)
EB1100364040	1405C_1	CLAY	8.0	590	0.03		0.9	9.4	-8.5	10.2	Non-Acid Forming (Barren)
EB1100364041	1405C_6	SILTSTONE	4.5	1,210	0.03		0.9	3.6	-2.7	3.9	Non-Acid Forming (Barren)
EB1100364042	1405C_19	SANDSTONE	8.3	1,110	0.04		1.2	35.9	-34.7	29.3	Non-Acid Forming (Barren)
EB1100364043	1405C_20	SANDSTONE	8.3	1,030	0.03		0.9	27.2	-26.3	29.6	Non-Acid Forming (Barren)
EB1100364044	1405C_21	SANDSTONE	8.2	1,400	0.04		1.2	36.5	-35.3	29.8	Non-Acid Forming (Barren)
EB1100364045	1405C_22	SANDSTONE	8.2	1,320	0.04		1.2	59.4	-58.2	48.5	Non-Acid Forming (Barren)
EB1100364046	1405C_25	SANDSTONE	8.4	1,210	0.04		1.2	81.0	-79.8	66.1	Non-Acid Forming (Barren)
EB1100364047	1405C_26	SANDSTONE	8.6	872	0.03		0.9	168.0	-167.1	182.9	Non-Acid Forming (Barren)
EB1100364048	1405C_28	SANDSTONE	8.8	510	0.03		0.9	41.4	-40.5	45.1	Non-Acid Forming (Barren)
EB1100364049	1405C_30	SANDSTONE	8.6	693	0.03		0.9	59.4	-58.5	64.7	Non-Acid Forming (Barren)
EB1100364050	1405C_31	SANDSTONE	8.3	1,030	0.03		0.9	45.8	-44.9	49.9	Non-Acid Forming (Barren)
EB1100364051	1405C_32	SANDSTONE	8.4	1,020	0.05		1.5	41.4	-39.9	27.0	Non-Acid Forming (Barren)
EB1100364052	1405C_33	SANDSTONE	8.3	1,020	0.03		0.9	30.9	-30.0	33.6	Non-Acid Forming (Barren)
EB1100364053	1405C_36	SANDSTONE	8.6	770	0.03		0.9	41.4	-40.5	45.1	Non-Acid Forming (Barren)
EB1100364054	1405C_40	SANDSTONE	8.4	1,010	0.04		1.2	33.4	-32.2	27.3	Non-Acid Forming (Barren)
EB1100364055	1405C_42	SANDSTONE	8.7	557	0.03		0.9	26.6	-25.7	29.0	Non-Acid Forming (Barren)
EB1100364056	1405C_43	SANDSTONE	8.6	601	0.04		1.2	56.9	-55.7	46.4	Non-Acid Forming (Barren)
EB1100364057	1405C_44	SANDSTONE	8.5	790	0.04		1.2	24.7	-23.5	20.2	Non-Acid Forming (Barren)

Table 3-1: Acid-base Results for Overburden Materials - Kevins Corner Project

ALS Laboratory Sample ID	Drill Hole ID	Lithology	pH[1]	EC[1]	Total Sulfur	CRS	MPA[2]	ANC[2]	NAPP[2]	ANC/MPA ratio	Sample Classification[3]
				(µS/cm)	(%)		($kg\ H_2SO_4/t$)				
EB1100364058	1405C_48	SANDSTONE	8.5	723	0.04		1.2	50.7	-49.5	41.4	Non-Acid Forming (Barren)
EB1100364059	1405C_49	SANDSTONE	8.7	74	0.03		0.9	35.2	-34.3	38.3	Non-Acid Forming (Barren)
EB1100364060	1405C_50	SANDSTONE	8.6	778	0.05		1.5	24.1	-22.6	15.7	Non-Acid Forming (Barren)
EB1100364061	1405C_51	SANDSTONE	8.6	772	0.04		1.2	23.5	-22.3	19.2	Non-Acid Forming (Barren)
EB1100364062	1405C_52	SANDSTONE	6.4	634	0.04		1.2	29.1	-27.9	23.8	Non-Acid Forming (Barren)
EB1100364063	1405C_53	SANDSTONE	8.6	522	0.03		0.9	32.8	-31.9	35.7	Non-Acid Forming (Barren)
EB1100364064	1405C_54	SANDSTONE	8.4	741	0.06		1.8	216.0	-214.2	117.6	Non-Acid Forming (Barren)
EB1100364065	1407C_78603	SAND	6.9	823	0.005		0.2	1.5	-1.3	9.8	Non-Acid Forming (Barren)
EB1100364066	1407C_78606	SILTSTONE	6.8	438	0.005		0.2	1.7	-1.5	11.1	Non-Acid Forming (Barren)
EB1100364067	1407C_78610	SILTSTONE	6.7	450	0.005		0.2	1.7	-1.5	11.1	Non-Acid Forming (Barren)
EB1100364068	1407C_78611	SILTSTONE	7.0	233	0.01		0.3	4.2	-3.9	13.7	Non-Acid Forming (Barren)
EB1100364069	1407C_78612	CLAY	6.9	290	0.005		0.2	2.9	-2.7	18.9	Non-Acid Forming (Barren)
EB1100364070	1407C_78614	CLAY	7.1	312	0.005		0.2	4.0	-3.8	26.1	Non-Acid Forming (Barren)
EB1100364071	1407C_78616	CLAY	7.2	272	0.005		0.2	2.9	-2.7	18.9	Non-Acid Forming (Barren)
EB1100364072	1407C_78619	CLAY	7.1	310	0.01		0.3	2.8	-2.5	9.1	Non-Acid Forming (Barren)
EB1100364073	1407C_78621	CLAY	7.4	355	0.005		0.2	3.6	-3.4	23.5	Non-Acid Forming (Barren)
EB1100364074	1407C_78624	SILTSTONE	7.8	100	0.005		0.2	3.3	-3.1	21.6	Non-Acid Forming (Barren)
EB1100364075	1407C_78627	SILTSTONE	6.1	396	0.02		0.6	1.9	-1.3	3.1	Non-Acid Forming (Barren)
EB1100364076	1407C_78628	SILTSTONE	3.9	684	0.15	0.054	1.7	0.3	1.4	0.2	PAF- Low Capacity
EB1100364077	1407C_78630	SANDSTONE	7.7	163	0.005		0.2	2.9	-2.7	18.9	Non-Acid Forming (Barren)
EB1100364078	1407C_78631	SANDSTONE	7.8	81	0.02		0.6	3.6	-3.0	5.9	Non-Acid Forming (Barren)
EB1100364079	1407C_78632	SANDSTONE	7.7	98	0.005		0.2	0.3	-0.1	1.6	Non-Acid Forming (Barren)
EB1100364080	1407C_78633	SANDSTONE	7.5	150	0.02		0.6	1.2	-0.6	2.0	Non-Acid Forming (Barren)
EB1100364081	1408C_78650	SAND	6.4	561	0.02		0.6	3.6	-3.0	5.9	Non-Acid Forming (Barren)
EB1100364082	1408C_78704	SILTSTONE	6.0	418	0.005		0.2	4.9	-4.7	32.0	Non-Acid Forming (Barren)
EB1100364083	1408C_78708	SILTSTONE	5.9	440	0.005		0.2	5.6	-5.4	36.6	Non-Acid Forming (Barren)
EB1100364084	1408C_78712	CLAY	7.0	269	0.005		0.2	1.0	-0.8	6.5	Non-Acid Forming (Barren)
EB1100364085	1408C_78715	CLAY	6.7	620	0.03		0.9	4.0	-3.1	4.4	Non-Acid Forming (Barren)
EB1100364086	1408C_78717	CLAY	7.2	436	0.005		0.2	4.9	-4.7	32.0	Non-Acid Forming (Barren)
EB1100364087	1408C_78720	SILTSTONE	7.6	108	0.005		0.2	0.8	-0.6	5.2	Non-Acid Forming (Barren)
EB1100364088	1408C_78725	SILTSTONE	4.5	729	0.11		3.4	0.3	3.1	0.1	Uncertain
EB1100364089	1408C_78726	SANDSTONE	6.1	176	0.07		2.1	1.0	1.1	0.5	Non-Acid Forming (Barren)
EB1100364090	1408C_78727	SANDSTONE	6.6	221	0.02		0.6	1.4	-0.8	2.3	Non-Acid Forming (Barren)
EB1100364091	1408C_78728	SANDSTONE	6.8	157	0.02		0.6	1.2	-0.6	2.0	Non-Acid Forming (Barren)
EB1100364092	1408C_78730	SANDSTONE	6.7	109	0.005		0.2	1.7	-1.5	11.1	Non-Acid Forming (Barren)
EB1100364093	1409C_5	SANDSTONE	6.0	72	0.005		0.2	1.2	-1.0	7.8	Non-Acid Forming (Barren)
EB1100364098	1409C_17	SANDSTONE	8.4	532	0.02		0.6	13.8	-13.2	22.5	Non-Acid Forming (Barren)
EB1100364099	1409C_19	SANDSTONE	8.2	584	0.02		0.6	40.2	-39.6	65.6	Non-Acid Forming (Barren)
EB1100364100	1409C_22	SANDSTONE	8.1	575	0.02		0.6	38.3	-37.7	62.5	Non-Acid Forming (Barren)
EB1100364101	1409C_23	SANDSTONE	8.4	608	0.03		0.9	42.7	-41.8	46.5	Non-Acid Forming (Barren)
EB1100364102	1409C_24	SANDSTONE	8.2	404	0.02		0.6	26.0	-25.4	42.4	Non-Acid Forming (Barren)
EB1100364103	1409C_25	MUDSTONE	8.8	395	0.02		0.6	50.7	-50.1	82.8	Non-Acid Forming (Barren)
EB1100364104	1409C_26	CARBONACEOUS MUDSTONE	8.1	1,180	0.57	0.641	19.6	24.7	-5.1	1.3	Non-Acid Forming
EB1100364106	1409C_29	SANDSTONE	8.4	594	0.05		1.5	53.8	-52.3	35.1	Non-Acid Forming (Barren)
EB1100364107	1409C_30	SANDSTONE	8.5	679	0.02		0.6	69.9	-69.3	114.1	Non-Acid Forming (Barren)
EB1100364108	1409C_31	SANDSTONE	8.5	639	0.04		1.2	56.9	-55.7	46.4	Non-Acid Forming (Barren)
EB1100364109	1409C_32	SANDSTONE	8.7	663	0.06		1.8	80.4	-78.6	43.8	Non-Acid Forming (Barren)
EB1100364110	1409C_33	SANDSTONE	9.0	350	0.04		1.2	64.9	-63.7	53.0	Non-Acid Forming (Barren)
EB1100364111	1409C_34	SILTSTONE	8.7	522	0.05		1.5	90.7	-89.2	59.2	Non-Acid Forming (Barren)
EB1100364112	1410C_1	SAND	7.2	144	0.005		0.2	2.3	-2.1	15.0	Non-Acid Forming (Barren)
EB1100364113	1410C_2	LATERITE	8.3	172	0.005		0.2	3.6	-3.4	23.5	Non-Acid Forming (Barren)
EB1100364114	1410C_3	SANDSTONE	6.0	216	0.02		0.6	3.2	-2.6	5.2	Non-Acid Forming (Barren)
EB1100364115	1410C_8	SANDSTONE	5.4	961	0.02		0.6	1.4	-0.8	2.3	Non-Acid Forming (Barren)
EB1100364116	1410C_13	SANDSTONE	5.8	988	0.02		0.6	7.4	-6.8	12.1	Non-Acid Forming (Barren)
EB1100364117	1410C_17	SILTSTONE	6.4	769	0.005		0.2	10.4	-10.2	67.9	Non-Acid Forming (Barren)
EB1100364118	1410C_22	MUDSTONE	7.0	56	0.03		0.9	10.9	-10.0	11.9	Non-Acid Forming (Barren)
EB1100364123	1410C_35	SILTSTONE	8.4	556	0.02		0.6	38.3	-37.7	62.5	Non-Acid Forming (Barren)
EB1100364124	1410C_40	SANDSTONE	9.1	252	0.02		0.6	71.1	-70.5	116.1	Non-Acid Forming (Barren)
EB1100364125	1410C_46	SANDSTONE	9.0	369	0.01		0.3	170.0	-169.7	555.1	Non-Acid Forming (Barren)
EB1100364126	1410C_47	SANDSTONE	8.8	378	0.02		0.6	60.0	-59.4	98.0	Non-Acid Forming (Barren)
EB1100364127	1410C_48	SANDSTONE	9.1	342	0.01		0.3	167.0	-166.7	545.3	Non-Acid Forming (Barren)
EB1100364128	1410C_49	SANDSTONE	8.9	307	0.02		0.6	28.2	-27.6	46.0	Non-Acid Forming (Barren)
EB1100364129	1410C_50	SANDSTONE	9.1	522	0.02		0.6	30.7	-30.1	50.1	Non-Acid Forming (Barren)
EB1100364130	1410C_51	SANDSTONE	9.0	357	0.02		0.6	119.0	-118.4	194.3	Non-Acid Forming (Barren)
EB1100364131	1410C_57	SILTSTONE	8.8	415	0.01		0.3	110.0	-109.7	359.2	Non-Acid Forming (Barren)
EB1100364132	1410C_58	SANDSTONE	8.9	369	0.05		1.5	47.2	-45.7	30.8	Non-Acid Forming (Barren)
EB1100364133	1410C_59	SANDSTONE	8.9	357	0.03		0.9	40.5	-39.6	44.1	Non-Acid Forming (Barren)
EB1100364134	1410C_60	SANDSTONE	8.8	545	0.03		0.9	42.9	-42.0	46.7	Non-Acid Forming (Barren)

Table 3-1: Acid-base Results for Overburden Materials - Kevins Corner Project

ALS Laboratory Sample ID	Drill Hole ID	Lithology	pH[1]	EC[1]	Total Sulfur	CRS	MPA[2]	ANC[2]	NAPP[2]	ANC/MPA ratio	Sample Classification[3]
				(µS/cm)	(%)		(kg H_2SO_4/t)				
EB1100364135	1410C_65	SANDSTONE	8.6	553	0.02		0.6	24.5	-23.9	40.0	Non-Acid Forming (Barren)
EB1100364136	1410C_70	SANDSTONE	8.6	573	0.02		0.6	50.3	-49.7	82.1	Non-Acid Forming (Barren)
EB1100364137	1410C_74	SANDSTONE	8.6	631	0.02		0.6	35.6	-35.0	58.1	Non-Acid Forming (Barren)
EB1100364138	1410C_78	SANDSTONE	8.7	590	0.03		0.9	36.2	-35.3	39.4	Non-Acid Forming (Barren)
EB1100364139	1410C_84	SILTSTONE	8.4	542	0.04		1.2	8.3	-7.1	6.8	Non-Acid Forming (Barren)
EB1100364140	1412C_1	CLAY	7.7	1,700	0.02		0.6	6.1	-5.5	10.0	Non-Acid Forming (Barren)
EB1100364141	1412C_8	SANDSTONE	9.0	1,140	0.03		0.9	27.6	-26.7	30.0	Non-Acid Forming (Barren)
EB1100364142	1412C_17	SANDSTONE	8.0	1,690	0.05		1.5	63.8	-62.3	41.7	Non-Acid Forming (Barren)
EB1100364143	1412C_19	SANDSTONE	8.5	1,080	0.03		0.9	28.2	-27.3	30.7	Non-Acid Forming (Barren)
EB1100364144	1412C_20	SANDSTONE	8.4	2,500	0.04		1.2	37.4	-36.2	30.5	Non-Acid Forming (Barren)
EB1100364145	1412C_21	SANDSTONE	8.4	2,350	0.03		0.9	30.7	-29.8	33.4	Non-Acid Forming (Barren)
EB1100364146	1412C_22	SANDSTONE	8.4	2,280	0.04		1.2	52.1	-50.9	42.5	Non-Acid Forming (Barren)
EB1100364147	1412C_23	SANDSTONE	8.2	1,980	0.04		1.2	30.7	-29.5	25.1	Non-Acid Forming (Barren)
EB1100364148	1412C_27	SANDSTONE	8.5	2,040	0.03		0.9	29.4	-28.5	32.0	Non-Acid Forming (Barren)
EB1100364149	1412C_28	SANDSTONE	9.1	1,920	0.03		0.9	41.7	-40.8	45.4	Non-Acid Forming (Barren)
EB1100364150	1412C_51	SANDSTONE	8.1	360	0.04		1.2	3.9	-2.7	3.2	Non-Acid Forming (Barren)
EB1100364151	1412C_52	SANDSTONE	8.2	479	0.18	0.148	4.5	4.8	-0.3	1.1	Uncertain
EB1100364152	1412C_53	SANDSTONE	7.6	325	0.03		0.9	2.7	-1.8	2.9	Non-Acid Forming (Barren)
EB1100364153	1412C_56	SANDSTONE	7.7	295	0.05		1.5	3.7	-2.2	2.4	Non-Acid Forming (Barren)
EB1100364154	1414X_3	SANDSTONE	6.1	1,810	0.005		0.2	4.1	-3.9	26.8	Non-Acid Forming (Barren)
EB1100364155	1414X_8	SANDSTONE	8.5	2,420	0.01		0.3	13.1	-12.8	42.8	Non-Acid Forming (Barren)
EB1100364156	1414X_14	SANDSTONE	7.9	2,700	0.005		0.2	3.9	-3.7	25.5	Non-Acid Forming (Barren)
EB1100364157	1414X_25	SANDSTONE	8.3	2,120	0.005		0.2	3.6	-3.4	23.5	Non-Acid Forming (Barren)
EB1100364158	1429R_24	CLAYSTONE	7.5	2,520	0.02		0.6	7.8	-7.2	12.7	Non-Acid Forming (Barren)
EB1100364159	1429R_26	SILTSTONE	6.6	1,670	0.02		0.6	6.5	-5.9	10.6	Non-Acid Forming (Barren)
EB1100364160	1429R_31	MUDSTONE	9.3	2,060	0.02		0.6	40.5	-39.9	66.1	Non-Acid Forming (Barren)
EB1100364161	1429R_33	SANDSTONE	9.3	2,180	0.03		0.9	55.2	-54.3	60.1	Non-Acid Forming (Barren)
EB1100364162	1429R_38	SANDSTONE	9.3	1,620	0.04		1.2	52.7	-51.5	43.0	Non-Acid Forming (Barren)
EB1100364164	1429R_42	CLAY	8.2	2,040	0.18		5.5	0.3	5.3	0.05	PAF- Low Capacity
EB1100364165	1429R_43	CARBONACEOUS SHALE	8.4	2,120	0.31	0.138	4.2	40.9	-36.7	9.7	Non-Acid Forming
EB1100364166	1429R_44	CARBONACEOUS SHALE	8.3	2,150	0.19	0.158	4.8	19.0	-14.2	3.9	Non-Acid Forming
EB1100364168	1429R_74	SILTSTONE	9.2	420	0.02		0.6	36.0	-35.4	58.8	Non-Acid Forming (Barren)
EB1100364169	1429R_80	SILTSTONE	9.3	901	0.02		0.6	40.3	-39.7	65.8	Non-Acid Forming (Barren)
EB1100364170	1429R_83	SILTSTONE	9.3	1,040	0.02		0.6	43.9	-43.3	71.7	Non-Acid Forming (Barren)
EB1100364171	1429R_84	SILTSTONE	9.3	846	0.02		0.6	56.1	-55.5	91.6	Non-Acid Forming (Barren)
EB1100364172	1429R_85	SILTSTONE	9.1	1,220	0.02		0.6	47.0	-46.4	76.7	Non-Acid Forming (Barren)
EB1100364173	1429R_88	SILTSTONE	8.9	1,330	0.02		0.6	40.3	-39.7	65.8	Non-Acid Forming (Barren)
EB1100364174	1429R_92	SILTSTONE	9.2	1,090	0.02		0.6	164.0	-163.4	267.8	Non-Acid Forming (Barren)
EB1100364175	1429R_95	SANDSTONE	8.6	1,040	0.05		1.5	34.8	-33.3	22.7	Non-Acid Forming (Barren)
EB1100364176	1429R_98	SANDSTONE	9.0	1,080	0.03		0.9	45.2	-44.3	49.2	Non-Acid Forming (Barren)
EB1100364178	1429R_119	SILTSTONE	6.5	1,150	0.5	0.407	12.5	9.8	2.7	0.8	Uncertain
EB1100364179	1429R_120	SILTSTONE	7.4	782	0.45	0.441	13.5	5.0	8.5	0.4	PAF- Low Capacity
EB1100364180	1429R_121	SILTSTONE	7.4	941	0.18	0.118	3.6	9.2	-5.6	2.5	Non-Acid Forming
EB1100364181	1429R_122	SILTSTONE	8.1	872	0.09		2.8	3.1	-0.3	1.1	Non-Acid Forming (Barren)
EB1100364182	1429R_129	SANDSTONE	8.4	359	0.02		0.6	5.5	-4.9	9.0	Non-Acid Forming (Barren)
EB1100364183	1429R_130	SANDSTONE	7.7	545	0.16	0.044	1.3	6.9	-5.6	5.1	Non-Acid Forming (Barren)
EB1100364185	1429R_132	MUDSTONE	8.0	474	0.06		1.8	12.6	-10.8	6.9	Non-Acid Forming (Barren)
EB1100364186	1429R_133	MUDSTONE	7.8	626	0.05		1.5	11.2	-9.7	7.3	Non-Acid Forming (Barren)
EB1100364192	1447L_34	SAND	7.0	32	0.005		0.2	1.0	-0.8	6.5	Non-Acid Forming (Barren)
EB1100364193	1447L_37	CLAY	6.2	1,060	0.005		0.2	4.5	-4.3	29.4	Non-Acid Forming (Barren)
EB1100364194	1447L_39	CLAY	6.5	1,240	0.005		0.2	4.8	-4.6	31.3	Non-Acid Forming (Barren)
EB1100364195	1447L_41	CLAY	6.6	1,370	0.005		0.2	5.6	-5.4	36.6	Non-Acid Forming (Barren)
EB1100364196	1447L_43	CLAY	6.8	1,120	0.005		0.2	4.4	-4.2	28.7	Non-Acid Forming (Barren)
EB1100364197	1447L_46	SILCRETE	6.8	518	0.03		0.9	3.4	-2.5	3.7	Non-Acid Forming (Barren)
EB1100364198	1447L_47	SILCRETE	6.4	979	0.04		1.2	3.5	-2.3	2.9	Non-Acid Forming (Barren)
EB1100364199	1447L_50	SILCRETE	6.5	999	0.01		0.3	8.6	-8.3	28.1	Non-Acid Forming (Barren)
EB1100364200	1447L_52	SILCRETE	6.4	860	0.01		0.3	3.9	-3.6	12.7	Non-Acid Forming (Barren)
EB1100364201	1447L_54	SANDSTONE	6.4	743	0.01		0.3	1.9	-1.6	6.2	Non-Acid Forming (Barren)
EB1100364202	1447L_60	CLAY	6.5	2,000	0.03		0.9	5.2	-4.3	5.7	Non-Acid Forming (Barren)
EB1100364203	1447L_63	CLAY	8.3	1,350	0.06		1.8	11.9	-10.1	6.5	Non-Acid Forming (Barren)
EB1100364204	1447L_66	CLAY	8.1	1,030	0.03		0.9	9.2	-8.3	10.0	Non-Acid Forming (Barren)
EB1100364205	1447L_70	CLAY	8.1	1,260	0.07		2.1	6.4	-4.3	3.0	Non-Acid Forming (Barren)
EB1100364206	1447L_77	CLAY	7.9	736	0.05		1.5	11.4	-9.9	7.4	Non-Acid Forming (Barren)

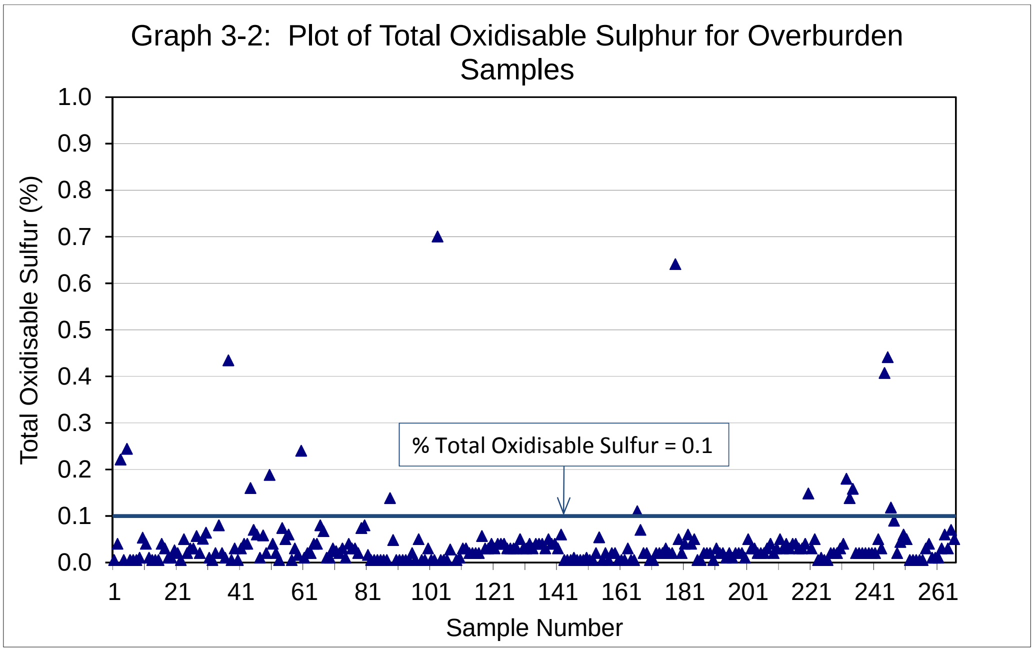
Notes

1. Current pH and EC provided for 1:5 sample:water extracts
2. S_{CR} = Chromium Reducible Sulfur; MPA = Maximum potential acidity; ANC = Acid neutralising capacity; and NAPP = Net acid producing potential.
3. Sample classification detail provided in report text.

Table 3-2: Salinity Criteria for Mine Waste Assessment (DME, 1995)

Test	Very Low	Low	Medium	High	Very High
EC (1:5 sample:water) (µS/cm)	<150	150 - 450	450 - 900	900 – 2,000	>2,000

Total Oxidisable Sulphur: Most of the overburden samples have very low total oxidisable sulphur (TOS) content and are essentially barren of sulphur as illustrated at **Graph 3-2.** Only six samples have total oxidisable sulphur content greater than 0.25%[3]. These results demonstrate that the capacity (maximum potential acidity (MPA)) of the bulk overburden material to generate acid is very low.

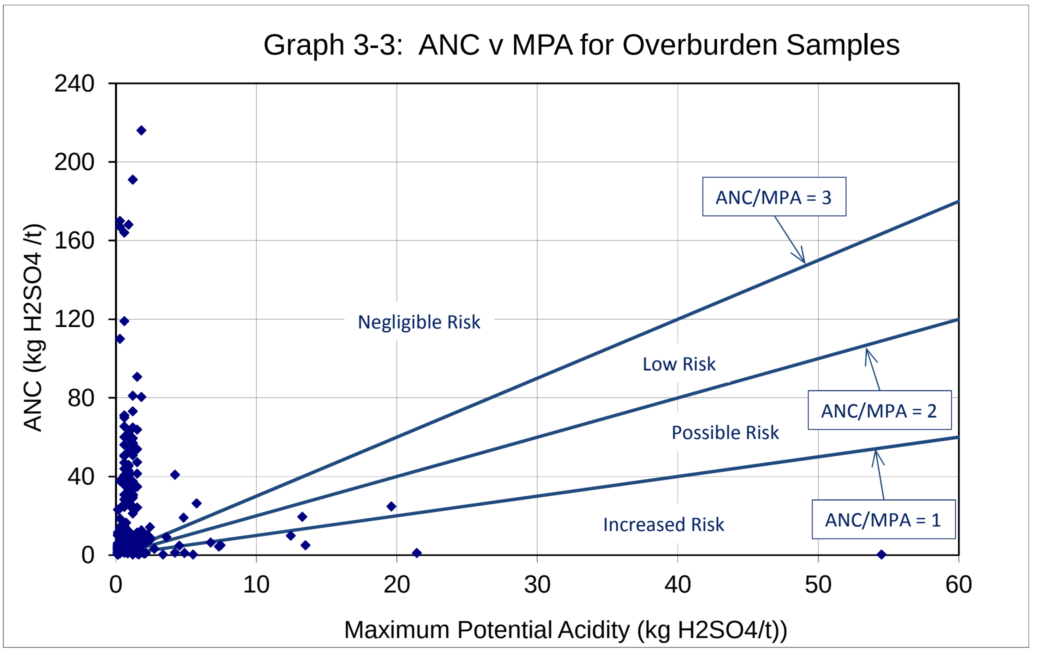


ANC: The ANC value of the overburden samples is highly variable and ranges from low to high. Both the MPA and ANC values of the overburden materials are presented at **Graph 3-3**. The six samples with elevated TOS content (*ie.* greater than 0.25 %) are readily identifiable on the plot. Overall, the results in the graph show that most of the samples have an ANC value in excess of the MPA value.

The ANC/MPA ratio of the 266 overburden samples was calculated to provide an indication of the relative margin of safety within a material with regard to acid generation potential. An ANC/MPA value of 2 or greater is, according to the International guidelines (INAP, 2009), an indication a low potential for acid generation. As a general rule, an ANC/MPA ratio of 2 or more signifies that there is a high factor of safety and a high probability that the material will remain circum-neutral in pH and thereby should not be problematic with respect to acid generation. The data illustrate that whilst the samples span a large range of ANC/MPA values from 0.005 to 555.1 and have a broad statistical distribution, the results clearly show that the bulk overburden materials will have ANC/MPA values between 4.5 (25th percentile) and 39 (75th percentile).

These results illustrate that the bulk overburden material at the Project is likely to have a high factor of safety and a low probability of acid generation.

3 One of the six samples is not shown on the plot as it has oxidisable sulphur content of 1.75%, which is above the presented range.



In this Interim Report, the acid generating nature of the 266 overburden samples has been determined by RGS using geochemical classification criteria summarised in **Table 3-3** and generally reflects Australian guideline criteria (AMIRA, 2002; DITR, 2007) and other Australian coal mining industry research criteria (ACARP, 2008).

Table 3-3: Geochemical Classification Criteria for Overburden Samples

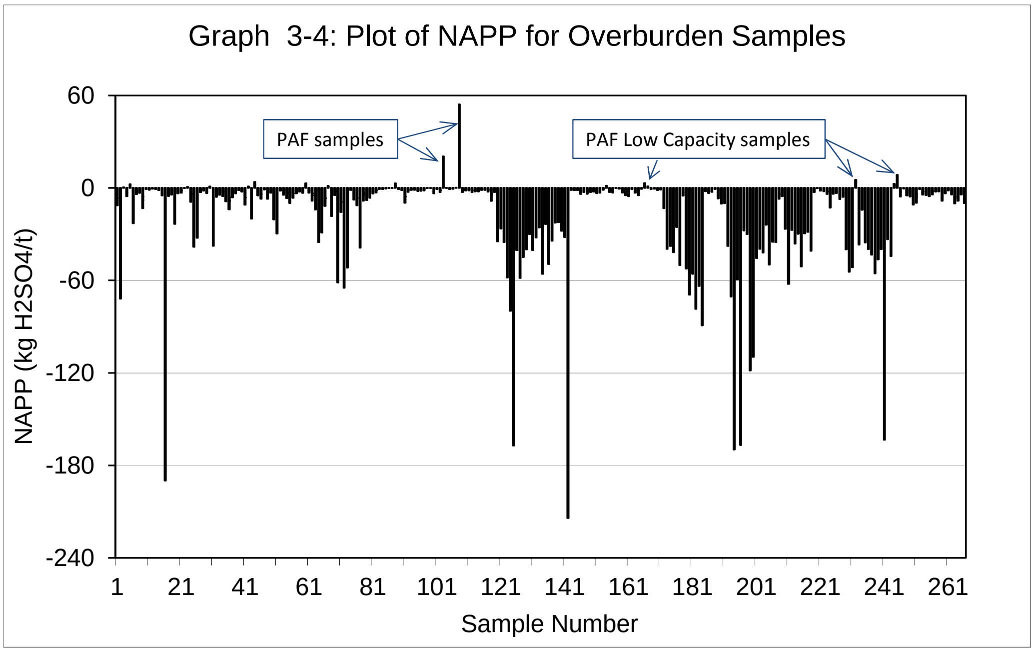
Geochemical Classification	Oxidisable Sulfur (%)	ANC:MPA Ratio	NAPP (kg H_2SO_4/t)	Number of samples	% of total samples
NAF - Barren	≤ 0.1	≥ 2	≤ 0	246	92.5
NAF	> 0.1	≥ 2	≤ 0	7	2.6
Uncertain	> 0.1	< 2	-5 to ≤ +5	8	3.0
PAF–Low Capacity	> 0.1	< 2	+5 to ≤ +10	3	1.1
PAF	> 0.1	< 2	> +10	2	0.8

Notes: PAF = Potentially Acid Forming; NAF = Non-Acid Forming. If current pH is less than 4.0, the sample is classified as PAF-Low Capacity or PAF depending on magnitude of NAPP Value.

Applying the classification criteria in **Table 3-3** to the geochemical data in **Table 3-1**, indicates that over 95% of the overburden samples fall in the NAF-Barren or NAF categories. Five of the 266 samples (1.9%) are classified as PAF-Low Capacity or PAF depending on their capacity to generate acid (NAPP value). The remaining eight samples (3%) are classified as "Uncertain" on the basis that they have relatively low NAPP values and generally low ANC:MPA ratios (less than two). The uncertainty surrounding the acid generating nature of a selection of these "Uncertain" samples will be evaluated by kinetic leaching tests on selected overburden samples.

NAPP: The low TOS value of most of the overburden samples and excess ANC, means that the Net Acid Producing Potential (NAPP) of the bulk overburden material is typically negative as shown at **Graph 3-4**. The two PAF samples and three PAF-LC samples are shown on the figure and provide a striking contrast with the negative NAPP values of the bulk overburden materials.

For the two samples identified as PAF, one is for clay material that is located directly above a coaly shale unit. The other PAF sample is for a sandstone material located at the roof of an undifferentiated coal unit. Clearly the bulk overburden material can be regarded as NAF with a small amount of PAF material located close to some of the coal units. Proposed management practices for overburden materials are described at Volume 2, Section 16-19 of the EIS and in the EMP.



Elemental Composition and Water Quality.

Elemental Composition. The results are also summarised and reported in the EIS document at Volume 2 Section 16 and Volume 5 Appendix Q1, respectively

At Volume 5 Appendix Q1 of the EIS (SRK, 2011), results for elemental (total metals) analyses of selected overburden samples are presented. The objective of these analyses was to determine the abundance of elements in the samples and whether any elements are significantly enriched compared to average crustal abundance.

The geochemical results obtained indicate that most elements are not significantly enriched in the sample materials, although Ag, As, Sb and Se are enriched in a very small number of samples compared to average crustal abundance, whereas enrichment of Re and Te is more widespread.

Selected (29) samples were also leached with distilled water (solid:water ratio 1:3) and quantitative elemental analysis was conducted on the leachate to identify readily soluble elements that may be leached from the test material. All of these enriched elements, apart from Se (ie. Ag, As, Re, Sb and Te), were found to be sparingly soluble in leach tests. Se was slightly above applied stock drinking water guideline concentrations (ANZECC, 2000) in 3 of the 29 samples tested.

Water Quality: Most of the samples tested had water quality values within the applied stock drinking water guideline criteria. The main exceptions were for a few of the (mainly lower pH) samples where Al (1 sample), Ni (2 samples), Se (3 samples) and SO_4 (1 sample) were greater than the applied water quality guideline criteria (ANZECC, 2000). It should be noted that these analysis were completed on pulverised samples with a large surface area in contact with the leaching solution and represent a worst case scenario. Hence, in the field, metals in leachate from bulk coal and mining waste is unlikely to present any significant issues for surface runoff and seepage quality at the site. However, the solubility of some environmentally important metals is linked to pH and should PAF materials such as coarse rejects be exposed to ongoing oxidising conditions and generate acidic leachate, dissolved metal and sulphate salt concentrations in surface runoff and seepage may increase significantly over time.

3.2 Development of a Geochemical Sampling and Testing Program for HGPL Infill Drilling and Future Drilling Programs

Project Geology

The Kevin's Corner Coal Deposit occurs within the Galilee Basin, a sequence of Late Permian to Early Triassic sedimentary rocks, characterised by undeformed sediments 1 - 2° westward. These are structurally simple and have an absence of intrusions and significant faults. The site geology consists of gently westerly dipping sediments of Permian age, overlain by Tertiary and Quaternary sediments. The Tertiary strata and some of the Permian deposit contain mudstone, claystone and sandstone, which have a clayey matrix. Sections of the sequence are prone to slaking and thus often rapidly degrade on exposure to weathering conditions. Below these sections, the rock grades into more sandy and generally more competent rock types towards the top of the C Seam. The geology of the deposit reflects consistent, correlatable lithologies and is well understood having been characterised through extensive drilling, geological interpretation and then geological modelling as part of the Pre-Feasibility Study.

The genesis of the deposit follows a typical coal and sedimentary rock profile. Both historical and recent borehole data shows that the thickness of Tertiary and Quaternary sediments varies from 5m to 60m (average 40m) across the Project site. In addition to the Tertiary and Quaternary sediments, a variable thickness of weathered Permian material is also commonly present. There are six coal seams in the project (mine) area designated as A, B, C, D, E, and F.

A schematic geological cross-section is presented at **Figure 1** (end of text) indicating the overburden materials and coal seams within the Project area. The site lithology/stratigraphy, including the site-specific coal seam information, is presented at **Figure 2**.

Geological Model

The Project geological model developed for the PFS has been independently audited, is compliant with the JORC Code (JORC, 2004) and provides a very good understanding of the Project geology/stratigraphy, which is similar to that of the adjacent Alpha Coal Project. The geological models for both projects describe a predictable coal and sedimentary rock genesis with little significant faulting. A detailed description of the Project site geology is presented in Volume 2, Section 4 of the Project EIS.

The mineralogy of 2,972 samples from 32 bores on site was also undertaken by HGPL using visible, near infrared, short wavelength infrared (vis-NIR-SWIR) reflectance measurements using the HyChips system. The minerals observed included kaolinite, montmorillonite (Al smectite), nontronite (Fe smectite), and white mica, in a similar uniform stratigraphic profile as observed for the adjacent Alpha Coal Project as illustrated at **Figure 3**.

Geochemical Sampling and Testing Program

The geochemical sampling and testing program for the Project EIS involved collecting a total of 300 drill core samples from 29 drill holes across the Project area for characterisation and assessment and represents coal, overburden, coal seam roof and floor materials, coarse reject and fine tailings materials. The program was developed based on

A representation of the lateral coverage of drill holes across the Project site for the 2010/11 EIS drilling, sampling and geochemical and lithological testing program is provided at **Figure 4**. The sampling program complements the existing geochemical and lithological database available from the geological model at the adjacent Alpha Coal Project as well as that of the Kevin's Corner Project. The number of samples and the drill hole intensity across the Project site compares favourably with the sampling strategies used for recent EIS programs for approved coal mining operations in Queensland.

The proposed geochemical sampling and testing program associated with infill drilling and future drilling programs being implemented by HGPL at the Project was developed to align with relevant Guidelines associated with proposed coal mining operations in Queensland, which include the Assessment and Management of Acid Drainage (DME, 1995), the Australian Leading Practice handbook (DITR, 2007) and Global Acid Rock Drainage (GARD) Guide (INAP, 2009). Essentially, HGPL plans to complete additional sampling and geochemical testing programs for representative samples of coal and mining waste materials as the Project progresses. The intention is to use geochemical data from infill drilling programs and bulk samples (where available) to update the geostatistical model[4] and verify the adopted material management strategies. HGPL has developed an additional infill drilling program focussed on sampling coal and mining waste materials from the area likely to be mined in the first five years of operation as well as the life of mine as shown at **Figure 5** and **Figure 6**. Specific drill hole locations have been earmarked for geochemical sampling and testing at drill hole intervals of approximately 1km.

Planning for these drill-holes is underway with Salva Resources having been commissioned to undertake the drilling program commencing in mid-2011 when sufficient capacity at the site camp becomes available (following completion of the Alpha Bulk Sample Test Pit program) to accommodate additional drilling crews. Recent communications between RGS and the Salva Resources site geologist indicate that approximately 25 drill-core samples per drill-hole will be sufficient to enhance the current geochemical knowledge of the rock types encountered through the stratigraphic profile. This will also present an opportunity to generate a wider variety of other mine materials such as coal, coarse reject and tailings through sample material processing at the coal quality laboratory.

For the planned 30 year life of mine, HGPL has committed to drilling a further 30 drill-holes over the proposed mine pit areas as shown at **Figure 6**. Geochemical testing of approximately 25 samples per drill-hole will be completed in advance of mining and results used for mine planning purposes. Hence, including the sampling completed at the EIS stage and that to which HCPL has committed to over the life of mine, a total of over 1,000 samples from approximately 60 drill-holes will be geochemically tested over the 30 year life of mine. The total number of samples provided here does not include additional sampling of coarse and fine reject materials, and additional overburden validation sampling for materials which report to on-site mining waste storage areas.

3.3 Development of Cross-Sections to Illustrate the Geochemical Nature of Overburden Materials

The results of the geochemical test program for overburden materials at the Project are provided in Volume 1, Section 16 and Volume 5 Appendix Q of the EIS. Of the 266 overburden samples tested, geochemical classification criteria provided at **Table 3-3** have been used to classify the bulk overburden material as NAF.

HGPL, with the assistance of RGS and Salva Resources, has developed a series of cross-sectional illustrations of the proposed Central open-pit area at the Project. A plan view of the cross-section locations (layout) is provided at **Figure 7**, with a north-south cross section shown at **Figure 8** and **Figure 9** and a series of four west-east cross-sections shown at **Figures 10 to 13**. The data used to generate the cross-sections was obtained from the geological model developed for the Project and geochemical data from the relevant drill-core samples that underwent geochemical testing for the EIS.

The information presented in the cross-sections clearly demonstrates that the bulk overburden materials are NAF and that PAF materials are limited to parts of the coal seams (probably including some roof, floor and parting rocks) or in close proximity to uneconomic coal units. This is typical of structurally simple coal deposits in Queensland, which have an absence of intrusions and an absence of significant faults. Weathered Tertiary sedimentary rock types vary in depth from 5m to 60m across the site (average 40m). These sediments are essentially barren of significant sulfur minerals and are classified as NAF. Whilst Permian rock types are present at depth at the proposed open-pit area, most of these materials are also classified as NAF.

These overburden geochemical characteristics make the management of these materials relatively simple in that the bulk of the overburden is overwhelmingly NAF and from an ABA (and neutral drainage metals) perspective will not need to be selectively handled. However, some of the Tertiary clay and Permian siltstone materials are likely to be (initially) saline and some clays are likely to be highly dispersive and should not report to the top cover and final batters of out-of-pit and in-pit overburden emplacement facilities. In the nearest comparable coal fields of the Bowen Basin, saline and/or sodic materials properties are addressed through appropriate material management and rehabilitation strategies (BMA, 2008).

[4] The geostatistical model developed by SRK for the Project was used to recommend to HGPL that additional drilling and geochemical sampling should take place in the western part of the proposed Central Open Pit mine area.

If PAF course reject materials are encapsulated in overburden storage areas, the Tertiary clay material could provide a useful interim reduced permeability cover material to seal PAF material within 4 weeks and limit sulfide oxidation, until a final cover of more competent NAF overburden and topsoil is placed over these material within 3 months.

It should be noted that some roof and floor and parting materials located directly adjacent to or within the economic and uneconomic coal seams below the base of weathering may be PAF and these PAF materials should be identified and handled in a similar manner to PAF coarse reject materials at the project (*ie*. selective handling, compaction, lime amendment and encapsulation within a thick layer of NAF overburden). Visual identification of these materials through open-pit mining geological control coupled with pre-mining and ongoing geochemical sampling and testing of coal seam and near coal seam materials should be used to delineate the extent of any PAF overburden materials and ensure that these are selectively handled and managed in an appropriate manner, similar to PAF coarse coal reject materials generated at the Project.

4.0 RESULTS AND DISCUSSION

4.1 Static Geochemical Characterisation

Acid Base Account:

The acid-base account (ABA) results of the six coal, coarse reject and tailings samples from the Project are provided at **Table 4-1.**

Table 4-1: Acid-base account results for coal, coarse reject and tailings samples

	Product Coal (1302L/1303L)	Raw Coal (1492L)	Coarse Rejects (1302L/1303L)	Coarse Rejects (1492L)	Tailings (1302L/1303L)	Tailings (1492L)
ALS Laboratory Sample ID	EB1023365 -003	EB1103269 -003	EB1023365 -002	EB1103269 -002	EB1023365 -001	EB1103269 -001
Date	17/10/2010	22/2/2011	17/10/2010	22/2/2011	17/10/2010	22/2/2011
pH[1]	4.8	6.6	4.1	4.2	6.4	6.2
EC[1] (µS/cm)	585	262	1,950	1,230	356	256
Total Sulfur (%)	0.27	0.67	2.20	1.62	0.59	1.03
S_{CR}[2] (%)	0.062	0.123	2.020	0.841	0.257	0.280
MPA[2] (kg H_2SO_4/t)	1.9	3.8	61.9	25.8	7.9	8.6
ANC[2] (kg H_2SO_4/t)	3.3	5.1	0.5	1.3	6.2	4.9
NAPP[2] (kg H_2SO_4/t)	-1.4	-1.3	61.4	24.5	1.7	3.7
ANC/MPA ratio	1.7	1.4	0.01	0.05	0.8	0.6
Sample Classification[3]	Uncertain	Uncertain	Potentially Acid Forming	Potentially Acid Forming	Uncertain	Uncertain

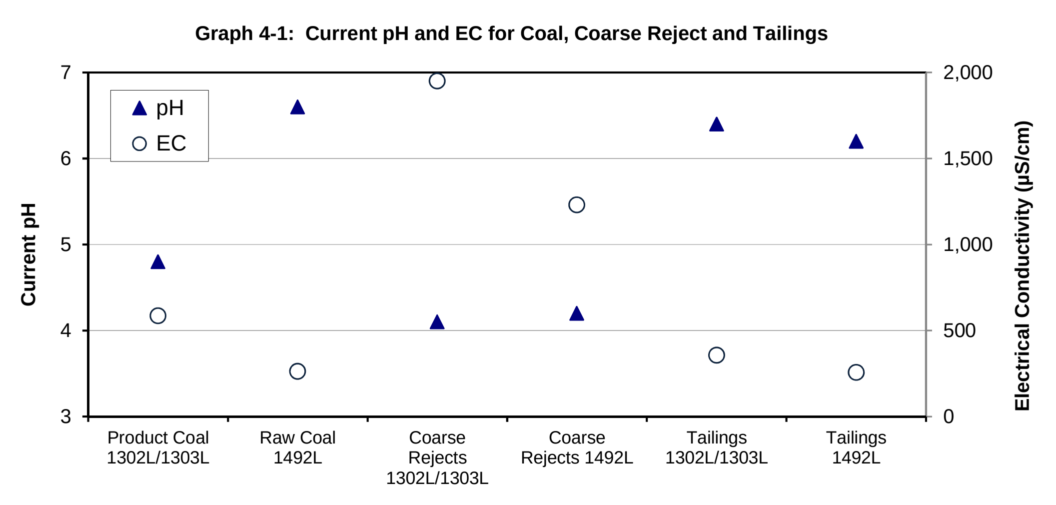
Notes
1. Current pH and EC provided for 1:5 sample:water extracts.
2. S_{CR} = Chromium Reducible Sulfur; MPA = Maximum potential acidity; ANC = Acid neutralising capacity; and NAPP = Net acid producing potential.
3. Sample classification detail provided in Table 4-3 and report text.

The ABA results at **Table 4-1** indicate that:

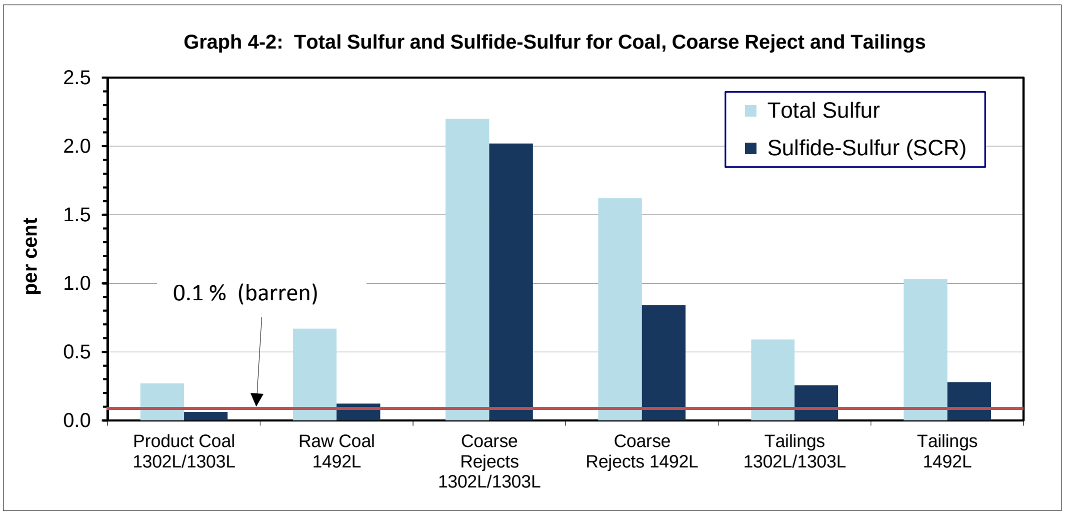
- The Raw Coal and Tailings samples have current $pH_{1:5}$ values of between 6.2 and 6.6, whereas the Product Coal and Coarse Reject samples have acidic pH values of 4.1 to 4.8. The Coarse Reject samples have already produced some acidity, with current $pH_{1:5}$ values of 4.1 and 4.2.
- The current $EC_{1:5}$ of the Coal and Tailings samples ranges from 262 to 585 µS/cm, which is regarded as being 'Low' to 'Medium' salinity criteria as defined in Queensland DME technical guideline (DME, 1995), previously provided at **Table 3-2**. Comparatively, the Coarse Reject samples have greater salinity values of 1,230 and 1,950 µS/cm, which is regarded as being 'High' salinity (**Table 3-2**).

The pH and EC results for the samples illustrated in **Graph 4-1** suggest that initial runoff/seepage from:

- Tailings materials and Raw Coal is likely to be pH-neutral and have a 'Low' salinity value;
- Coarse rejects are likely to be acidic and have a 'High' salinity value; and
- Product Coal is likely to be acidic and have a 'Medium' salinity value.

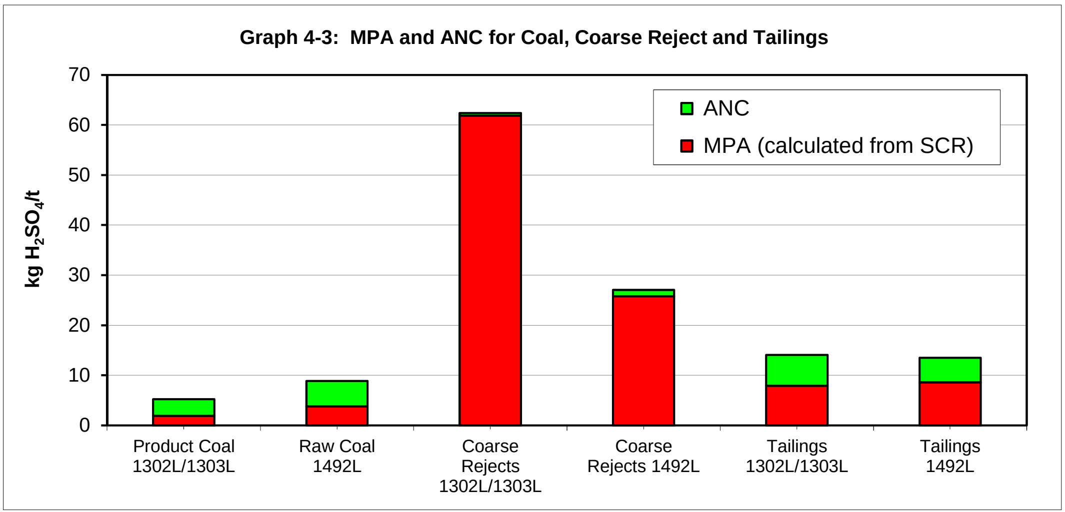


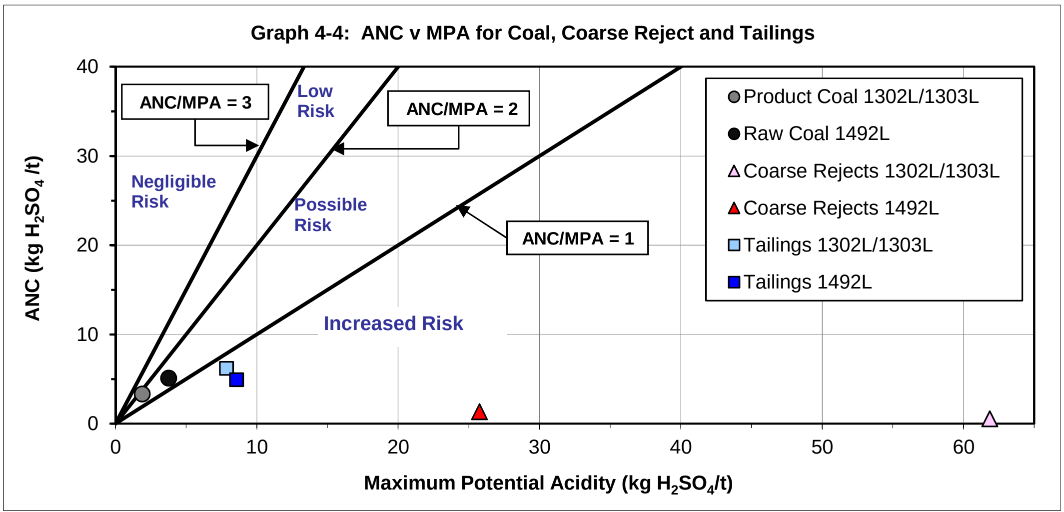
- **Sulfur**: The total sulfur content of the samples ranges from low to high (0.27 to 2.20% S) and has a median total sulfur value of 0.85%. However, as illustrated in **Graph 4-2**, in all samples some of the sulfur is present in non-pyritic forms such as organic- and sulfate-sulfur, which do not contribute to the acid forming potential of these materials. In particular, samples with an oxidisable sulfur value of less than 0.1% are typically regarded as 'barren', with negligible potential to generate significant additional acidity. The coal and tailings samples have relatively low S_{CR} (oxidisable sulfur) values compared to the coarse reject samples (although the current pH of this Product Coal sample is mildly acidic (pH 4.8)). The likelihood of these coal and coarse reject samples generating significant additional acidity is much lower than the coarse reject samples, which have a high risk of generating significant additional acidity, if exposed to ongoing oxidising (weathering) conditions.



- **MPA**: The Maximum Potential Acidity (MPA) that could be theoretically generated by the samples ranges from 1.9 to 61.9 kg H_2SO_4/t. The coal and tailings sample MPAs range from 1.9 to 8.6 kg H_2SO_4/t, whereas the coarse reject samples have comparatively high MPA values of 25.8 kg H_2SO_4/t 61.9 kg H_2SO_4/t for the for the 1492L and 1302L/1303L samples, respectively.
- **ANC**: The ANC values for all samples are relatively low, and range from 0.5 to 6.2 kg H_2SO_4/t, but are higher in the coal and tailings samples compared to the coarse reject samples.
- **NAPP**: Due to the wide range of MPA values, the calculated net acid producing potential (NAPP) ranges from -1.4 to +61.4 kg H_2SO_4/t. Again, the NAPP values were much lower in the coal and tailings samples than the coarse reject samples.

Graph 4-3 and **Graph 4-4** are plots of MPA and ANC, and ANC versus MPA, respectively, for the six coal coarse reject and tailings samples. The ANC:MPA ratio ranges from 0.01 to 1.7, with a median ANC:MPA ratio of 0.7. ANC:MPA ratio lines have been plotted on **Graph 4-4** to illustrate the factor of safety associated with the samples. Generally those samples with an ANC:MPA ratio of greater than or equal to two are considered to have a low to negligible risk of acid generation and a high factor of safety in terms of potential for AMD (acid and metalliferous drainage)[5] (DITR, 2007; INAP, 2009). However, if the sample has a low oxidisable sulphur content and therefore a low capacity to generate additional acidity, it may not generate acid, is lower risk and is more amenable to management methods such as capture and alkaline amendment of any contact waters.





Whilst none of the samples tested have an ANC:MPA ratio of greater than 2, the coarse reject samples clearly have a higher risk of generating significant additional acidity than the coal and tailings samples. The greater proportion of MPA compared to ANC is clearly evident in the Coarse Reject samples (**Graph 4-3**), compared to most other samples where the proportion of ANC is about the same as the MPA, and comparatively low. The geochemical results presented in this section (**Table 4-1**) were used to geochemically classify the samples. The geochemical criteria used by RGS to classify these samples are provided at **Table 4-3** and generally reflect Australian guideline criteria (AMIRA, 2002; DITR, 2007) and other Australian coal mining industry research criteria (ACARP, 2008).

[5] The International Network on Acid Prevention (INAP, 2009) considers that mine materials with an ANC/MPA ratio greater than two are likely to be NAF unless significant preferential exposure of sulfides along fracture planes occurs in combination with insufficiently reactive ANC.

Table 4-3: Geochemical classification criteria for coal, coarse reject and tailings samples

Geochemical Classification	Oxidisable Sulfur (%)	ANC:MPA Ratio	NAPP (kg H_2SO_4/t)	Samples
NAF - Barren	≤ 0.1	≥ 2	≤ 0	none
NAF	> 0.1	≥ 2	≤ 0	none
Uncertain	> 0.1	< 2	-5 to ≤ +5	Coal and Tailings
PAF–Low Capacity	> 0.1	< 2	+5 to ≤ +10	none
PAF	> 0.1	< 2	> +10	Coarse Reject

Notes: PAF = Potentially Acid Forming; NAF = Non-Acid Forming.

If current pH is less than 4.5, the sample is classified as Uncertain, PAF-Low Capacity or PAF depending on magnitude of NAPP Value.

Applying the classification criteria in **Table 4-3** to the data in **Table 4-1**, the results in **Table 4-1** indicates that the Coarse Reject samples are classified as PAF and the coal and tailings samples are uncertain. Whilst the Coarse Reject samples are PAF and already have a reduced pH value, they do not appear to immediately generate significant additional acidity as some time elapsed (a few months) between the sample being taken from large diameter drill core in the field, through initial sample preparation at the coal quality laboratory, to final static geochemical testing at ALS Brisbane laboratory. It should also be noted that the pH of the distilled water typically used in geochemical tests is already approximately pH 5.

The uncertainty surrounding the acid generating nature of the coal and tailings samples is currently being evaluated by the KLC tests currently underway (refer to **Section 4.2**). Kinetic leaching tests are also being undertaken on the coarse reject samples.

Estimates of runoff/seepage water quality from some of these materials, based on the static test data alone, is difficult to predict. For example, the Product Coal sample already has a mildly acidic current pH value of 4.8), but is not expected to generate significant additional quantities of acid due to its very low oxidisable sulfur content (0.06%). This sample also has a 'Low' salinity classification under Queensland guidelines (DME, 1995). Similarly, the tailings samples are currently pH-neutral, have a relatively low oxidisable sulphur content and low acid generating capacity, and are by no means certain to generate significant additional acidity and salinity over time. Comparatively, the coarse rejects may generate acidic leachate within a relatively short period of time (possibly weeks to a few months) but are unlikely to generate significant additional acidity for a period of weeks to a few months. These materials are likely to be a source of saline leachate, and salinity values could increase with prolonged exposure to oxidising (weathering) conditions.

Assessment of Element Enrichment:

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 surface water quality and revegetation. The assay result (total concentration) for each element is compared to potentially relevant guideline criteria to determine any concerns related to mine operation and final rehabilitation. Elements identified as enriched may not necessarily be a concern for revegetation, drainage water quality, or human/animal 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 and Zn increases significantly.

There are no guidelines and/or regulatory criteria specifically related to total metal concentrations in mine waste materials, such as coal and coal rejects. In the absence of these, and to provide relevant context for this assessment, the total concentration of each element reported in all mineral waste samples (solids) is compared to NEPC (1999a) health-based investigation levels (HIL) category 'E' for parks and recreation (open spaces). 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 metals concentration for individual elements in mineral waste materials can be relevant for revegetation activities and/or where the potential exists for human contact (*eg*. if the material was to be used off-site).

Each sample underwent analysis at ALS for total metals and metalloids, with the results provided in **Table 4-4**. The results show that the concentrations of total elements in all samples is below the applied NEPC (1999a) health-based investigation level (HIL) category 'E' for parks and recreation (open spaces).

Table 4-4: Multi-element (total) results for coal, coarse reject and tailings samples

Parameters	Laboratory Limit of Reporting	NEPC[1] Health-Based Investigation Level	Coal		Coarse Reject		Tailings	
			Product Coal 1302/1303L	Raw Coal 1492L	1302L/1303L	1492L	1302L/1303L	1492L
	All element concentrations in mg/kg							
Aluminium (Al)	100	-	18,800	42,600	135,000	99,100	25,600	20,900
Antimony (Sb)	0.05	-	0.83	0.60	0.51	0.39	0.53	0.74
Arsenic (As)	0.2	200	1.3	2.3	64.6	28.9	1.9	3.9
Cadmium (Cd)	0.02	40	0.08	0.24	0.23	0.24	0.10	0.30
Calcium (Ca)	100	-	1,200	1,000	1,400	1,100	1,200	1,400
Chromium (Cr)	1	-*	28	7	16	4	32	13
Cobalt (Co)	0.1	200	5.6	4.1	2.3	1.6	3.3	2.6
Copper (Cu)	0.2	2,000	12.9	15.4	19.7	15.1	12.7	27.7
Iron (Fe)	100	-	7,700	26,200	47,500	61,400	22,000	33,200
Lead (Pb)	0.5	600	9.7	23.2	32.2	33.0	10.7	17.1
Magnesium (Mg)	100	-	400	500	1,300	800	500	500
Manganese (Mn)	5	3,000	82	244	244	497	237	329
Molybdenum (Mo)	0.05	-	1.01	1.99	4.19	2.73	0.88	4.14
Nickel (Ni)	0.2	600	15.6	6.4	6.0	1.9	10.2	5.0
Phosphorus (P)	10	-	30	70	210	160	50	40
Potassium (K)	100	-	400	1,200	3,800	2,200	900	400
Selenium (Se)	1	-	2	1	6	1	1	<1
Sodium (Na)	100	-	300	400	600	400	200	200

Notes:

All units mg/kg < indicates less than the laboratory limit of reporting.

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

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

General analytical methodology: HF-HNO3-HClO4 acid digestion, HCl leach and combination of ICP-MS and ICP-AES analyses.

Assessment of Element Solubility:

Of more importance to the Project is the potential for coal and coal reject materials to leach soluble metals, metalloids and salts 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 are generally compared with those recommended in relevant surface water and groundwater guideline criteria in order to determine their potential environmental significance.

Again, there are no guidelines and regulatory criteria specifically related to seepage from coal and 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 the coal and coal reject 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*.).

To evaluate the immediate solubility of multi-elements in solids, water extract (1:5 sample:water) tests were undertaken for soluble metals and metalloids. The soluble multi-element results for all six samples are provided in **Table 4-5**.

The 'static' soluble multi-element results show that soluble metal and metalloid concentrations in water extracts from all samples tested are currently low. With the exception of one of the coarse reject samples, leachate from all other samples contained soluble elements at concentrations below the applied ANZECC (2000) livestock drinking water guideline values and NEPC (1999b) groundwater investigation level (livestock drinking water) values, and for many elements, below the limit of reporting (LOR). The coarse reject 1302L/1303L sample, which is already slightly acidic (pH 4.24), has a soluble selenium (Se) concentration in initial leachate of 0.04 mg/L, which is marginally above the applied water quality guideline value (0.02 mg/L). This dynamic solubility of metals from coal and coal reject materials is discussed for KLC tests in **Section 4-2**.

Table 4-5: Multi-element (soluble) results for coal, coarse reject and tailings samples

Parameters	Laboratory Limit of Reporting	Guideline Levels[1]	Coal		Coarse Reject		Tailings	
			Product Coal 1302/1303L	Raw Coal 1492L	1302L/1303L	1492L	1302L/1303L	1492L
pH	0.01 pH unit	-	5.47	7.18	4.24	5.58	6.89	7.09
Major Ions	*All element concentrations in mg/L*							
Calcium (Ca)	1	1,000	39	2	114	42	23	15
Magnesium (Mg)	1	-	12	<1	39	7	6	2
Sodium (Na)	1	-	61	27	54	54	23	18
Potassium (K)	1	-	5	1	8	6	2	1
Chloride (Cl)	1	-	136	3	253	204	36	8
Sulfate (SO_4)	1	1,000	92	39	538	48	53	54
Metals	*All element concentrations in mg/L*							
Aluminium (Al)	0.01	5	0.45	0.27	17.2	0.03	0.44	0.03
Antimony (Sb)	0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic (As)	0.001	0.5	<0.001	<0.001	0.015	<0.001	<0.001	<0.001
Boron (B)	0.05	5	1.74	0.35	1.28	0.44	1.51	0.37
Cadmium (Cd)	0.0001	0.01	0.0004	<0.0001	0.0079	0.0005	0.0001	<0.0001
Chromium (Cr)	0.001	1 / -	0.001	<0.001	0.002	<0.001	<0.001	<0.001
Cobalt (Co)	0.001	1	0.01	<0.001	0.1	0.011	0.004	<0.001
Copper (Cu)	0.001	1 / 0.5	0.01	0.002	0.196	0.003	0.011	0.003
Fluoride (F)	0.1	2	0.4	0.6	1.6	0.5	0.3	0.4
Iron (Fe)	0.05	-	0.39	0.69	109	6.51	0.18	0.07
Lead (Pb)	0.001	0.1	0.001	0.002	0.008	<0.001	<0.001	<0.001
Manganese (Mn)	0.001	-	0.863	0.004	3.26	0.984	0.274	0.054
Mercury (Hg)	0.0001	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum (Mo)	0.001	0.15 / 0.01	<0.001	0.002	<0.001	<0.001	<0.001	<0.001
Nickel (Ni)	0.001	1	0.005	<0.001	0.072	0.005	0.004	<0.001
Phosphorus (P)	0.01	-	0.02	0.02	0.03	<0.01	<0.01	<0.01
Selenium (Se)	0.01	0.02	0.01	0.02	0.04	<0.01	<0.01	<0.01
Vanadium (V)	0.01	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (Zn)	0.005	20	1.31	0.017	2.54	0.569	0.709	0.019

Notes:

< indicates concentration less than the laboratory limit of reporting.

Shaded cells indicate values which exceed applied water quality guideline values.

1. The first guideline level shown refers to ANZECC (2000) and the second to NEPC (1999b) *eg.* 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.

4.2 Kinetic Geochemical Characterisation

The results of the KLC tests for the three composite samples from drill holes 1302L and 1303L are provided at **Attachment A**, along with data trends. ALS laboratory results for both static and KLC geochemical tests are provided at **Attachment B**. The key findings of the KLC program, after 10 weeks of leaching for these three samples are broadly summarised in **Table 4-6**. At the time of reporting, results for the three samples from drill hole 1492L, which commenced in late February 2011 are only available for the first (initial) leaching event. As such, the KLC results for these samples are not reported or discussed in this Interim Report and will be contained in the Draft Report provided to HGPL in the second half of 2011.

Table 4-6: Summary of key parameters and trends from KLC data (at week 10) for selected coal, coarse reject and tailing samples

	Product Coal 1302L/1303L	Coarse Reject 1302L/1303L	Tailing 1302L/1303L
KLC Sample No.	KLC 1	KLC 3	KLC 5
pH	4.13; variable	2.86; decreasing	4.62; decreasing
Net Alkalinity* (mg/L as $CaCO_3$)	-8; stable	-330; decreasing	-2; stable
EC (µS/cm)	693; variable	2,620; generally increasing	490; decreasing
SO_4 release rate (mg/kg)	26; stable	177, increasing	100; decreasing
Comments	Static test data was inconclusive and classified the sample as 'Uncertain'. KLC testing suggests the sample is PAF-LC, as the amount of released acidity is relatively low. The SO_4 release rate and EC are not expected to increase significantly.	PAF status confirmed and material is continuing to release elevated levels of acidity. The SO_4 release rate and EC are expected to increase over time.	Static test data was inconclusive and classified the sample as 'Uncertain'. KLC testing suggests the sample may be PAF-LC, as the amount of released acidity is very low. The SO_4 release rate and EC are not expected to increase.

* Net alkalinity is total alkalinity minus acidity. A negative value indicates the sample has overall acidity whereas a positive value indicates the sample has overall alkalinity.

Whether a trend is regarded as relatively stable or fluctuating significantly is somewhat subjective and takes in to account that the test program is partially complete.

The interim results of the KLC tests (after 10 weeks of leaching) confirm the PAF nature of the Coarse Reject samples. The KLC data also suggests that Product Coal and Tailings samples may also generate relatively low pH leachate although this currently remains above pH 4. In addition, the capacity for these samples to generate significant quantities of acid is expected to be very low and these materials are likely to be amenable to lime treatment, to raise the pH if required, should the pH decrease to below pH 5 in the field.

The Product Coal and Tailings samples were initially classified as 'Uncertain' based on static testing results. The KLC test results has reduced this uncertainty and suggests that materials represented by the Product Coal and Tailings samples are likely to be PAF-LC (ie. they are not expected to cause significant environmental or management issues, and therefore will not require the same level of management as for the Coarse Rejects). In comparison to the Coarse Reject 1302L/1303L sample, the Product Coal and Tailings samples have generated leachate with much lower acidity (up to 10 mg/L as $CaCO_3$) and lower salinity and sulphate levels compared to coarse rejects.

The results suggest that Coarse Reject materials are expected to generate low pH, high acidity surface runoff and seepage (pH <3; acidity up to 330 mg/L as $CaCO_3$), with elevated salinity levels (approaching 3,000 µS/cm) and elevated sulfate concentrations (over 450 mg/L) after a few weeks to a few months of exposure to oxidising conditions. Coarse reject will therefore need to be well managed at the project to limit the risk of AMD.

Metals appear to be sparingly soluble and occur in relatively low concentrations in leachate from the three samples from drill hole '1302L/1303L'. Increased metal solubility appears to be generally limited to iron, manganese and zinc.

Overall, the available KLC results have confirmed that, from a material management perspective, the Coarse Reject 1302L/1303L material is expected to present the most risk of significant AMD generation.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

RGS has partially completed an on-going geochemical test work program for the Kevin's Corner Project. The complete geochemical assessment will be documented in the Draft Geochemical Report to be provided to HGPL during the second half of 2011.

The program of works underway has built upon the existing understanding of the geochemical characteristics of coal and mining waste materials and assisted in further clarifying the potential environmental geochemical risks associated with these materials. As such, the level of confidence in the management strategies proposed for the various mining materials at the Project has increased.

The geochemical work program has also assisted in optimising the proposed management and monitoring strategies for mining waste materials at the Project. Specific knowledge gaps at the Project have been filled and a targeted review of existing geochemical data and associated interpretations relied upon in Volume 5 Appendix Q1 of the EIS (SRK, 2011) has been completed.

As this is an Interim Report, and the assessment of coal and mining waste materials is continuing, preliminary conclusions associated with specific areas of the ongoing geochemical work program include:

- The bulk overburden material at the Project is likely to have a high factor of safety and a low probability of acid generation, however most overburden materials are expected to have a medium to high salinity. Less than 1% of overburden was assessed as having an increased risk of acid generation. Materials identified as PAF are located close to coal units and should be able to be selectively mined and handled.
- Most coal seam roof and floor materials are unlikely to pose a significant risk of developing acid conditions. Some materials may have a low capacity to generate acid, however the management of these materials should not be problematic, especially if mixed with the NAF bulk overburden materials.
- Based on available data, the coarse reject materials have a low factor of safety and are expected to be PAF and a source of acid generation, sulphate salts and some metals. Acid generation is expected to occur within weeks to a few months. These materials will need to be well managed at the Project.
- There is some uncertainty regarding the acid generating nature of the tailings materials, however the current data coupled to that available for the adjacent Alpha Coal Project indicates that tailings, will generally have a low capacity to generate significant acidity, which can be managed by lime amendment, if required.
- There is some uncertainty regarding the acid generating nature of coal materials (product and raw), and again these materials are not expected to generate significant acidity. Raw 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.
- With the exception of a very small number of samples (mostly those identified as PAF, such as coarse rejects) the soluble metals concentrations are low, and below the applied water quality livestock drinking water criteria.
- Alkaline amendment of coarse reject materials with a fast-acting lime product, should extend the lag-period preceding acid generation and improving leachate quality.

RGS will continue to work closely with HGPL/URS to ensure that proposed commitments made for the Project remain appropriate to manage the identified environmental geochemical risks associated with the various mining materials.

5.2 Recommendations

As a result of the current findings of the geochemical assessment programs described in this Interim Report, it is recommended that HGPL considers:

- Appropriate management of any surface runoff and seepage from ROM coal materials to minimise any potential for acidic, metalliferous and/or saline runoff/seepage to interact with surface water and groundwater environments.
- Future sampling and geochemical testing of mining materials at the Kevin's Corner Project, completed as per the infill drilling and future drilling programs described in this Interim Report.
- Open-pit mining geological control coupled with pre-mining and ongoing geochemical sampling and testing of mining materials. This strategy should be used to delineate the extent of any PAF materials associated with coal seams and ensure that these are selectively handled and managed in a similar manner to PAF coarse coal reject materials (described below).
- Selective handling of any PAF materials located close to or within the coal seams and similar management as proposed for PAF coarse reject materials at the Project (*ie*. selective handling, compaction, alkaline amendment and encapsulation within a thick layer of NAF overburden).
- Any PAF uneconomic coal that is mined but not processed should also report directly to coarse reject storage facilities.
- Any coal ply parting greater than 30 cm thickness that is NAF or low capacity PAF will be selectively left at the floor of the pit (or if storage capacity is unavailable at the pit floor, will report to an alternative in-pit storage location). PAF-LC materials should be covered within four weeks with reduced permeability NAF overburden material.
- Placement of PAF coarse reject materials in the open-pit (when sufficient capacity is available after one year) and compaction prior to alkaline amendment with a suitable lime product to extend the lag period preceding acid generation. Overlay of exposed PAF coarse reject with at least a one metre of compacted NAF layer within a period of four weeks and material scheduling optimisation to ensure covering with a thick layer (at least 3m) of NAF overburden material within three months.
- Isolation of PAF coarse reject materials placed in the out-of-pit overburden emplacement facility with reduced permeability NAF overburden during the first year of operation within a period of four weeks and material scheduling optimisation to ensure encapsulation with a thick layer of NAF overburden material within three months.
- Consideration of lime amendment of PAF tailings materials if the occurrence of PAF materials is more widespread than currently expected and tailings materials generate pH values less than five.
- Avoiding placement of saline (and potentially dispersive) Tertiary clay and Permian siltstone materials at the top cover and final batters of out-of-pit and in-pit overburden emplacement facilities.
- Continuation of KLC tests on selected mining materials (potentially to 40 weeks) depending on the outcomes of a planned review of available KLC test data after 20 weeks of operation.

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7.0 LIMITATIONS AND SIGN-OFF

This Report documents the work undertaken by RGS Environmental (RGS) Pty Ltd. Acknowledgment is provided to Terrenus Earth Sciences for assistance with this report.

This document contains confidential information that is intended only for the use by RGS's Client, as named in this report. It is not for public circulation or publication or to be used by any third party without the express permission of either the Client or RGS. The concepts and information contained in this document are the property of RGS. Use or copying of this document in whole or in part without the written permission of RGS constitutes an infringement of copyright.

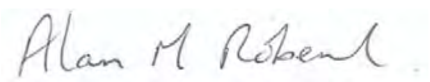
This Interim Report should be read in full and with full cognisance that the geochemical assessment is ongoing. This Interim Report contains all available information at the date of this report. The level of assessment provided to this data and contained within this Interim Report has been undertaken based on the available data, however as the geochemical assessment work is ongoing, RGS reserves the right to withdraw and/or revaluate findings and conclusions contained herein once the complete dataset is available. The complete report is expected to be produced in the second half of 2011.

While the interim findings presented in this report are based on information that RGS considers reliable unless stated otherwise, the accuracy and completeness of source information cannot be guaranteed. RGS has made no independent verification of this information beyond the agreed scope of works and RGS assumes no responsibility for any inaccuracies or omissions outside of RGS's direct control. Furthermore, the information compiled in this Interim Report addresses the specific needs of the client, so may not address the needs of third parties using this report for their own purposes. Thus, RGS and its employees accept no liability for any losses or damage for any action taken or not taken on the basis of any part of the contents of this report. Those acting on information provided in this report do so entirely at their own risk.

This Interim Report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

We trust that this Interim Report meets your requirements and expectations for the time being and look forward to continuing to work closely with you on geochemical aspects of the Kevins Corner Project.

Best regards,



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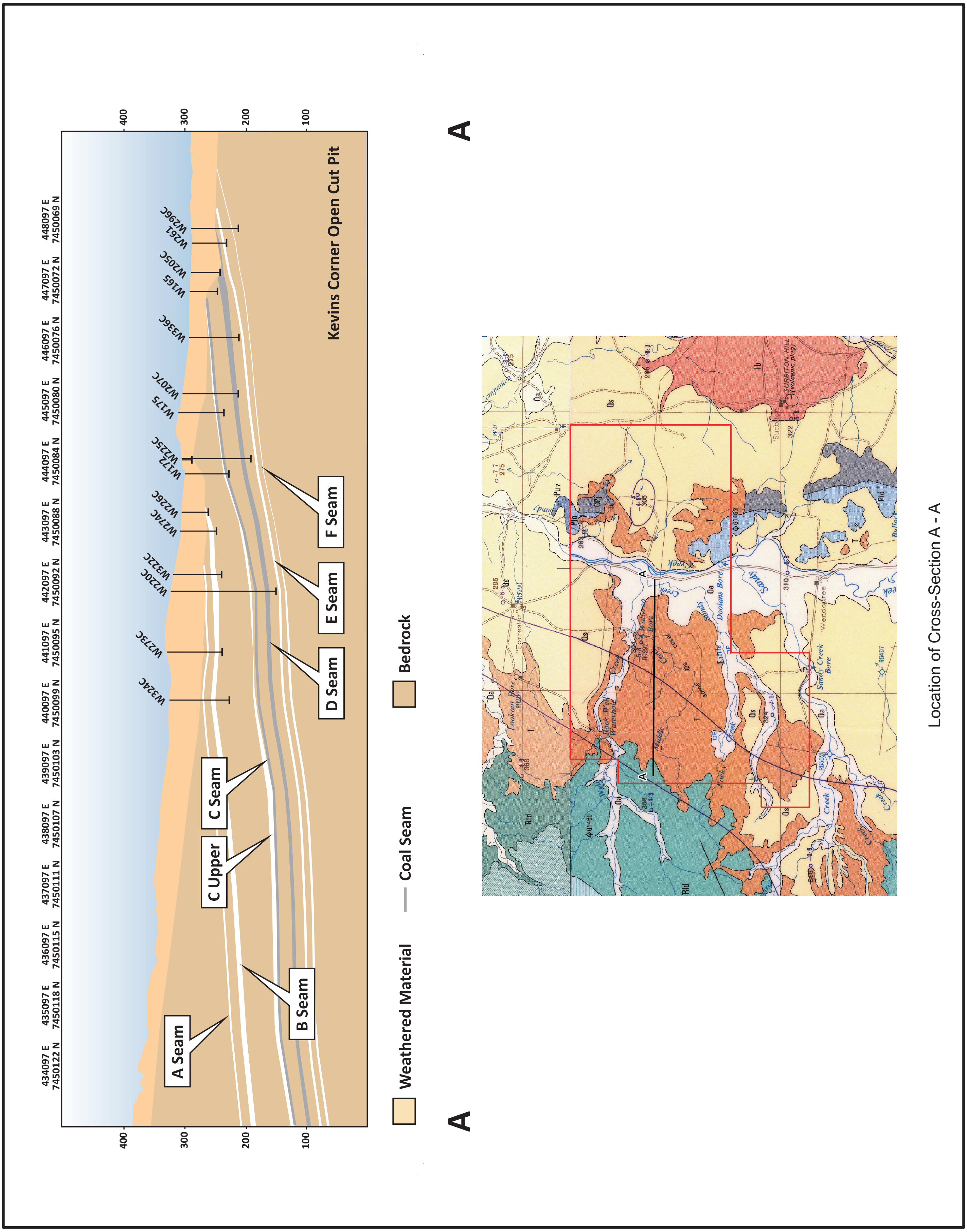
Figures 1 to 13



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RGS

GEOLOGICAL WEST -EAST
CROSS-SECTION A - A THROUGH
MINING LEASE APPLICATION 70425

Job Number	4262 6660
Revision	B
Date	12-09-2011

Figure: 1

File No: 42626660-g-2098.cdr

Age	Lithology	Stratigraphic Unit	Thickness	Comments
Quaternary	Sand, fine gravel, clay		Average 40 m	Alluvium
Tertiary	Saprolite, laterite and remanent red mudstone and white / beige sandstone		5 - 60 m	Clay-rich
Triassic	Green brown-purple mudstone, siltstone and labile sandstone	Rewan Formation	175 m[1]	In far west
Late Permian	Sandstone	Bandanna Formation	30–50 m	Increasingly argillaceous
	Coal Seam A. Seam contains thin stone bands that thicken from south to north		1 - 2.5 m	
	Labile sandstone, siltstone and mudstone		10 m	
	Coal Seam B. Seam contains numerous dirt bands that constitute between 15 and 30% of seam. Variable in quality.		6 - 8 m	
	Siltstone and mudstone		60–70 m	
	Coal Seam C. Inferior C upper seam C Seam	Colinlea Sandstone	2 - 5 m 3 – 4 m	Increasingly arenaceous
	Siltstone and sandstone		2 – 20 m	
	Coal Seam D. Stone bands present with seam thickening westward, upper section splits off main seam to north west		4.5 - 6 m	
	Sandstone		30 m	
	Coal Seam E		0.5 m	
	Sandstone		15 – 20 m	
	Coal Seam F		1 - 3 m	
	Sandstone		Unknown	
Early Permian	Labile and quartz sandstone	Undefined	Transition to Joe Joe Formation	

[1] Typical thickness

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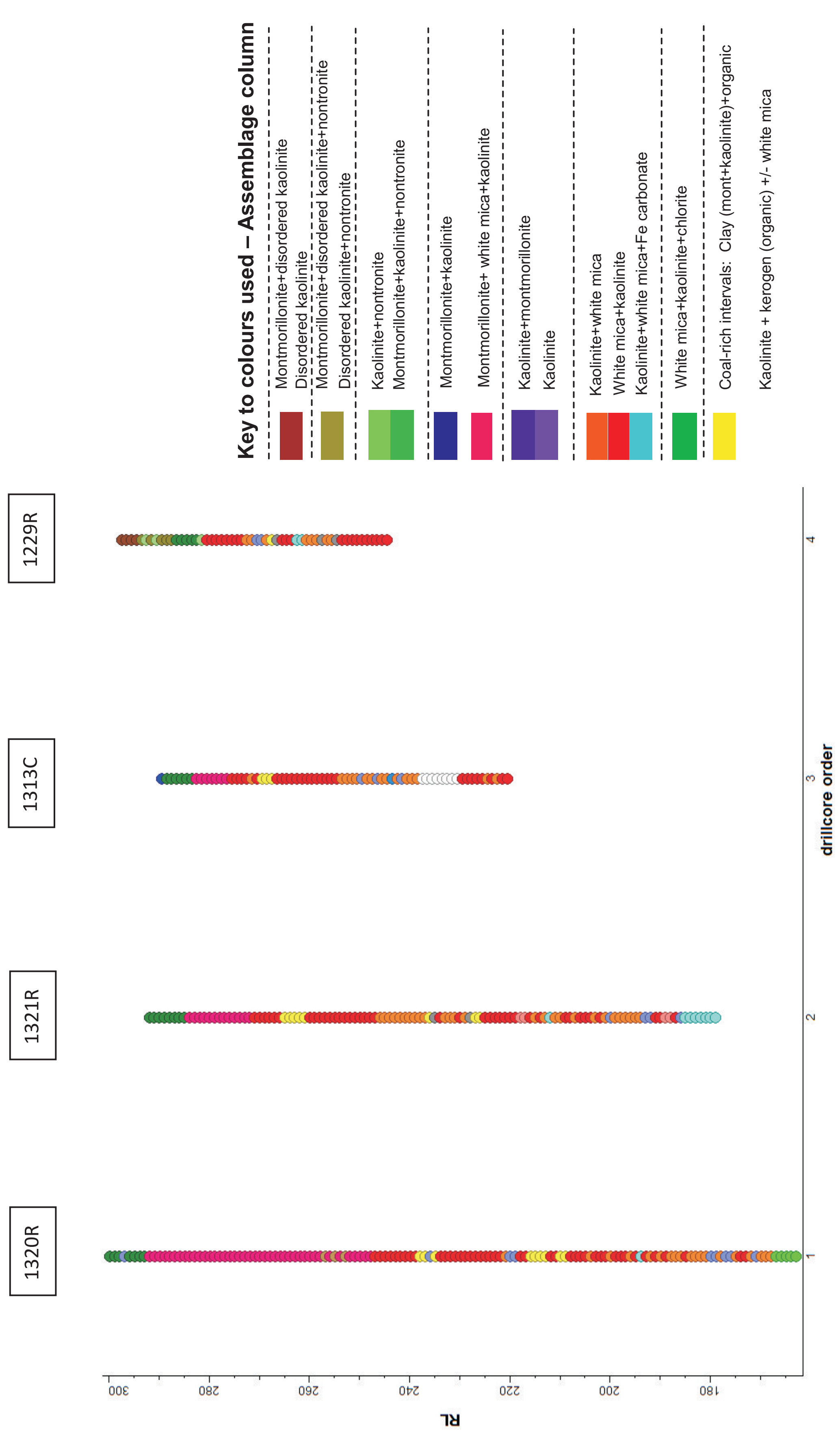
SCHEMATIC STRATIGRAPHIC SECTION IN THE KEVINS CORNER PROJECT (MINE) AREA

Job Number 4262 6660
Revision B
Date 12-09-2011

Figure: 2

File No: 42626660-g-2099.cdr



Plot showing mineral assemblage data for the Kevin's Corner holes. The legend shows the colour for the different assemblages. White in 1313C is where there was no sample.

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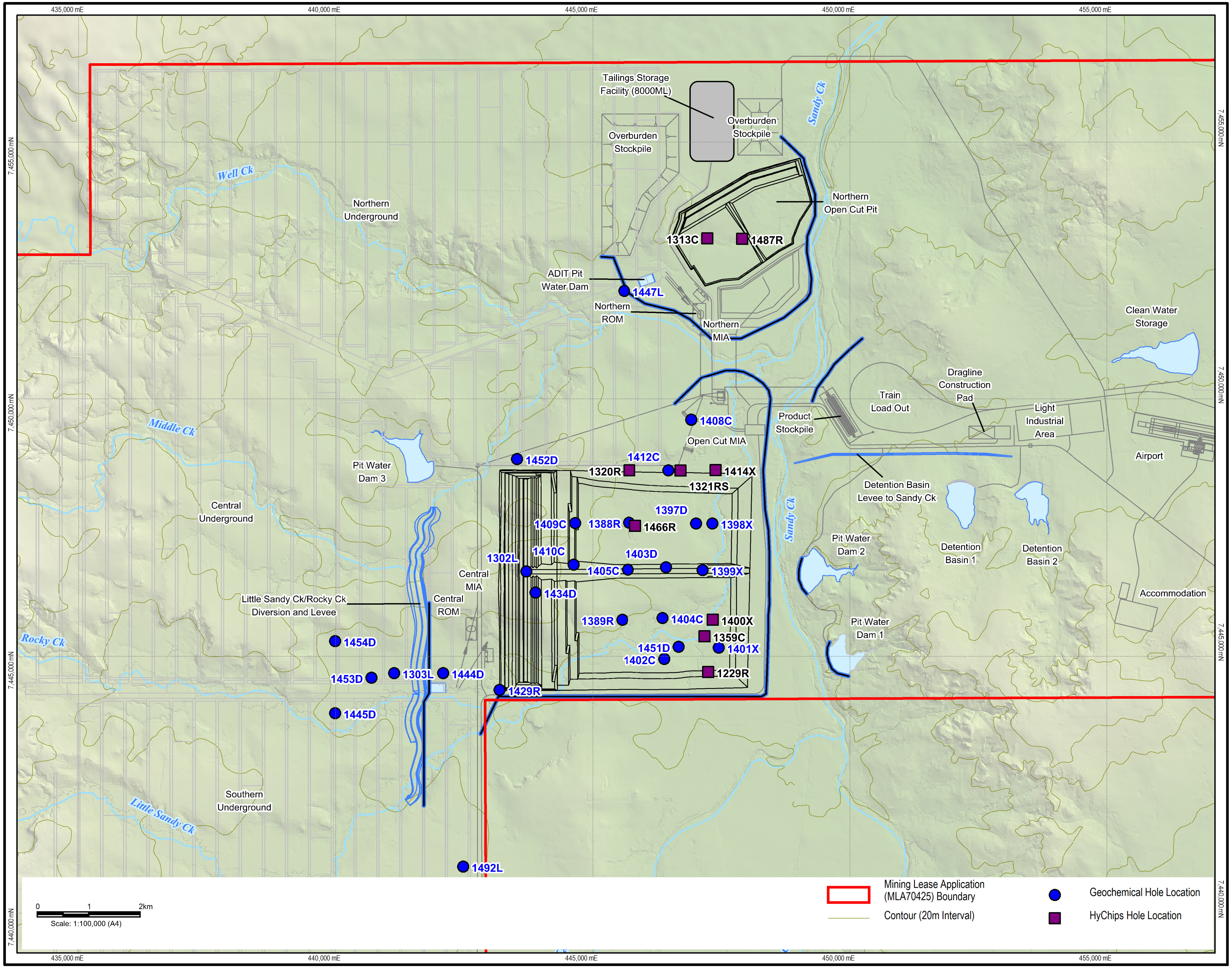
RGS

KEVINS CORNER COAL PROJECT (MINE)
MINERAL ASSEMBLAGES ACROSS
HYCHIP DRILL HOLES

Job Number	4262 6660
Revision	B
Date	12-09-2011

Figure: 3

File No: 42626660-g-2100.cdr



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Datum: GDA94, MGA Zone55

File No: 42626660-g-2101.wor

N W E S

RGS

KEVINS CORNER (MINE)
DRILL HOLES USED TO PROVIDE
LITHOLOGICAL AND GEOCHEMICAL
INFORMATION IN EIS

Job Number	4262 6660
Revision	C
Date	12-09-2011

Figure: 4

PLANNED MINING AREA FOR FIRST FIVE YEARS AND LOCATION OF ADDITIONAL INFILL DRILL CORE HOLES FOR GEOCHEMICAL SAMPLING

Job Number | 4262 6660
Revision | C
Date | 12-09-2011

Figure: 5

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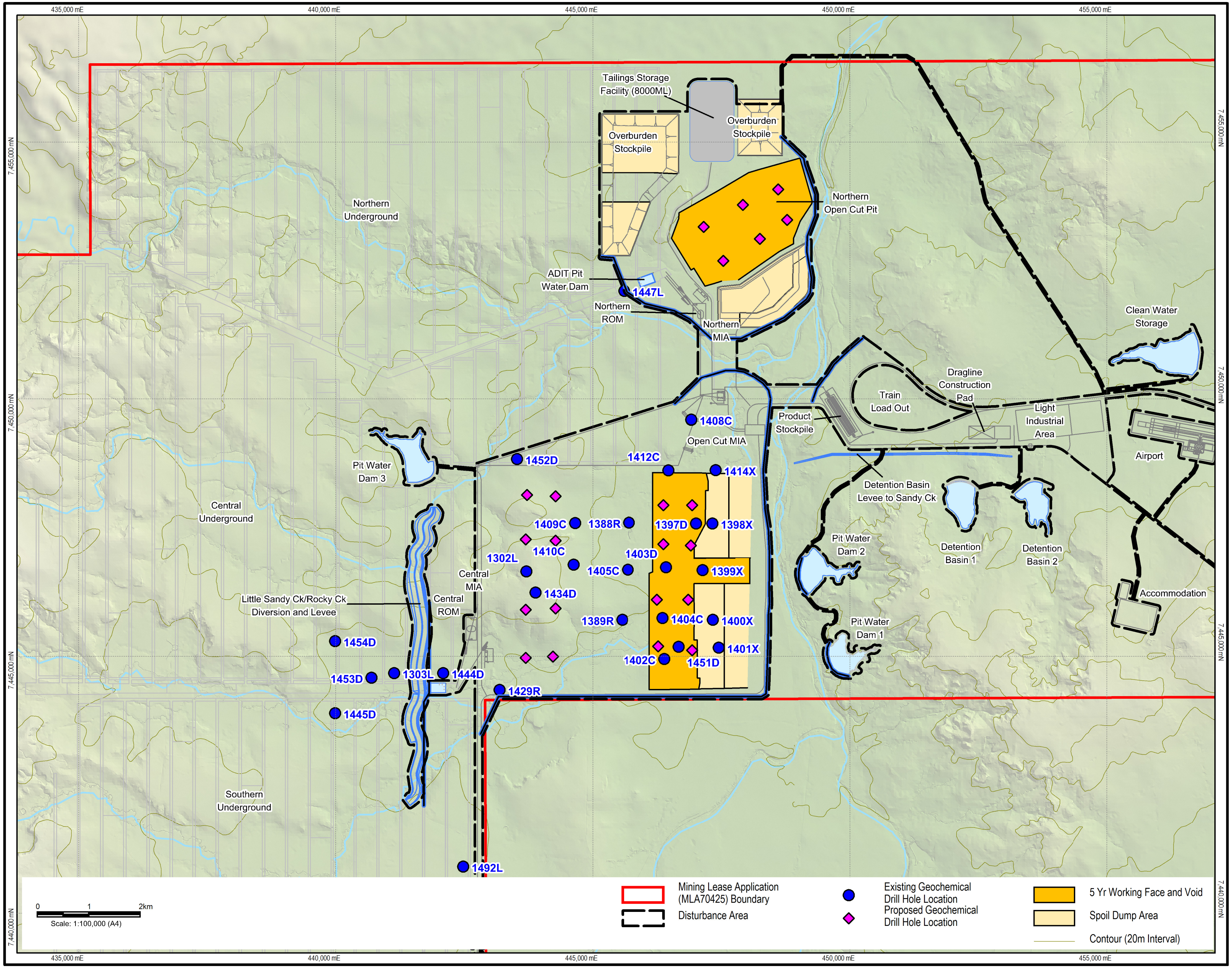
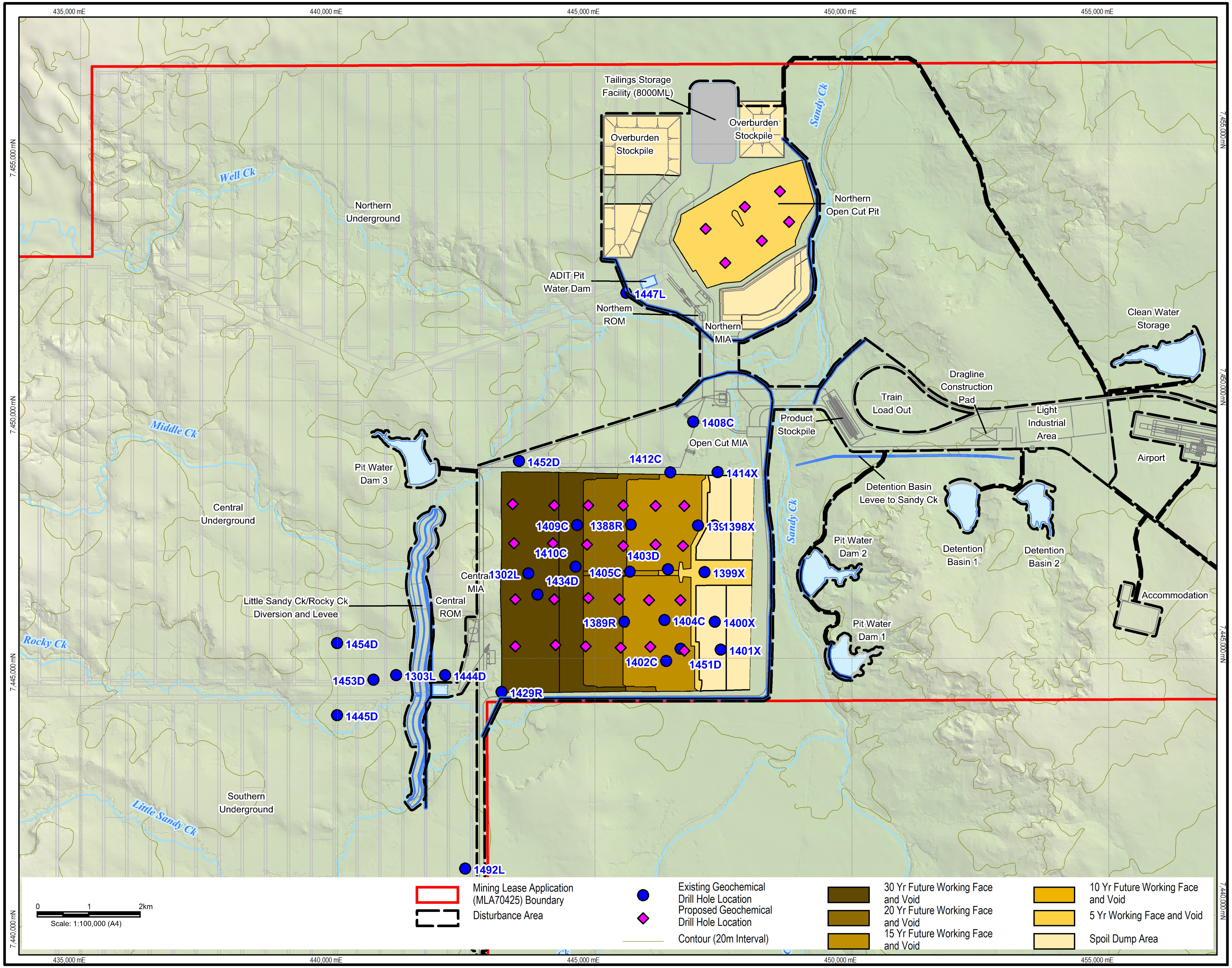
RGS

Datum: GDA94, MGA Zone55

File No: 42626660-g-2102.wor





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N W E S

RGS

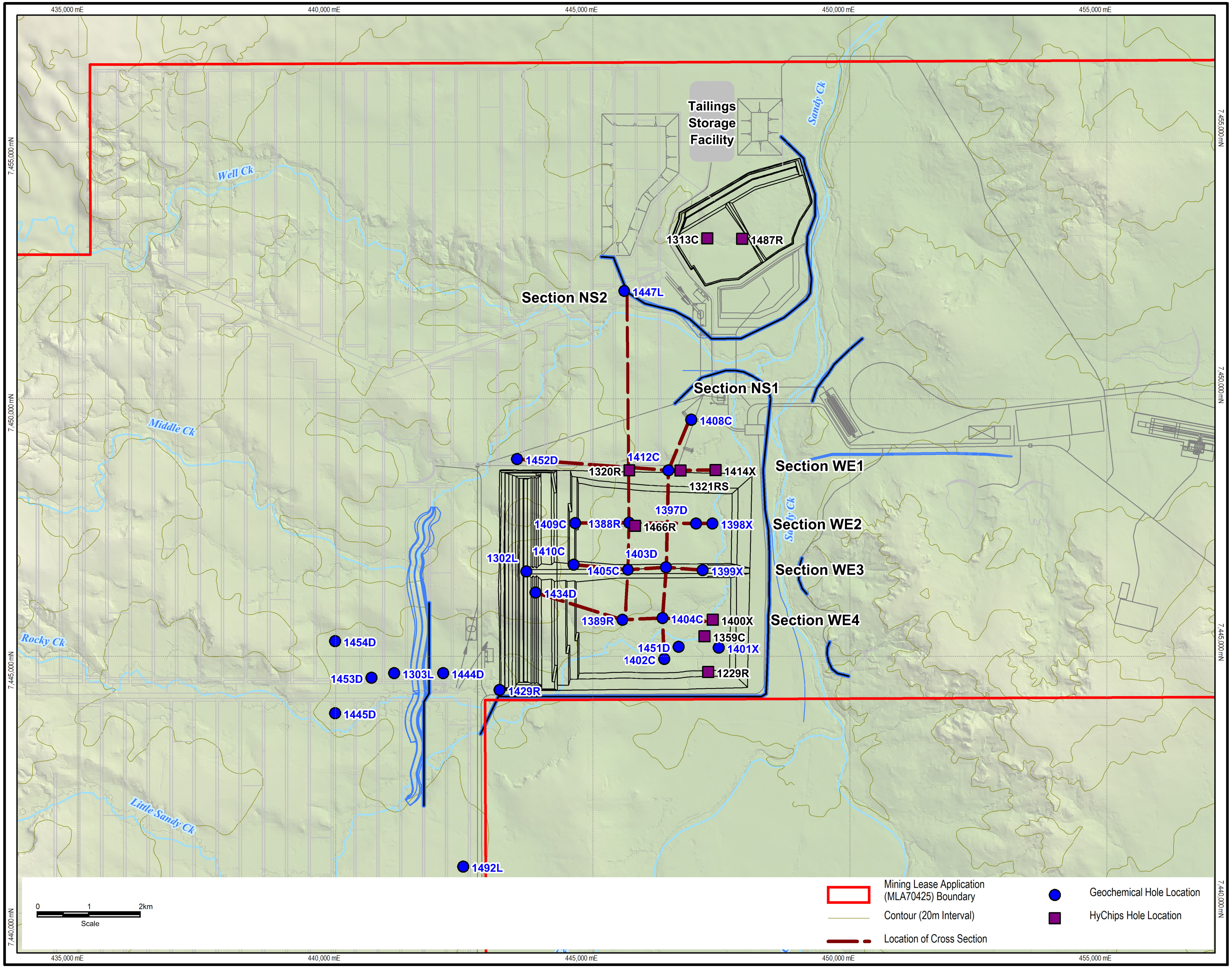
Datum: GDA94, MGA Zone55

PLANNED LIFE OF MINE AREA AND LOCATION OF ADDITIONAL INFILL DRILL CORE HOLES FOR GEOCHEMICAL SAMPLING

Job Number 4262 6660
Revision C
Date 12-09-2011

Figure: 6

File No: 42626660-g-2103.wor



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File No: 42626660-g-2104.wor

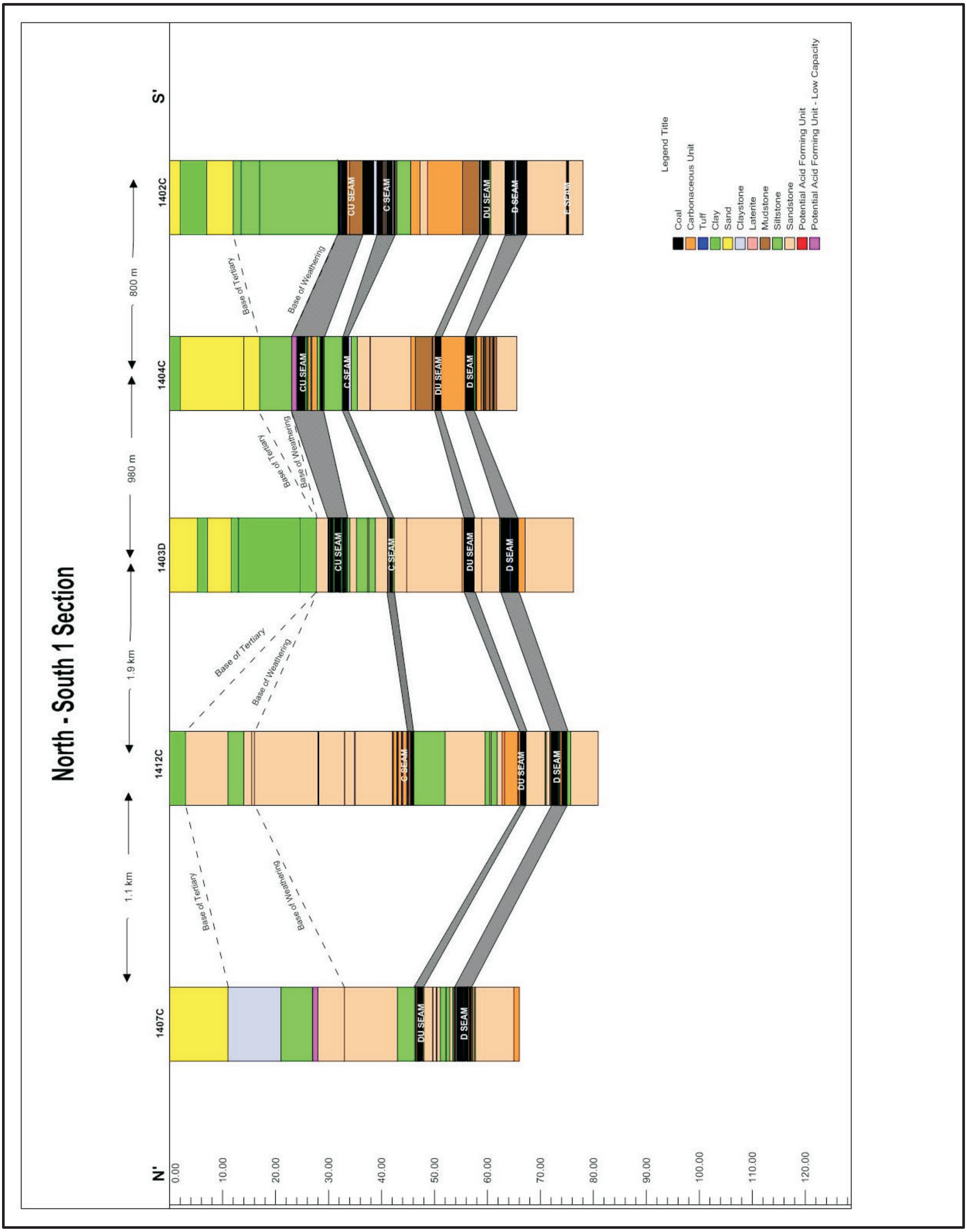
Datum: GDA94, MGA Zone55

RGS

KEVINS CORNER PROJECT (MINE) MINE SITE CROSS SECTION LOCATIONS

Job Number	4262 6660
Revision	C
Date	12-09-2011

Figure: 7



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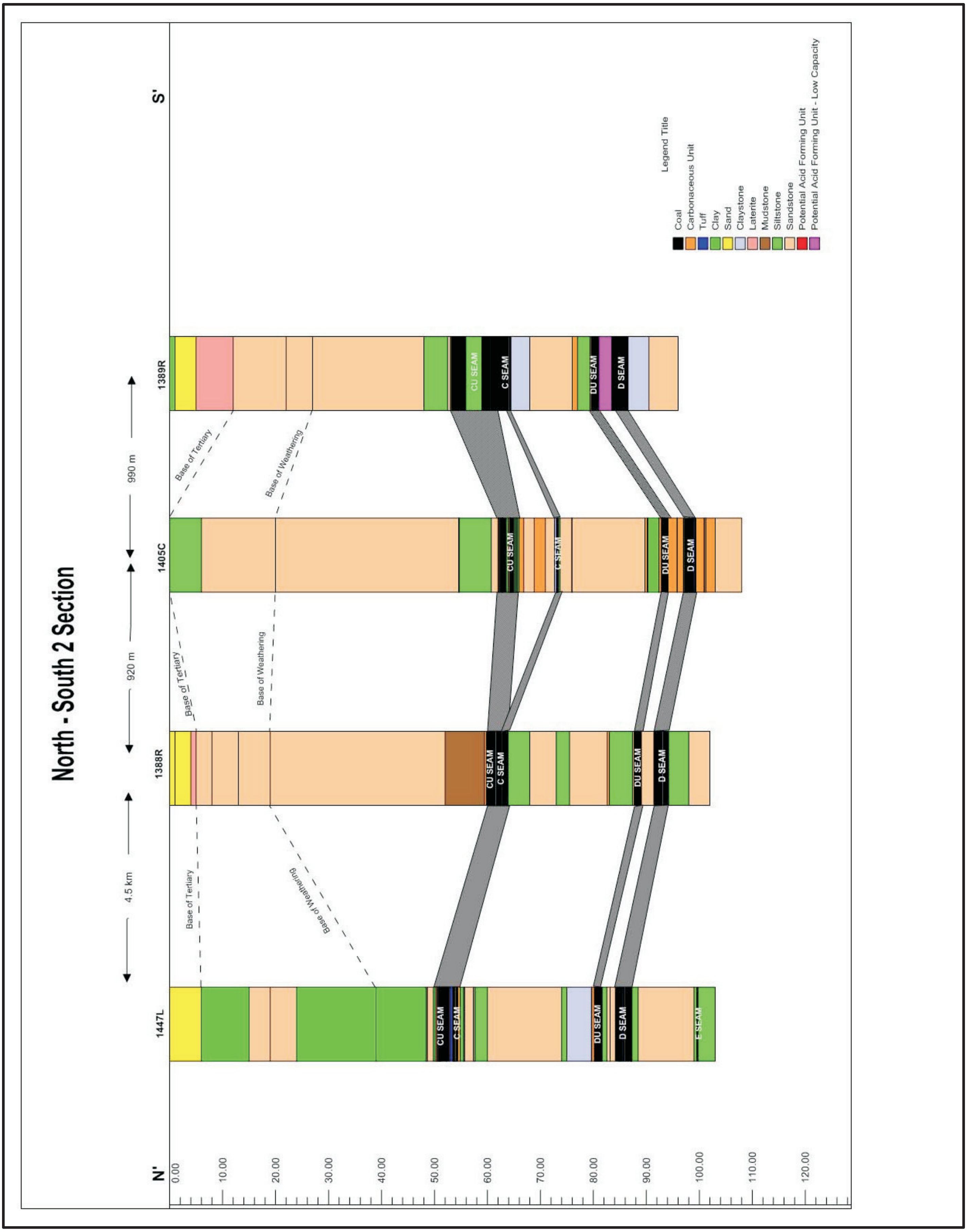
RGS

N-S CROSS SECTION OF PROPOSED KEVINS CORNER PIT ILLUSTRATING UNIFORM GEOLOGY AND LOCATION OF PAF MATERIALS CLOSE TO COAL SEAM

Job Number	4262 6660
Revision	B
Date	12-09-2011

Figure: 8

File No: 42626660-g-2105.cdr



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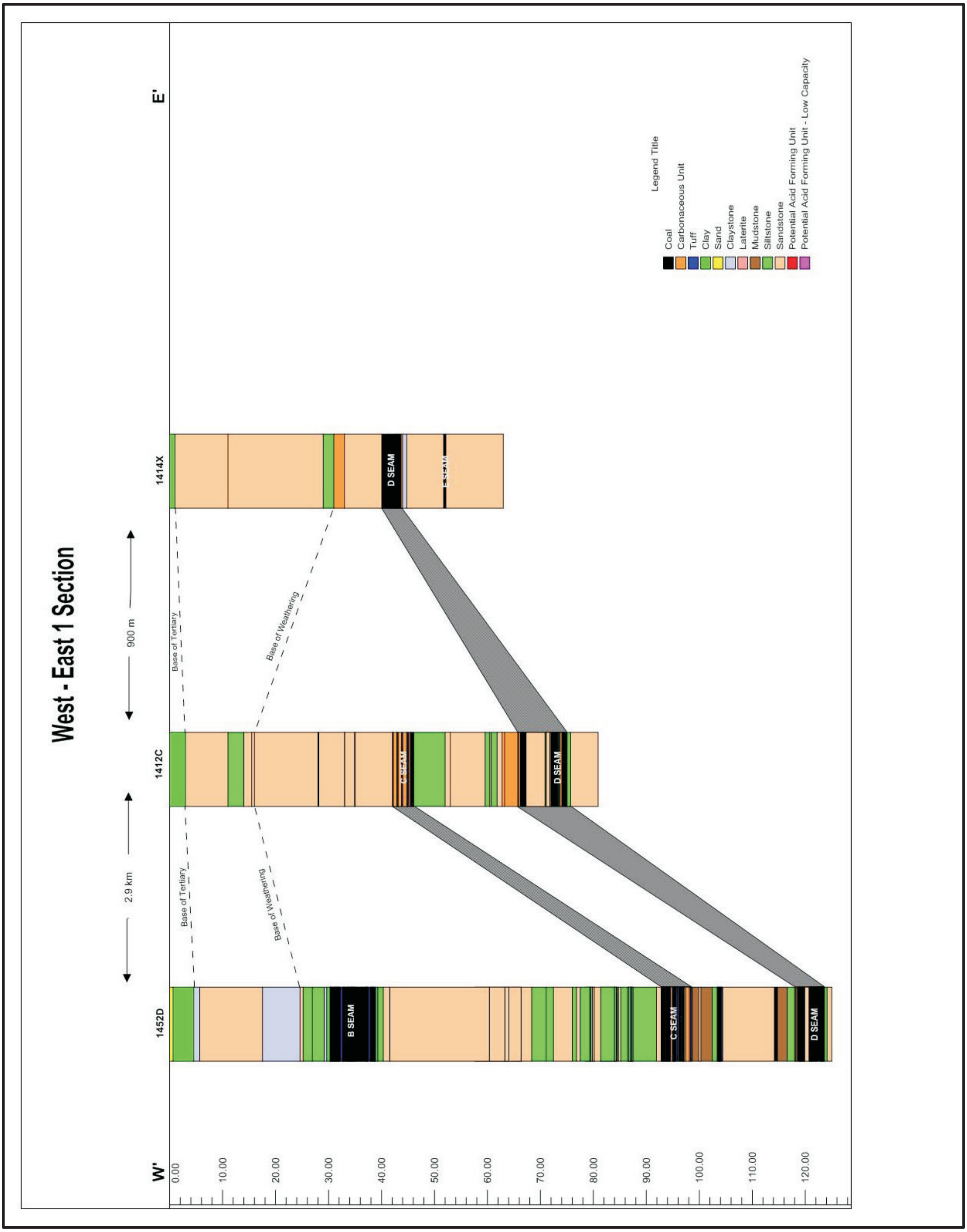
RGS

N-S CROSS SECTION OF PROPOSED KEVINS CORNER PIT ILLUSTRATING UNIFORM GEOLOGY AND LOCATION OF PAF MATERIALS CLOSE TO COAL SEAM

Job Number	4262 6660
Revision	B
Date	12-09-2011

Figure: 9

File No: 42626660-g-2106.cdr



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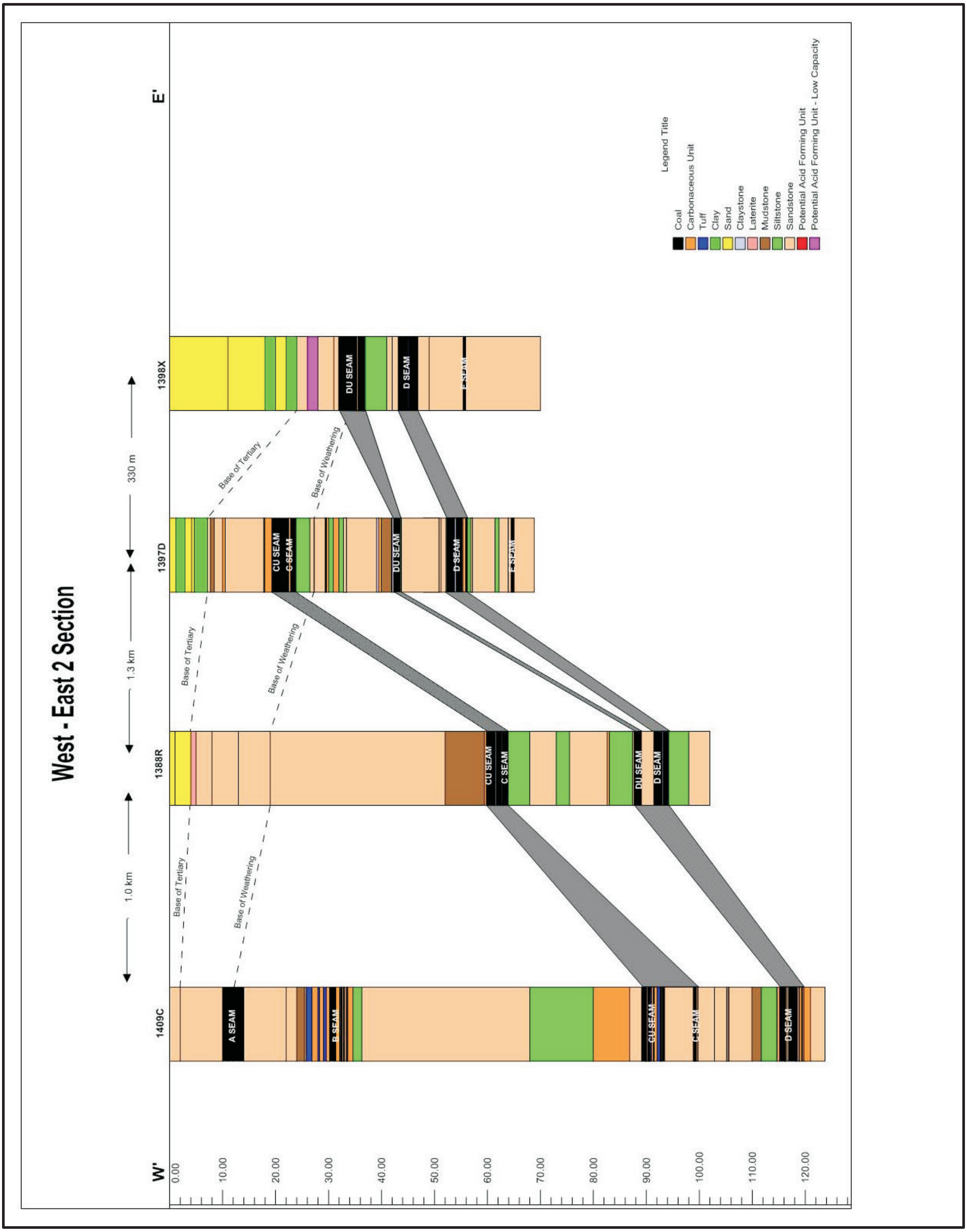
RGS

W-E CROSS SECTION OF PROPOSED KEVINS CORNER PIT ILLUSTRATING UNIFORM GEOLOGY AND LOCATION OF PAF MATERIALS CLOSE TO COAL SEAM

Job Number	4262 6660
Revision	B
Date	12-09-2011

Figure: 10

File No: 42626660-g-2107.cdr



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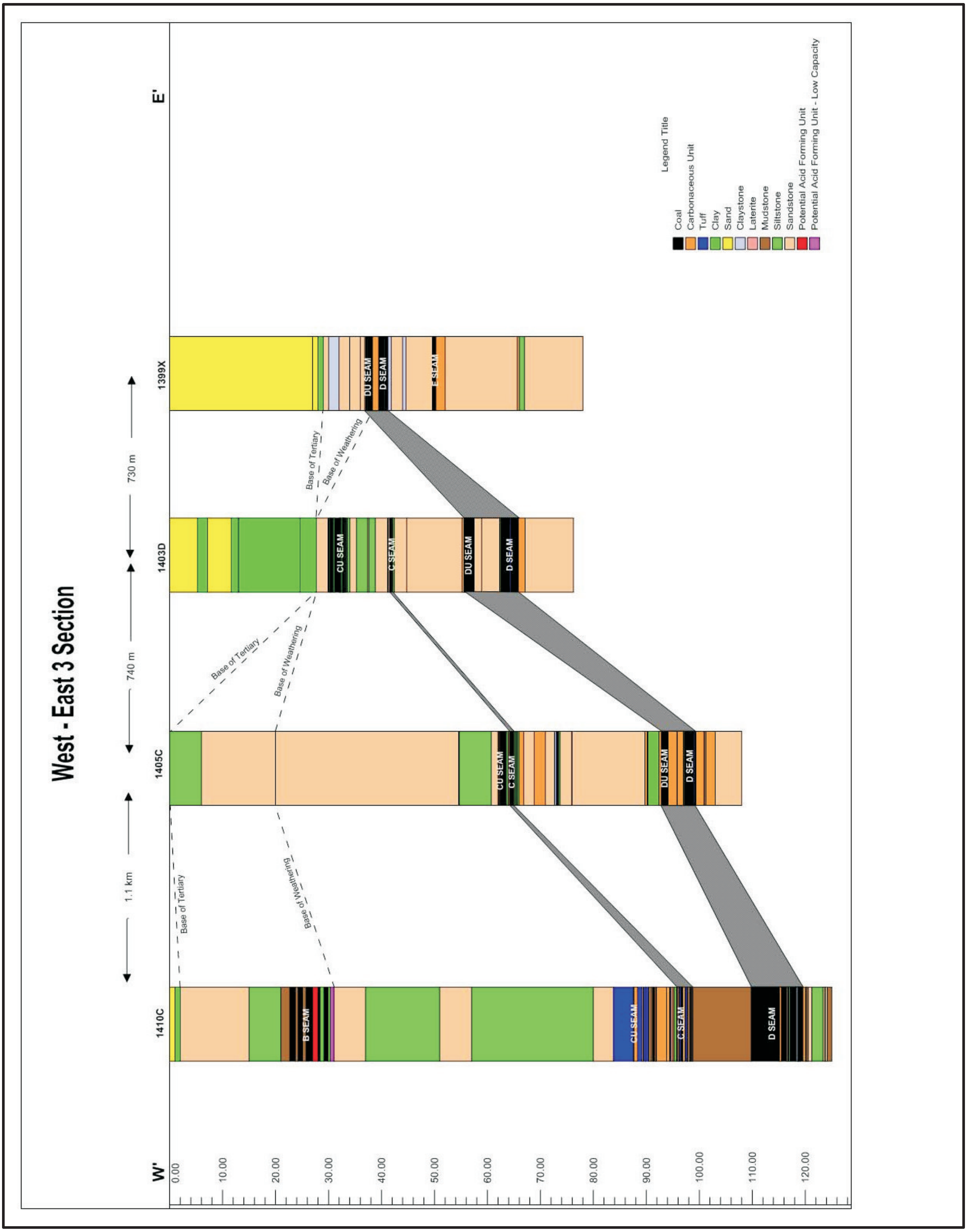
RGS

W-E CROSS SECTION OF PROPOSED KEVINS CORNER PIT ILLUSTRATING UNIFORM GEOLOGY AND LOCATION OF PAF MATERIALS CLOSE TO COAL SEAM

Job Number	4262 6660
Revision	B
Date	12-09-2011

Figure: 11

File No: 42626660-g-2108.cdr



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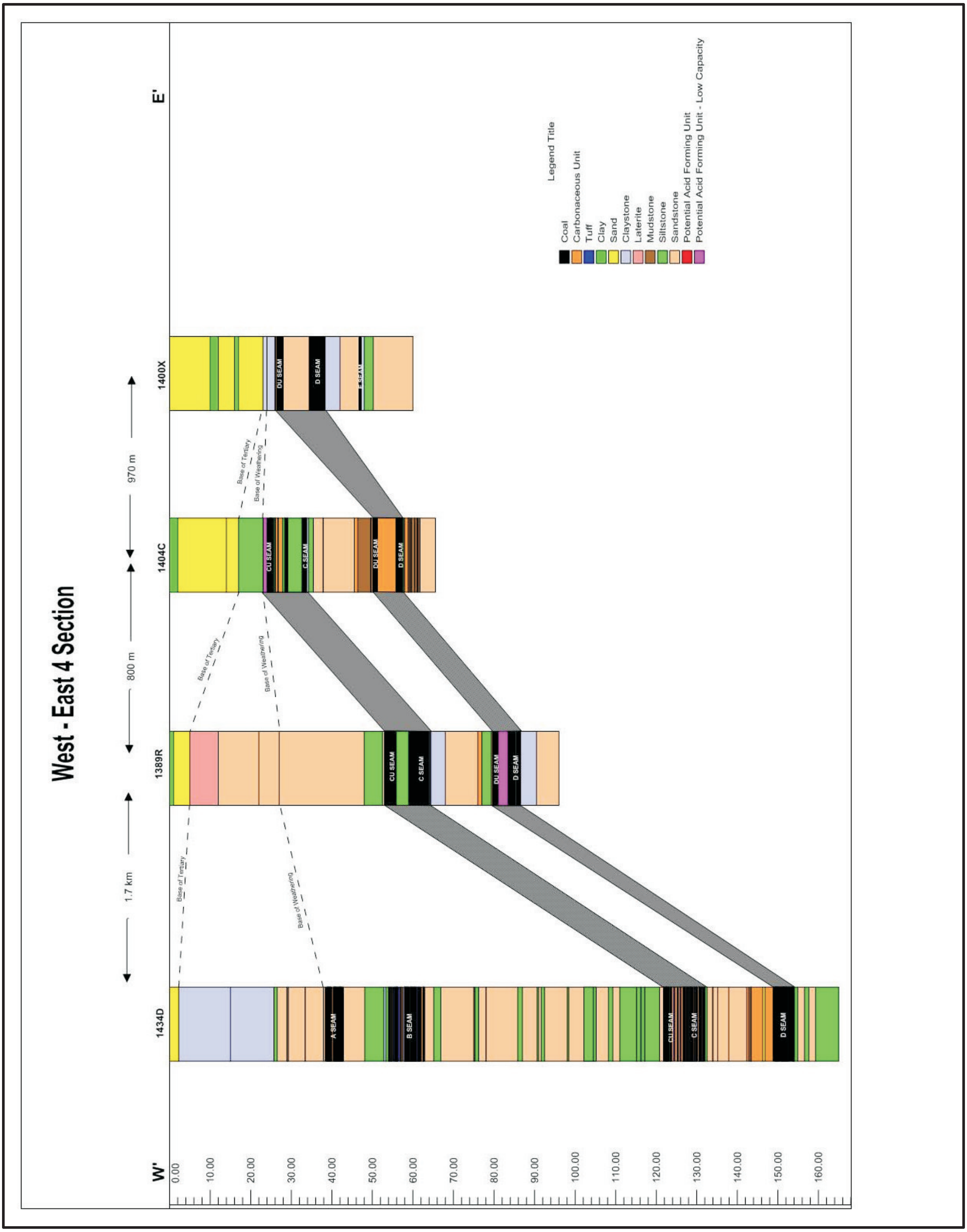
RGS

W-E CROSS SECTION OF PROPOSED KEVINS CORNER PIT ILLUSTRATING UNIFORM GEOLOGY AND LOCATION OF PAF MATERIALS CLOSE TO COAL SEAM

Job Number	4262 6660
Revision	B
Date	12-09-2011

Figure: 12

File No: 42626660-g-2109.cdr



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RGS

W-E CROSS SECTION OF PROPOSED KEVINS CORNER PIT ILLUSTRATING UNIFORM GEOLOGY AND LOCATION OF PAF MATERIALS CLOSE TO COAL SEAM

Job Number	4262 6660
Revision	B
Date	12-09-2011

Figure: 13

File No: 42626660-g-2110.cdr

Attachment A

Kinetic Leach Column Test Results

Table KLC1

KLC Test Results: Product Coal 1302L/1303L

Sample Weight (kg)	1.4	**Total S (%)**	0.27	**ANC (kg H_2SO_4/t)**	3.3
pH(1:5)	4.8	**S_{CR} (%)**	0.062	**NAPP (kg H_2SO_4/t)**	-1.4
EC(1:5) (µS/cm)	585	**MPA (kg H_2SO_4/t)**	1.9	**ANC:MPA ratio**	1.7

Date	**17-Dec-10**	**31-Dec-10**	**13-Jan-11**	**27-Jan-11**	**10-Feb-11**	**24-Feb-11**	**10-Mar-11**	**24-Mar-11**	**7-Apr-11**	**21-Apr-11**
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Volume Collected (L)	0.82	0.74	0.75	0.77	0.78	0.76	0.78	0.75	0.77	
Cum. Volume (L)	0.82	1.56	2.31	3.08	3.86	4.62	5.40	6.15	6.92	
Pore Volumes	0.6	1.2	1.7	2.3	2.9	3.4	4.0	4.6	5.1	
pH	5.56	5.35	4.33	4.59	5.62	4.13				
EC (µS/cm)	292	396	507	425	840	693				
Acidity (mg/L)*	10	10	7	4	4	8				
Alkalinity (mg/L)*	5	3	<1	<1	1	<1				
Net Alkalinity (mg/L)*	-5	-7	-7	-4	-3	-8				
Dissolved elements (mg/L)										
Al	0.08	0.12	0.09	0.04	0.06	0.09				
As	0.002	0.004	0.024	<0.001	0.023	0.009				
B	0.07	0.09	0.14	0.13	0.11	0.3				
Ca	14	19	26	20	26	36				
Cd	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001				
Cl	43	83	140	115	141	178				
Co	0.008	0.004	0.004	0.003	0.004	0.006				
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				
Cu	<0.001	0.001	0.002	<0.001	0.001	0.001				
Fe	5.66	0.59	0.08	0.26	0.42	0.13				
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
K	2	3	3	3	3	3				
Mg	4	6	9	7	9	14				
Mn	0.11	0.205	0.371	0.341	0.491	0.734				
Mo	<0.001	<0.001	<0.001	0.002	<0.001	<0.001				
Na	22	34	55	42	50	64				
Ni	0.005	0.002	0.002	0.002	0.002	0.003				
Pb	<0.001	0.001	<0.001	<0.001	<0.001	<0.001				
SO_4	43	34	32	29	41	48				
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				
Se	0.01	0.03	0.1	<0.01	0.1	0.05				
V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
Zn	0.034	0.018	0.02	0.018	0.024	0.039				
RESULTS**										
SO_4 Release Rate	25	18	17	16	23	26				
Cumulative SO_4 Release	25	43	60	76	99	125				
Ca Release Rate	8	10	14	11	14	20				
Cumulative Ca Release	8	18	32	43	58	77				
Mg Release Rate	2.3	3.2	4.8	4	5.0	7.6				
Cumulative Mg Release	2.3	5.5	10	14	19	27				
Residual ANC (%)	99	98	96	95	93	91				
Residual Sulfur (%)	100	99	99	99	99	98				
SO_4/(Ca+Mg) molar ratio	0.9	0.5	0.3	0.4	0.4	0.3				

< indicates less than the analytical detection limit.

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

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

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

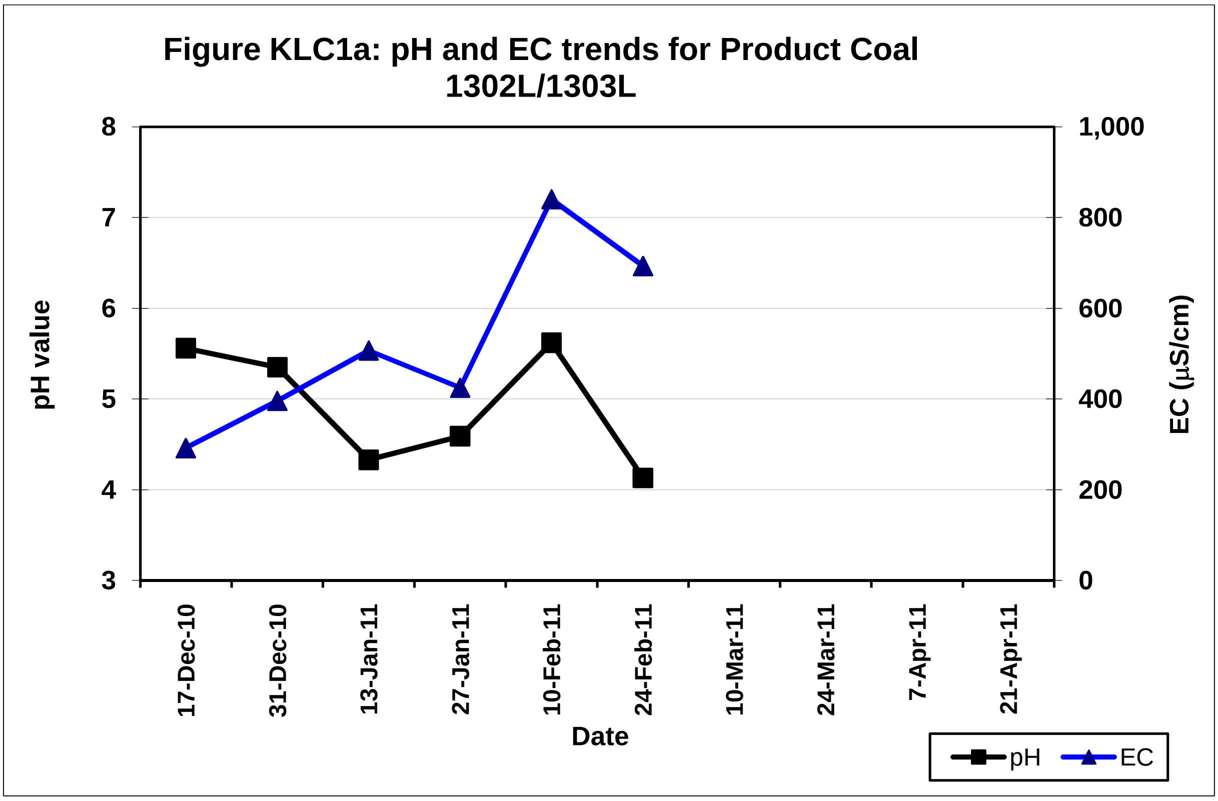

Figure KLC1a: pH and EC trends for Product Coal 1302L/1303L
pH value
EC (µS/cm)
8
7
6
5
4
3
1,000
800
600
400
200
0
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
Date
pH
EC

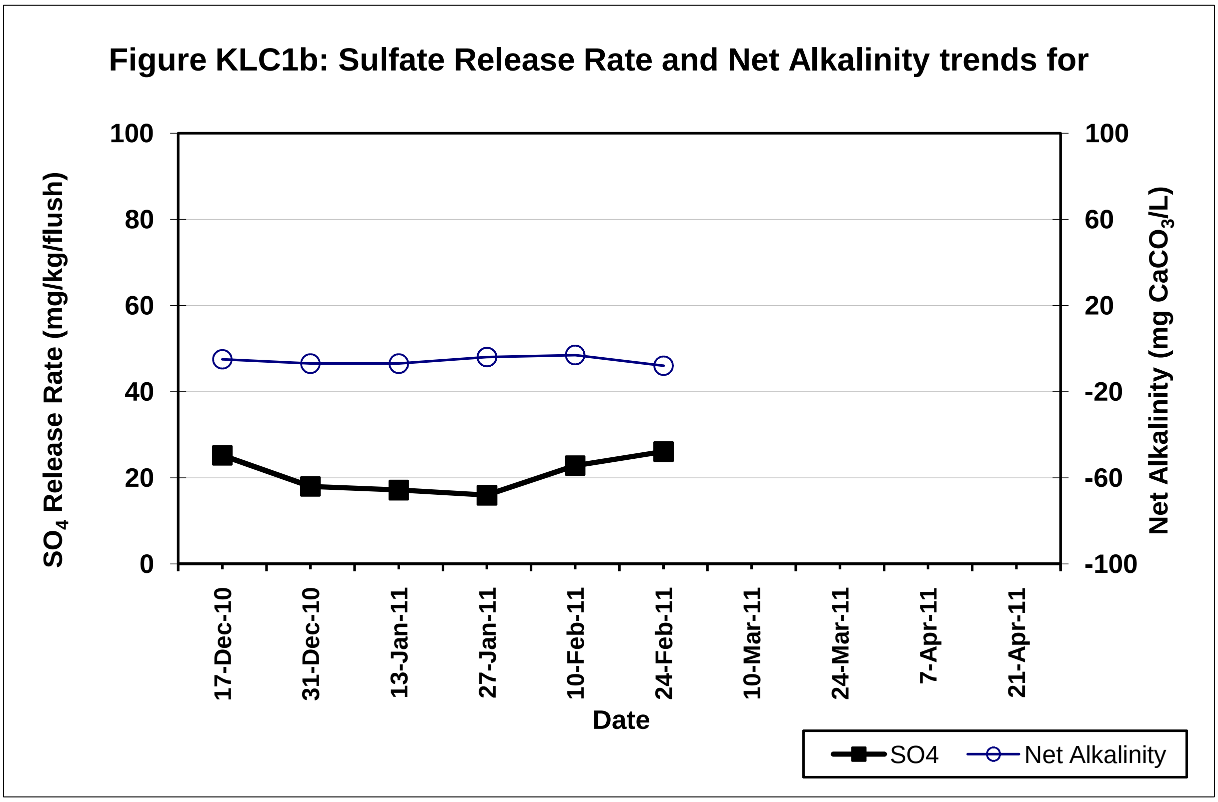

Figure KLC1b: Sulfate Release Rate and Net Alkalinity trends for
SO4 Release Rate (mg/kg/flush)
Net Alkalinity (mg CaCO3/L)
100
80
60
40
20
0
100
60
20
-20
-60
-100
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
Date
SO4
Net Alkalinity

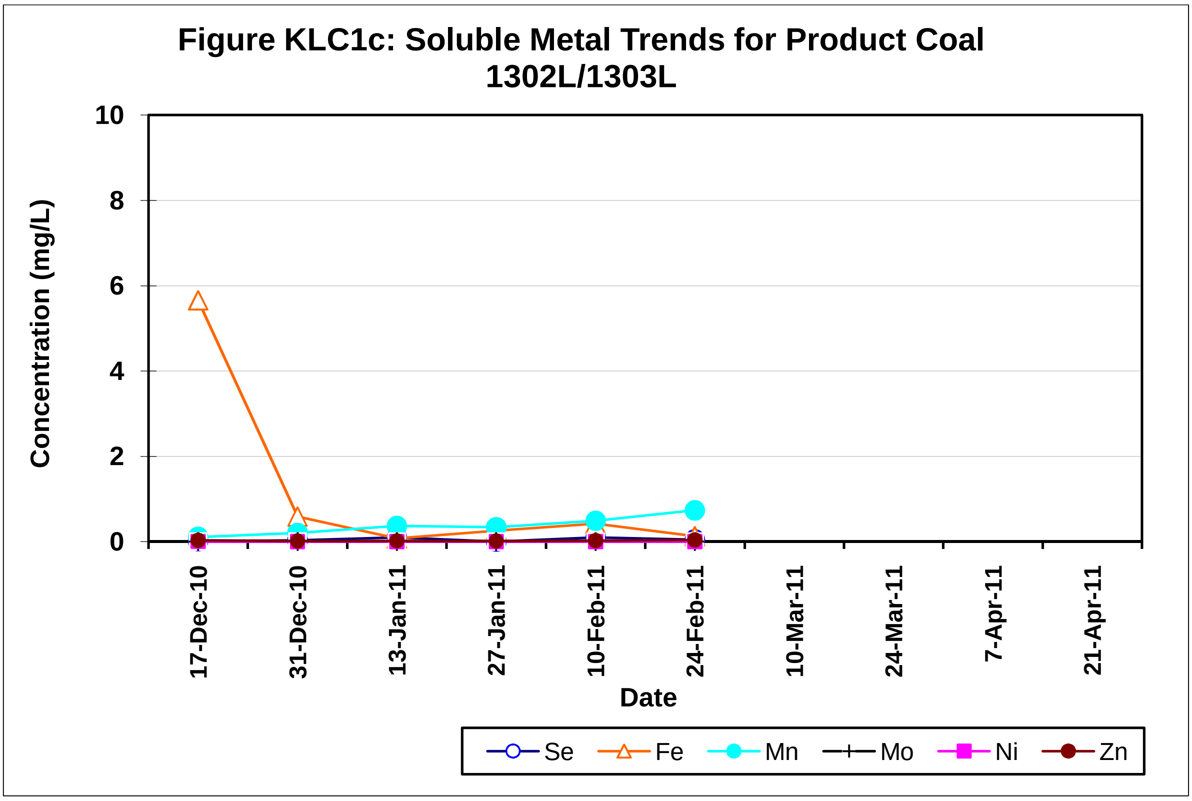
Figure KLC1c: Soluble Metal Trends for Product Coal 1302L/1303L
Concentration (mg/L)
10
8
6
4
2
0
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
Date
Se
Fe
Mn
Mo
Ni
Zn

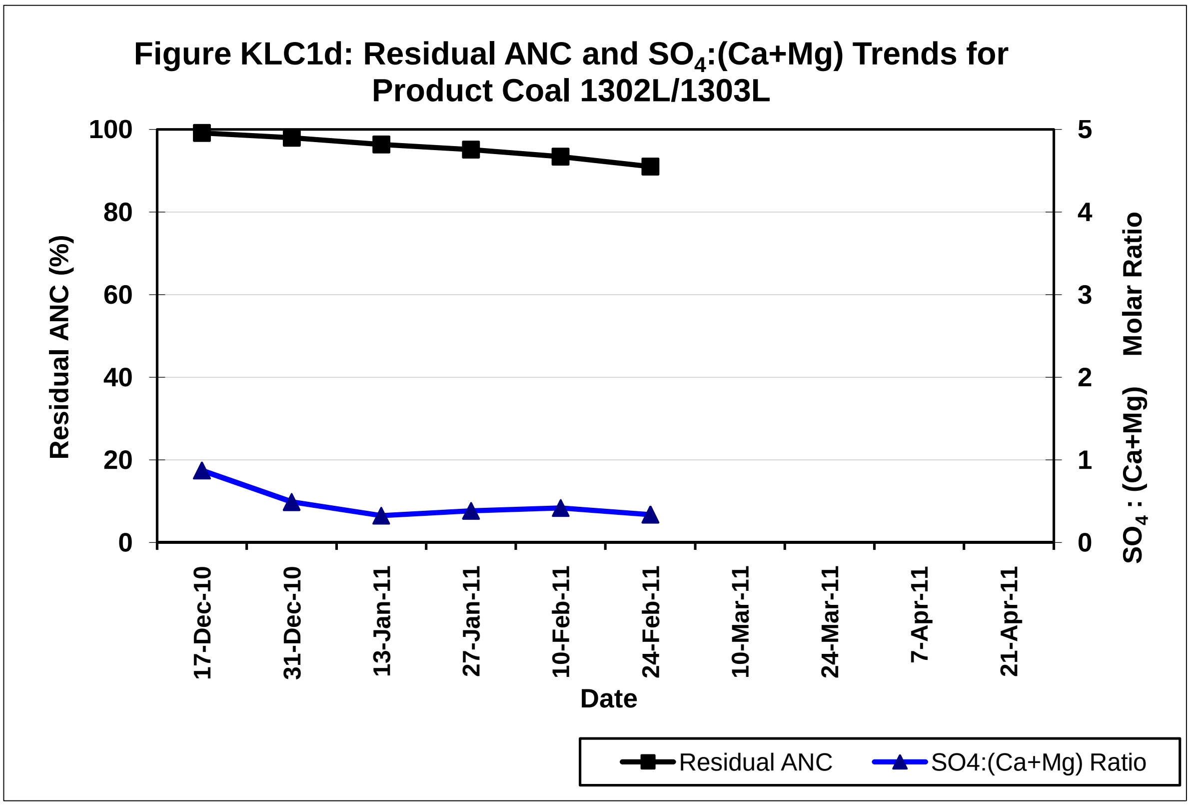
Figure KLC1d: Residual ANC and SO_4:(Ca+Mg) Trends for Product Coal 1302L/1303L
Residual ANC (%)
100
80
60
40
20
0
SO_4 : (Ca+Mg) Molar Ratio
5
4
3
2
1
0
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
Date
Residual ANC
SO4:(Ca+Mg) Ratio

Table KLC3

KLC Test Results: Coarse Reject 1302L/1303L

Sample Weight (kg)	2.0	**Total S (%)**	2.20	**ANC (kg H_2SO_4/t)**	0.5
pH(1:5)	4.1	**S_{CR} (%)**	2.02	**NAPP (kg H_2SO_4/t)**	61.4
EC(1:5) (µS/cm)	1,950	**MPA (kg H_2SO_4/t)**	61.9	**ANC:MPA ratio**	0.0

Date	**17-Dec-10**	**31-Dec-10**	**13-Jan-11**	**27-Jan-11**	**10-Feb-11**	**24-Feb-11**	**10-Mar-11**	**24-Mar-11**	**7-Apr-11**	**21-Apr-11**
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Volume Collected (L)	0.78	0.76	0.75	0.77	0.76	0.78	0.76	0.78	0.77	
Cum. Volume (L)	0.78	1.54	2.29	3.06	3.82	4.60	5.36	6.14	6.91	
Pore Volumes	0.6	1.1	1.7	2.3	2.8	3.4	4.0	4.5	5.1	
pH	3.70	3.62	2.97	3.05	3.13	2.86				
EC (µS/cm)	1,820	2,040	2,220	1,860	1,880	2,620				
Acidity (mg/L)*	269	77	85	107	127	330				
Alkalinity (mg/L)*	<1	<1	<1	<1	<1	<1				
Net Alkalinity (mg/L)*	-269	-77	-85	-107	-127	-330				
Dissolved elements (mg/L)										
Al	4.46	3.33	5.94	5.54	9.48	27.9				
As	0.024	0.038	0.085	<0.001	0.065	<0.001				
B	<0.05	0.06	0.08	0.09	<0.05	0.16				
Ca	84	105	126	92	104	121				
Cd	0.0021	0.001	0.0014	0.0015	0.0014	0.0032				
Cl	245	528	852	573	558	825				
Co	0.062	0.08	0.125	0.097	0.128	0.237				
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	0.001				
Cu	0.065	0.073	0.076	0.079	0.069	0.107				
Fe	111	12.9	2.67	5.96	11.4	2.83				
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
K	10	12	12	10	8	8				
Mg	25	46	56	45	60	91				
Mn	1.06	2.54	4.53	3.72	6.32	12.2				
Mo	0.002	0.005	<0.001	0.005	<0.001	<0.001				
Na	77	150	134	100	107	122				
Ni	0.052	0.082	0.127	0.113	0.15	0.291				
Pb	0.046	0.046	0.039	0.039	0.024	0.036				
SO_4	458	182	212	209	316	454				
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				
Se	0.1	0.16	0.32	<0.01	0.25	<0.01				
V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
Zn	0.168	0.496	0.828	0.635	0.781	1.78				
RESULTS**										
SO_4 Release Rate	179	69	80	80	120	177				
Cumulative SO_4 Release	179	248	327	408	528	705				
Ca Release Rate	33	40	47	35	40	47				
Cumulative Ca Release	33	73	120	155	195	242				
Mg Release Rate	10	17	21	17	23	35				
Cumulative Mg Release	10	27	48	66	88	124				
Residual ANC (%)	76	43	2	0	0	0				
Residual Sulfur (%)	100	100	100	99	99	99				
SO_4/(Ca+Mg) molar ratio	1.5	0.4	0.4	0.5	0.6	0.7				

< indicates less than the analytical detection limit.

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

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

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

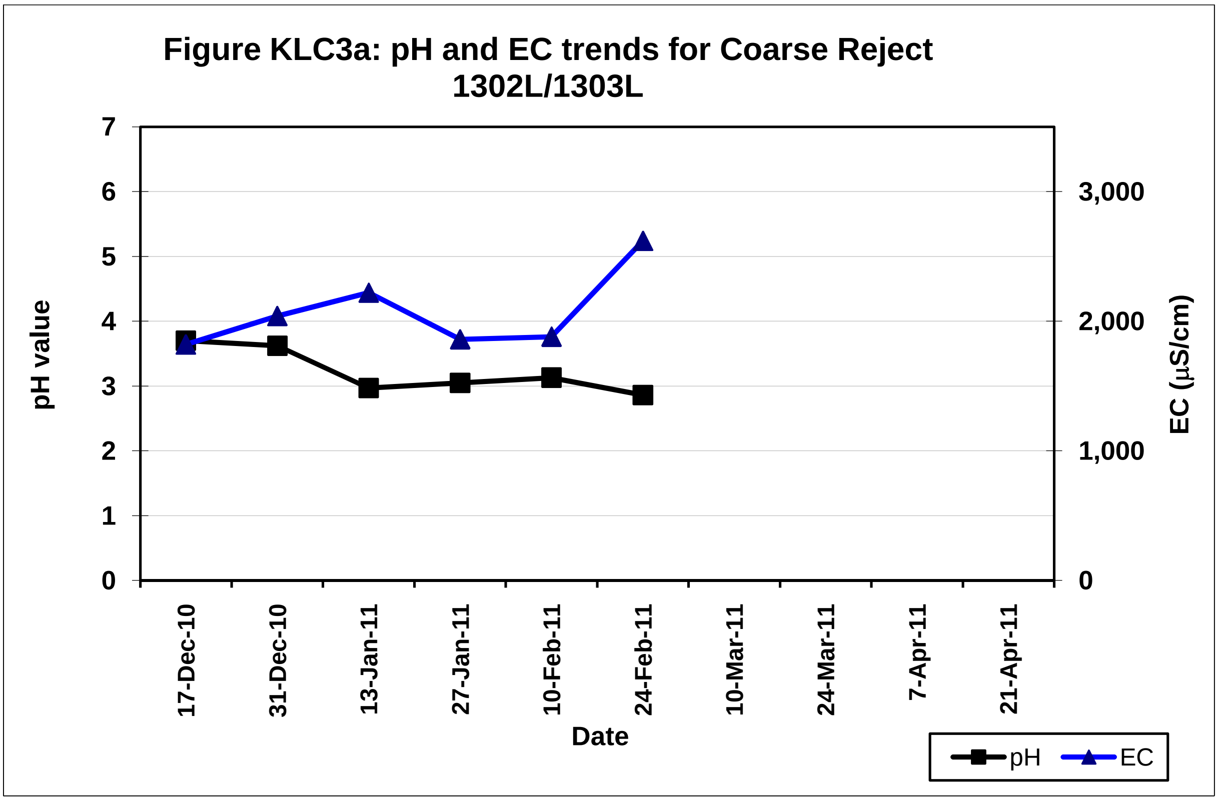

Figure KLC3a: pH and EC trends for Coarse Reject 1302L/1303L
pH value
EC (µS/cm)
Date
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
0
1
2
3
4
5
6
7
1,000
2,000
3,000
pH
EC

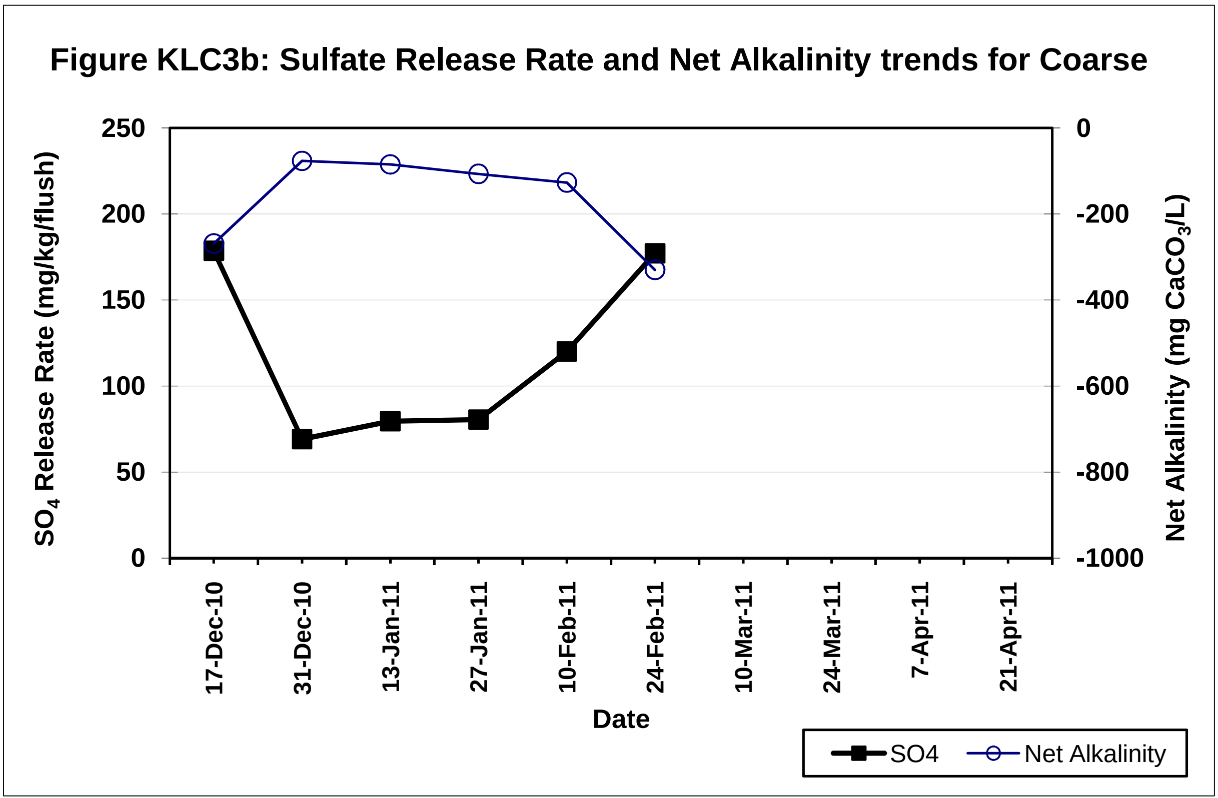

Figure KLC3b: Sulfate Release Rate and Net Alkalinity trends for Coarse
SO4 Release Rate (mg/kg/flush)
Net Alkalinity (mg CaCO3/L)
Date
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
0
50
100
150
200
250
-200
-400
-600
-800
-1000
SO4
Net Alkalinity

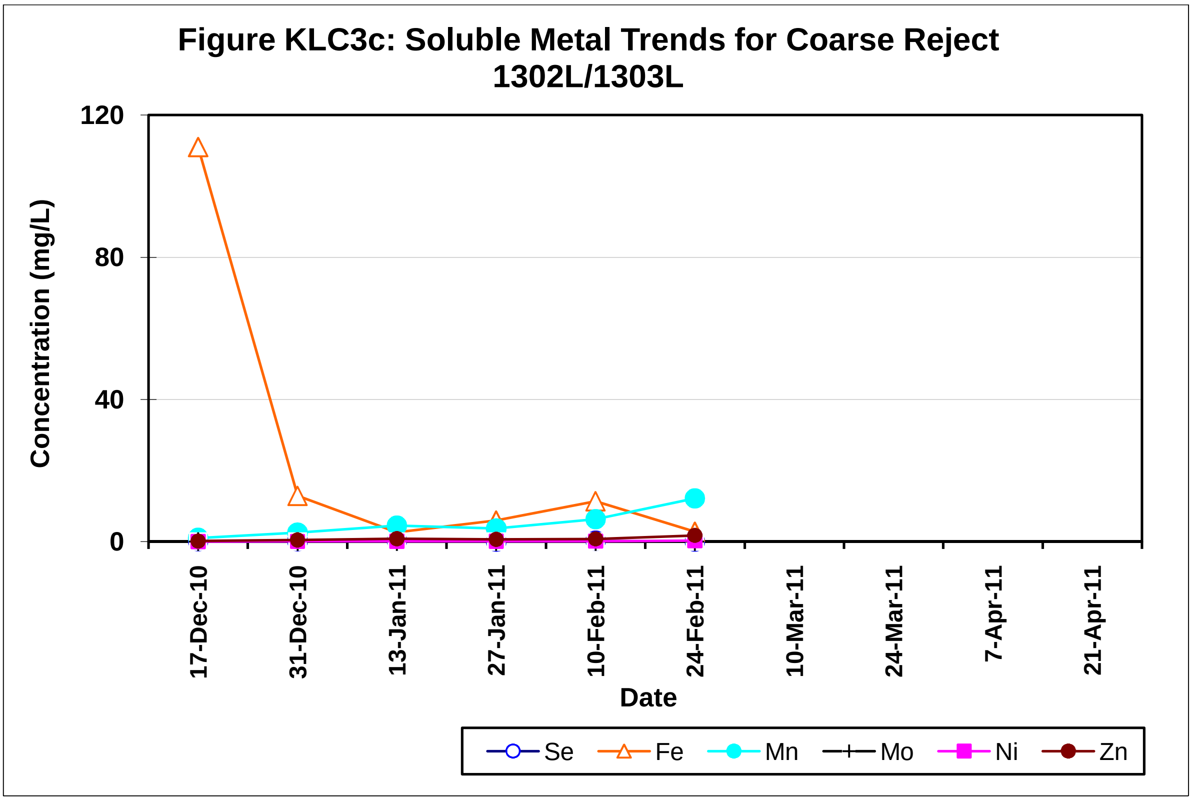
Figure KLC3c: Soluble Metal Trends for Coarse Reject 1302L/1303L
Concentration (mg/L)
120
80
40
0
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
Date
Se
Fe
Mn
Mo
Ni
Zn

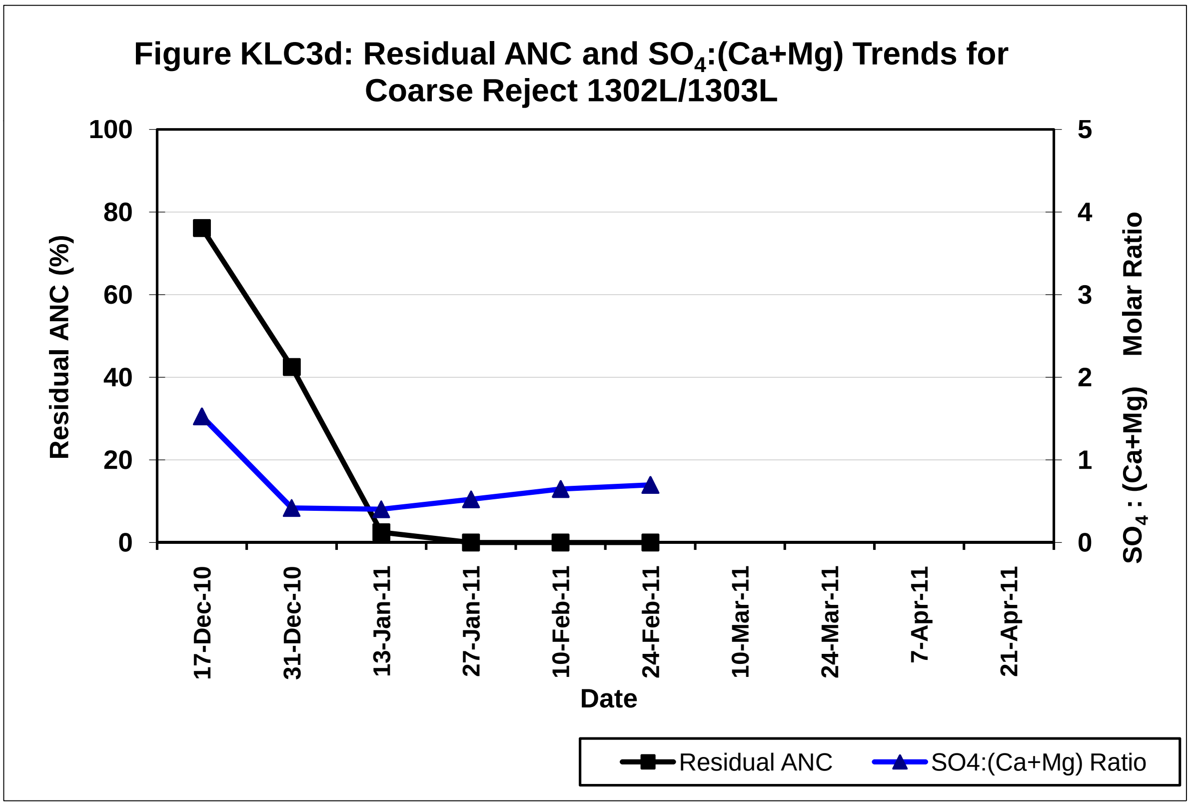
Figure KLC3d: Residual ANC and SO_4:(Ca+Mg) Trends for Coarse Reject 1302L/1303L
Residual ANC (%)
100
80
60
40
20
0
5
4
3
2
1
0
SO_4 : (Ca+Mg) Molar Ratio
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
Date
Residual ANC
SO4:(Ca+Mg) Ratio

Table KLC5

KLC Test Results: Tailings 1302L/1303L

Sample Weight (kg)	1.2	**Total S (%)**	0.59	**ANC (kg H_2SO_4/t)**	6.2
pH(1:5)	6.4	**S_{CR} (%)**	0.257	**NAPP (kg H_2SO_4/t)**	1.7
EC(1:5) (µS/cm)	356	**MPA (kg H_2SO_4/t)**	7.9	**ANC:MPA ratio**	0.8

Date	**17-Dec-10**	**31-Dec-10**	**13-Jan-11**	**27-Jan-11**	**10-Feb-11**	**24-Feb-11**	**10-Mar-11**	**24-Mar-11**	**7-Apr-11**	**21-Apr-11**
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Volume Collected (L)	0.60	0.62	0.68	0.60	0.62	0.60	0.62	0.65	0.64	
Cum. Volume (L)	0.60	1.22	1.90	2.50	3.12	3.72	4.34	4.99	5.63	
Pore Volumes	0.5	1.1	1.7	2.2	2.7	3.2	3.8	4.3	4.9	
pH	6.69	5.14	5.30	5.27	5.36	4.62				
EC (µS/cm)	1,250	917	560	513	548	490				
Acidity (mg/L)*	<1	<1	3	4	4	3				
Alkalinity (mg/L)*	64	<1	1	<1	1	1				
Net Alkalinity (mg/L)*	64	0	-2	-4	-3	-2				
Dissolved elements (mg/L)										
Al	<0.01	<0.01	<0.01	<0.01	<0.01	0.01				
As	0.014	<0.001	0.003	<0.001	0.001	<0.001				
B	1.16	0.87	0.75	0.64	0.46	0.66				
Ca	96	83	58	57	65	55				
Cd	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001				
Cl	150	61	8	13	1	6				
Co	0.012	0.007	<0.001	0.007	0.011	0.013				
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				
Cu	0.002	<0.001	<0.001	<0.001	<0.001	<0.001				
Fe	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
K	10	6	4	4	3	3				
Mg	28	22	15	14	15	12				
Mn	0.457	0.518	0.013	0.471	0.791	0.766				
Mo	0.002	<0.001	<0.001	<0.001	<0.001	<0.001				
Na	99	48	31	20	15	13				
Ni	0.009	0.003	0.001	0.003	0.006	0.007				
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				
SO_4	283	315	265	225	243	200				
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				
Se	0.11	0.02	0.02	0.02	0.02	0.01				
V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
Zn	0.149	0.1	0.07	0.105	0.209	0.241				
RESULTS**										
SO_4 Release Rate	142	163	150	113	126	100				
Cumulative SO_4 Release	142	304	454	567	692	792				
Ca Release Rate	48	43	33	29	34	28				
Cumulative Ca Release	48	91	124	152	186	213				
Mg Release Rate	14	11	8.5	7	8	6				
Cumulative Mg Release	14	25	34	41	49	55				
Residual ANC (%)	97	95	93	91	90	88				
Residual Sulfur (%)	99	98	97	97	96	96				
SO_4/(Ca+Mg) molar ratio	0.8	1.1	1.3	1.2	1.1	1.1				

< indicates less than the analytical detection limit.

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

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

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

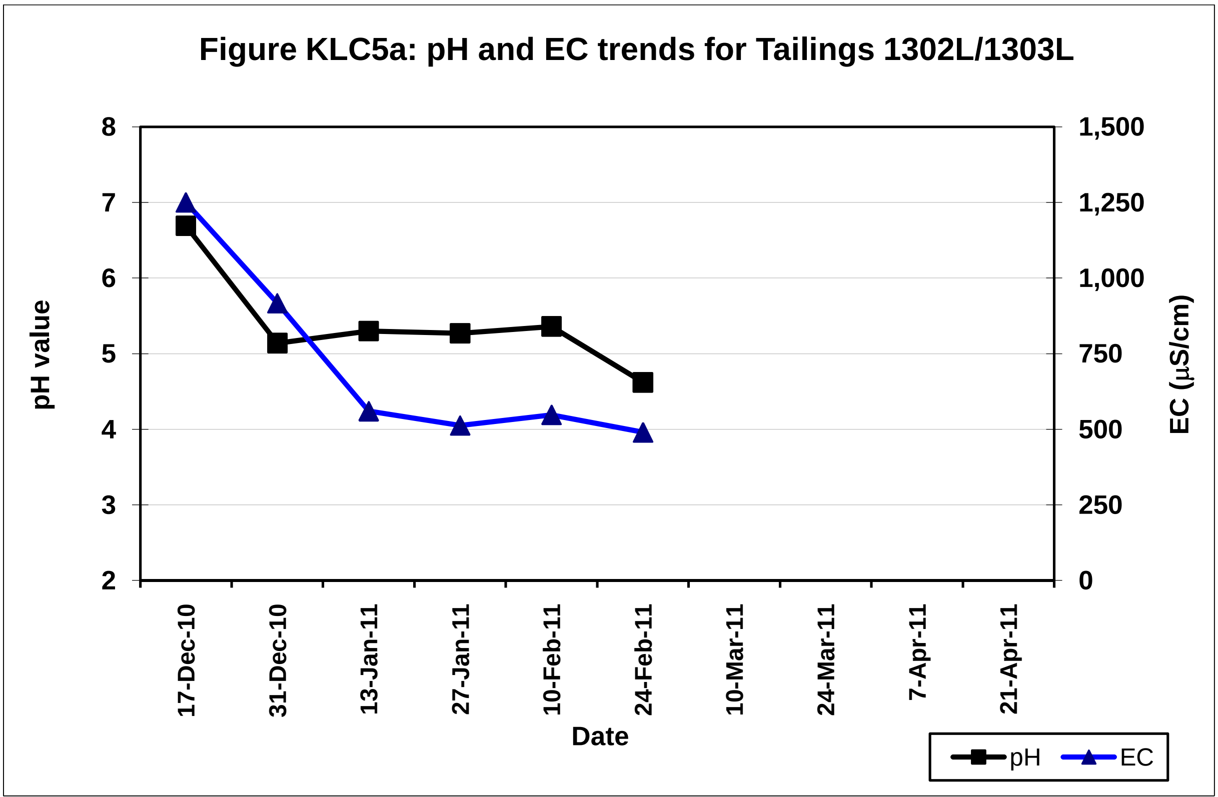
Figure KLC5a: pH and EC trends for Tailings 1302L/1303L
pH value
EC (µS/cm)
Date
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
pH
EC

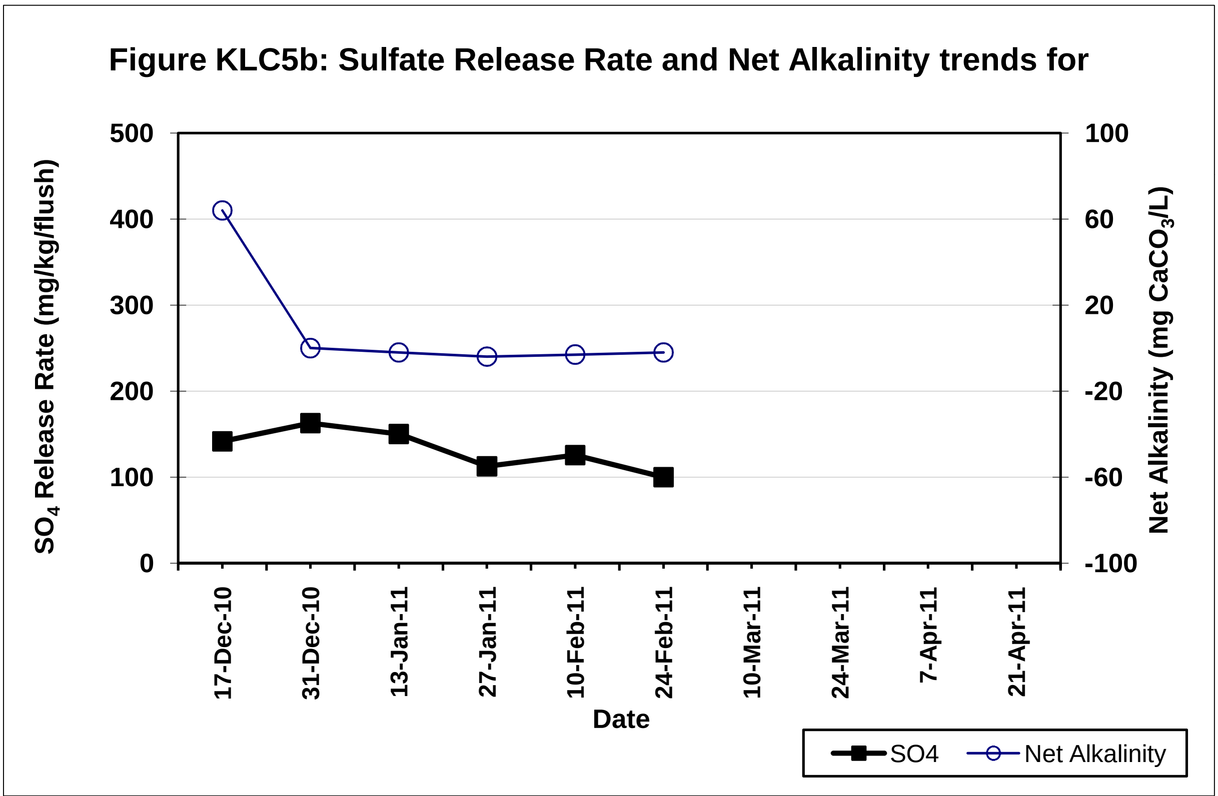
Figure KLC5b: Sulfate Release Rate and Net Alkalinity trends for
SO4 Release Rate (mg/kg/flush)
Net Alkalinity (mg CaCO3/L)
Date
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
SO4
Net Alkalinity

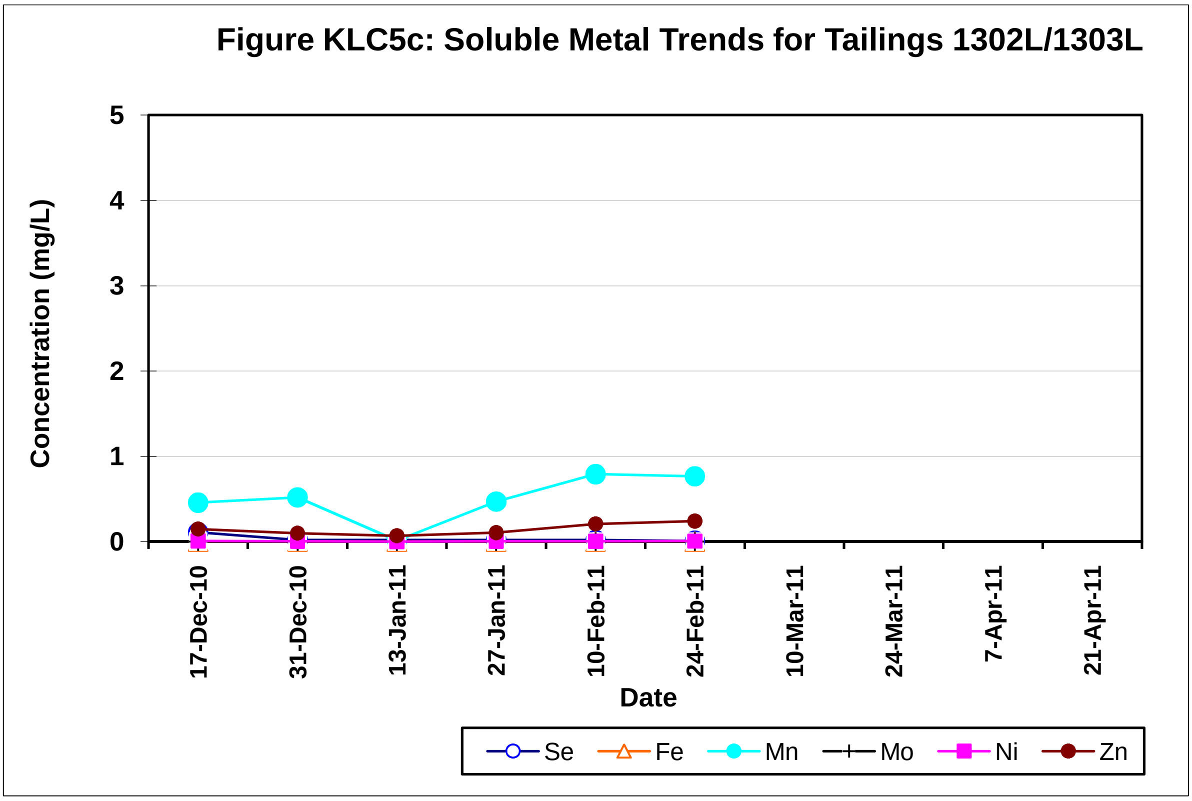
Figure KLC5c: Soluble Metal Trends for Tailings 1302L/1303L
Concentration (mg/L)
0
1
2
3
4
5
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
Date
Se
Fe
Mn
Mo
Ni
Zn

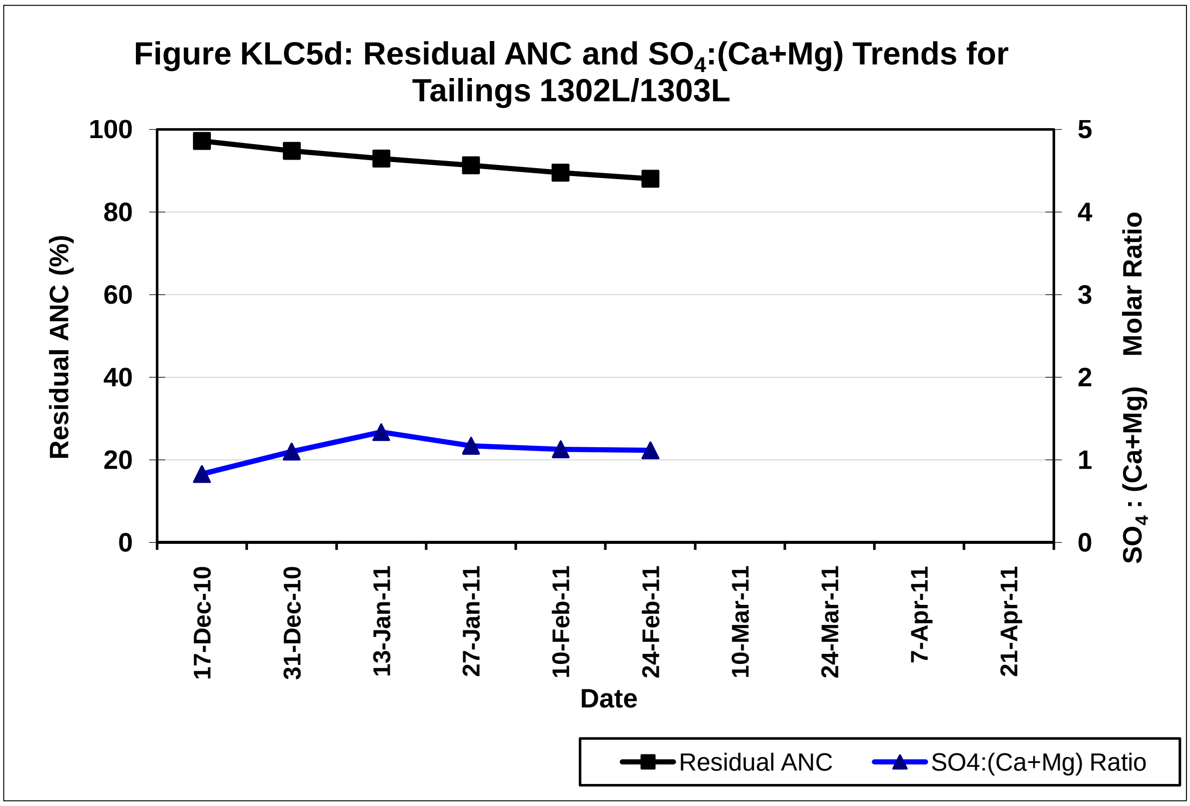
Figure KLC5d: Residual ANC and SO_4:(Ca+Mg) Trends for Tailings 1302L/1303L
Residual ANC (%)
0
20
40
60
80
100
SO_4 : (Ca+Mg) Molar Ratio
0
1
2
3
4
5
17-Dec-10
31-Dec-10
13-Jan-11
27-Jan-11
10-Feb-11
24-Feb-11
10-Mar-11
24-Mar-11
7-Apr-11
21-Apr-11
Date
Residual ANC
SO4:(Ca+Mg) Ratio

Attachment B

ALS Results for Static and Kinetic Leach Column Test Programs

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1023365**	Page	: 1 of 3
Client	: **RGS ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Carsten Emrich
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 3856 5591	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: Kevins Corner Project	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 17-DEC-2010
Sampler	: A. Robertson	Issue Date	: 18-JAN-2011
Site	: Kevins Corner		
		No. of samples received	: 3
Quote number	: BN/567/10	No. of samples analysed	: 3

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA
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	Bne Acid Sulphate Soils
Kim McCabe	Senior Inorganic Chemist	Inorganics
Myles.Clark	Acid Sulfate Soils Supervisor	Bne Acid Sulphate Soils
Myles.Clark	Acid Sulfate Soils Supervisor	Inorganics
Myles.Clark	Acid Sulfate Soils Supervisor	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

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

Analytical Results

Sub-Matrix: SOIL			Client sample ID	Tailings - 250	Rejects + 250	Product + 250	----	----
			Client sampling date / time	[17-DEC-2010]	[17-DEC-2010]	[17-DEC-2010]	----	----
Compound	CAS Number	LOR	Unit	EB1023365-001	EB1023365-002	EB1023365-003	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.4	4.1	4.8	----	----
EA009: Nett Acid Production Potential								
^ Acid Production Potential (APP)	----	0.5	kg H2SO4/t	18.0	67.3	8.3	----	----
^ Net Acid Production Potential	----	0.5	kg H2SO4/t	11.8	66.8	5.0	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	356	1950	585	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	6.2	0.5	3.3	----	----
^ ANC as CaCO3	----	0.1	% CaCO3	0.6	<0.1	0.3	----	----
Fizz Rating	----	0	Fizz Unit	0	0	0	----	----
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	0.257	2.02	0.062	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.59	2.20	0.27	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EB1103269**	Page	: 1 of 6
Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: C/- RGS ENVIRONMENTAL 18 INGLIS ST GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 7 3856 5591	Telephone	: +61 7 3243 7222
Facsimile	: ----	Facsimile	: +61 7 3243 7218
Project	: Kevins Corner Project	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 22-FEB-2011
Sampler	: ----	Issue Date	: 06-APR-2011
Site	: Kevins Corner		
		No. of samples received	: 6
Quote number	: BN/644/10	No. of samples analysed	: 3

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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Signatories

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

Signatories	*Position*	*Accreditation Category*
Andrew Epps	Metals Production Chemist	Brisbane Inorganics
Cass Sealby	Senior Chemist - Acid Sulphate Soils	Brisbane Inorganics
Cass Sealby	Senior Chemist - Acid Sulphate Soils	Stafford Minerals - AY
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
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.

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

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

- **$$: NATA accreditation does not cover performance of this service.**
- **ANC Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong.**
- **EG020-F (Dissolved Metals): LCS recovery for Sb falls outside Dynamic Control Limits. It is however within ALS Static Control Limits and hence deemed acceptable.**

Analytical Results

Sub-Matrix: **LEACHATE**

Compound	CAS Number	LOR	Unit	Fine Tailings 1492L	Coarse Reject 1492L	Raw Coal 1492L	----	----
Client sampling date / time				01-MAR-2011 14:00	01-MAR-2011 14:00	01-MAR-2011 14:00	----	----
				EB1103269-001	EB1103269-002	EB1103269-003	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.09	5.58	7.18	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	54	48	39	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	8	204	3	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	15	42	2	----	----
Magnesium	7439-95-4	1	mg/L	2	7	<1	----	----
Sodium	7440-23-5	1	mg/L	18	54	27	----	----
Potassium	7440-09-7	1	mg/L	1	6	1	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.03	0.03	0.27	----	----
Dysprosium	7429-91-6	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Bismuth	7440-69-9	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Erbium	7440-52-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	0.39	0.44	0.35	----	----
Europium	7440-53-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Strontium	7440-24-6	0.001	mg/L	0.151	1.02	0.007	----	----
Barium	7440-39-3	0.001	mg/L	0.162	0.360	0.109	----	----
Gadolinium	7440-54-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0005	<0.0001	----	----
Hafnium	7440-58-6	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Tellurium	22541-49-7	0.005	mg/L	<0.005	<0.005	<0.005	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.011	<0.001	----	----
Holmium	7440-60-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Caesium	7440-46-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Indium	7440-74-6	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.002	----	----
Lanthanum	7439-91-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Rubidium	7440-17-7	0.001	mg/L	<0.001	0.008	<0.001	----	----
Lithium	7439-93-2	0.001	mg/L	0.007	0.084	0.004	----	----

Analytical Results

Sub-Matrix: **LEACHATE**			Client sample ID	Fine Tailings 1492L	Coarse Reject 1492L	Raw Coal 1492L	----	----
			Client sampling date / time	01-MAR-2011 14:00	01-MAR-2011 14:00	01-MAR-2011 14:00	----	----
Compound	CAS Number	LOR	Unit	EB1103269-001	EB1103269-002	EB1103269-003	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Lutetium	7439-94-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cerium	7440-45-1	0.001	mg/L	<0.001	<0.001	**0.002**	----	----
Manganese	7439-96-5	0.001	mg/L	**0.054**	**0.984**	**0.004**	----	----
Neodymium	7440-00-8	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	**0.002**	----	----
Praseodymium	7440-10-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	**0.005**	<0.001	----	----
Samarium	7440-19-9	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	**0.002**	----	----
Terbium	7440-27-9	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Thulium	7440-30-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	**0.02**	----	----
Ytterbium	7440-64-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Tin	7440-31-5	0.001	mg/L	<0.001	**0.002**	<0.001	----	----
Yttrium	7440-65-5	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Zirconium	7440-67-7	0.005	mg/L	<0.005	<0.005	<0.005	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L	**0.017**	**0.569**	**0.019**	----	----
Iron	7439-89-6	0.05	mg/L	**0.07**	**6.51**	**0.69**	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.4**	**0.5**	**0.6**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	**0.02**	----	----

Analytical Results

Sub-Matrix: **PULP**			Client sample ID	Fine Tailings 1492L	Coarse Reject 1492L	Raw Coal 1492L	----	----
			Client sampling date / time	22-FEB-2011 11:00	22-FEB-2011 11:00	22-FEB-2011 11:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1103269-001**	**EB1103269-002**	**EB1103269-003**	**----**	**----**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	**1230**	**262**	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**4.9**	**1.3**	**5.1**	----	----
^ ANC as CaCO3	----	0.1	% CaCO3	**0.5**	**0.1**	**0.5**	----	----
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	----	----
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	----	0.005	%	**0.280**	**0.841**	**0.123**	----	----
EA046 Acid Buffering Characterisation Curves								
Dummy Analyte	----	-	-	----	----	----	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**1.03**	**1.62**	**0.67**	----	----

Work Order : EB1103269
Client : URS AUSTRALIA PTY LTD (QLD)
Project : Kevins Corner Project

Analytical Results

Sub-Matrix: **SOIL**			Client sample ID	**Fine Tailings 1492L**	**Coarse Reject 1492L**	**Raw Coal 1492L**	----	----
			Client sampling date / time	22-FEB-2011 11:00	22-FEB-2011 11:00	22-FEB-2011 11:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1103269-001**	**EB1103269-002**	**EB1103269-003**	**----**	**----**
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**6.2**	**4.2**	**6.6**	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**256**	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EB1106504**	Page	: 1 of 4
Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: C/- RGS ENVIRONMENTAL 18 INGLIS ST GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 7 3856 5591	Telephone	: +61 7 3243 7222
Facsimile	: ----	Facsimile	: +61 7 3243 7218
Project	: Kevins Corner Project - 43626669	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 04-APR-2011
Sampler	: Alan Robertson	Issue Date	: 14-APR-2011
Site	: Kevins Corne4r		
		No. of samples received	: 3
Quote number	: BN/644/10	No. of samples analysed	: 3

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA
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

General Comments

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

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

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

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

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

Analytical Results

Sub-Matrix: LEACHATE			Client sample ID	Tailings -250 1302L/1303/L	Rejects +250 1302L/1303/L	Product Coal +250 1302L/1303/L	----	----
			Client sampling date / time	06-APR-2011 14:00	06-APR-2011 14:00	06-APR-2011 14:00	----	----
Compound	CAS Number	LOR	Unit	EB1106504-001	EB1106504-002	EB1106504-003	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.89	4.24	5.47	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	53	538	92	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	36	253	136	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	23	114	39	----	----
Magnesium	7439-95-4	1	mg/L	6	39	12	----	----
Sodium	7440-23-5	1	mg/L	23	54	61	----	----
Potassium	7440-09-7	1	mg/L	2	8	5	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.44	17.2	0.45	----	----
Dysprosium	7429-91-6	0.001	mg/L	<0.001	0.006	<0.001	----	----
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.015	<0.001	----	----
Bismuth	7440-69-9	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Erbium	7440-52-0	0.001	mg/L	<0.001	0.003	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	1.51	1.28	1.74	----	----
Europium	7440-53-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Strontium	7440-24-6	0.001	mg/L	0.216	1.79	0.494	----	----
Barium	7440-39-3	0.001	mg/L	0.830	0.208	1.86	----	----
Gadolinium	7440-54-2	0.001	mg/L	<0.001	0.005	<0.001	----	----
Titanium	7440-32-6	0.01	mg/L	0.02	<0.01	<0.01	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	0.010	<0.001	----	----
Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0001	0.0079	0.0004	----	----
Hafnium	7440-58-6	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Tellurium	22541-49-7	0.005	mg/L	<0.005	<0.005	<0.005	----	----
Cobalt	7440-48-4	0.001	mg/L	0.004	0.100	0.010	----	----
Holmium	7440-60-0	0.001	mg/L	<0.001	0.001	<0.001	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	0.002	<0.001	----	----
Caesium	7440-46-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	0.002	0.001	----	----
Indium	7440-74-6	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	0.011	0.196	0.010	----	----
Lanthanum	7439-91-0	0.001	mg/L	<0.001	0.016	<0.001	----	----
Rubidium	7440-17-7	0.001	mg/L	0.004	0.032	0.013	----	----

Analytical Results

Sub-Matrix: **LEACHATE**

			Client sample ID	Tailings -250 1302L/1303/L	Rejects +250 1302L/1303/L	Product Coal +250 1302L/1303/L	----	----
			Client sampling date / time	06-APR-2011 14:00	06-APR-2011 14:00	06-APR-2011 14:00	----	----
Compound	CAS Number	LOR	Unit	EB1106504-001	EB1106504-002	EB1106504-003	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Lithium	7439-93-2	0.001	mg/L	**0.013**	**0.135**	**0.022**	----	----
Lutetium	7439-94-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cerium	7440-45-1	0.001	mg/L	<0.001	**0.025**	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L	**0.274**	**3.26**	**0.863**	----	----
Neodymium	7440-00-8	0.001	mg/L	<0.001	**0.013**	<0.001	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Praseodymium	7440-10-0	0.001	mg/L	<0.001	**0.003**	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	**0.004**	**0.072**	**0.005**	----	----
Samarium	7440-19-9	0.001	mg/L	<0.001	**0.004**	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	**0.008**	**0.001**	----	----
Terbium	7440-27-9	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Thulium	7440-30-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	**0.04**	**0.01**	----	----
Ytterbium	7440-64-4	0.001	mg/L	<0.001	**0.002**	<0.001	----	----
Tin	7440-31-5	0.001	mg/L	**0.003**	**0.001**	<0.001	----	----
Yttrium	7440-65-5	0.001	mg/L	<0.001	**0.028**	<0.001	----	----
Thallium	7440-28-0	0.001	mg/L	<0.001	**0.002**	<0.001	----	----
Zirconium	7440-67-7	0.005	mg/L	<0.005	<0.005	<0.005	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L	**0.709**	**2.54**	**1.31**	----	----
Iron	7439-89-6	0.05	mg/L	**0.18**	**109**	**0.39**	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.3**	**1.6**	**0.4**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	**0.03**	**0.02**	----	----

Finalized Date: 22- MAR- 2011
Account: URSAUS

ALS Minerals
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www.alsglobal.com

CERTIFICATE BR11025922

Project: Kevins Corner
P.O. No.:
This report is for 3 Pulp samples submitted to our lab in Brisbane, QLD, Australia on 25- FEB- 2011.
The following have access to data associated with this certificate:

TONY JONG	ALAN ROBERTSON 2	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
LOG- 22	Sample login - Rcd w/o BarCode
LEV- 01	Waste Disposal Levy
ASH- 01	Ashing of carbons/soils

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME- MS42	Up to 34 elements by ICP- MS	ICP- MS
C- IR07	Total Carbon (Leco)	LECO
ME- MS61	48 element four acid ICP- MS	

To: URS AUSTRALIA PTY LTD
ATTN: ALAN ROBERTSON 2
LEVEL 14
240 QUEEN STREET
BRISBANE QLD 4000

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Comments: All samples were ashed prior to ME- MS61 digestion.

Signature:

Shaun Kenny, Brisbane Laboratory Manager

Finalized Date: 22- MAR- 2011
Account: URSAUS

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Project: Kevins Corner

CERTIFICATE OF ANALYSIS BR11025922

Sample Description	Method / Analyte / Units / LOR	ME-MS61 Ag ppm 0.01	ME-MS61 Al % 0.01	ME-MS61 As ppm 0.2	ME-MS61 Ba ppm 10	ME-MS61 Be ppm 0.05	ME-MS61 Bi ppm 0.01	ME-MS61 Ca % 0.01	ME-MS61 Cd ppm 0.02	ME-MS61 Ce ppm 0.01	ME-MS61 Co ppm 0.1	ME-MS61 Cr ppm 1	ME-MS61 Cs ppm 0.05	ME-MS61 Cu ppm 0.2	ME-MS61 Fe % 0.01	ME-MS61 Ga ppm 0.05
Fine Tailings 1492L		0.43	2.09	3.9	40	0.95	0.31	0.14	0.30	17.15	2.6	13	0.21	27.7	3.32	8.52
Coarse Reject 1492L		7.58	9.91	28.9	70	0.62	0.49	0.11	0.24	9.84	1.6	4	0.65	15.1	6.14	21.8
Raw Coal 1492L		1.23	4.26	2.3	50	1.43	0.45	0.10	0.24	9.29	4.1	7	0.35	15.4	2.62	13.45

Comments: All samples were ashed prior to ME- MS61 digestion.

***** See Appendix Page for comments regarding this certificate *****

Finalized Date: 22- MAR- 2011
Account: URSAUS

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Project: Kevins Corner

CERTIFICATE OF ANALYSIS BR11025922

Sample Description / Method / Analyte / Units / LOR	ME- MS61 Ge ppm 0.05	ME- MS61 Hf ppm 0.1	ME- MS61 In ppm 0.005	ME- MS61 K % 0.01	ME- MS61 La ppm 0.5	ME- MS61 Li ppm 0.2	ME- MS61 Mg % 0.01	ME- MS61 Mn ppm 5	ME- MS61 Mo ppm 0.05	ME- MS61 Na % 0.01	ME- MS61 Nb ppm 0.1	ME- MS61 Ni ppm 0.2	ME- MS61 P ppm 10	ME- MS61 Pb ppm 0.5	ME- MS61 Rb ppm 0.1
Fine Tailings 1492L	0.49	2.4	0.031	0.04	7.2	8.9	0.05	329	4.14	0.02	4.3	5.0	40	17.1	1.8
Coarse Reject 1492L	0.21	3.1	0.056	0.22	3.6	40.9	0.08	497	2.73	0.04	8.9	1.9	160	33.0	6.2
Raw Coal 1492L	0.24	2.8	0.041	0.12	3.3	20.2	0.05	244	1.99	0.04	5.5	6.4	70	23.2	2.9

Comments: All samples were ashed prior to ME- MS61 digestion.

***** See Appendix Page for comments regarding this certificate *****

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Finalized Date: 22- MAR- 2011
Account: URSAUS

Project: Kevins Corner

CERTIFICATE OF ANALYSIS BR11025922

Sample Description	Method / Analyte / Units / LOR	ME- MS61 Re ppm 0.002	ME- MS61 S % 0.01	ME- MS61 Sb ppm 0.05	ME- MS61 Sc ppm 0.1	ME- MS61 Se ppm 1	ME- MS61 Sn ppm 0.2	ME- MS61 Sr ppm 0.2	ME- MS61 Ta ppm 0.05	ME- MS61 Te ppm 0.05	ME- MS61 Th ppm 0.2	ME- MS61 Ti % 0.005	ME- MS61 Tl ppm 0.02	ME- MS61 U ppm 0.1	ME- MS61 V ppm 1	ME- MS61 W ppm 0.1
Fine Tailings 1492L		<0.002	0.12	0.74	3.8	<1	1.4	18.5	0.23	0.08	5.4	0.099	1.32	1.6	26	1.1
Coarse Reject 1492L		<0.002	0.07	0.39	4.7	1	3.3	22.4	0.92	0.09	5.9	0.351	3.79	3.6	16	2.7
Raw Coal 1492L		<0.002	0.08	0.60	4.8	1	1.9	20.4	0.48	0.07	5.3	0.185	0.60	2.4	24	1.6

Comments: All samples were ashed prior to ME- MS61 digestion.

***** See Appendix Page for comments regarding this certificate *****

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Finalized Date: 22- MAR- 2011
Account: URSAUS

Project: Kevins Corner

CERTIFICATE OF ANALYSIS BR11025922

Sample Description	Method Analyte Units LOR	ME- MS61 Y ppm 0.1	ME- MS61 Zn ppm 2	ME- MS61 Zr ppm 0.5	ME- MS42 Hg ppm 0.005	ME- MS42 As ppm 0.1	ME- MS42 Sb ppm 0.05	ME- MS42 Se ppm 0.2	ME- MS42 Te ppm 0.01	ME- MS42 Tl ppm 0.02	C- IR07 C % 0.01
Fine Tailings 1492L		9.5	69	105.5	0.113	4.2	0.20	1.9	0.06	0.25	>50
Coarse Reject 1492L		4.8	16	62.9	0.526	28.1	0.21	4.5	0.07	2.52	11.30
Raw Coal 1492L		6.0	17	88.3	0.059	1.6	0.19	1.8	0.07	0.10	45.6

Comments: All samples were ashed prior to ME- MS61 digestion.

***** See Appendix Page for comments regarding this certificate *****

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Finalized Date: 22- MAR- 2011
Account: URSAUS

Project: Kevins Corner

CERTIFICATE OF ANALYSIS BR11025922

Method	CERTIFICATE COMMENTS
ME- MS61	REE's may not be totally soluble in this method.

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Finalized Date: 24-JAN-2011
Account: RGSENV

CERTIFICATE BR11003504

Project: Kevins Corner Project
P.O. No.:
This report is for 3 Pulp samples submitted to our lab in Brisbane, QLD, Australia on 14-JAN-2011.
The following have access to data associated with this certificate:

TONY JONG	ALAN ROBERTSON	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
LEV-01	Waste Disposal Levy
LOG-22	Sample login - Rcd w/o BarCode

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION
ME-MS61	48 element four acid ICP-MS

To: RGS ENVIRONMENTAL PTY LTD
ATTN: ALAN ROBERTSON
18 INGLIS STREET
GRANGE QLD 4051

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:

Shaun Kenny, Brisbane Laboratory Manager

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Finalized Date: 24-JAN-2011
Account: RGSENV

Project: Kevins Corner Project

CERTIFICATE OF ANALYSIS BR11003504

Sample Description	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
	Analyte	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga
	Units	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
	LOR	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2	0.01	0.05
Tailings - 250		0.04	2.56	1.9	60	1.45	0.21	0.12	0.10	27.1	3.3	32	0.36	12.7	2.20	8.43
Rejects +250		0.11	13.50	64.6	140	0.98	0.75	0.14	0.23	73.6	2.3	16	1.30	19.7	4.75	29.7
Product +250		0.02	1.88	1.3	40	3.41	0.30	0.12	0.08	30.3	5.6	28	0.23	12.9	0.77	6.62

***** See Appendix Page for comments regarding this certificate *****

Finalized Date: 24-JAN-2011
Account: RGSENV

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Project: Kevins Corner Project

CERTIFICATE OF ANALYSIS BR11003504

Sample Description	Method / Analyte / Units / LOR	ME-MS61 Ge ppm 0.05	ME-MS61 Hf ppm 0.1	ME-MS61 In ppm 0.005	ME-MS61 K % 0.01	ME-MS61 La ppm 0.5	ME-MS61 Li ppm 0.2	ME-MS61 Mg % 0.01	ME-MS61 Mn ppm 5	ME-MS61 Mo ppm 0.05	ME-MS61 Na % 0.01	ME-MS61 Nb ppm 0.1	ME-MS61 Ni ppm 0.2	ME-MS61 P ppm 10	ME-MS61 Pb ppm 0.5	ME-MS61 Rb ppm 0.1
Tailings - 250		0.11	1.9	0.030	0.09	12.8	11.3	0.05	237	0.88	0.02	3.7	10.2	50	10.7	5.2
Rejects +250		0.22	4.1	0.086	0.38	34.6	66.1	0.13	244	4.19	0.06	10.8	6.0	210	32.2	20.7
Product +250		0.09	1.9	0.029	0.04	14.4	10.6	0.04	82	1.01	0.03	3.1	15.6	30	9.7	2.6

***** See Appendix Page for comments regarding this certificate *****

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Project: Kevins Corner Project

CERTIFICATE OF ANALYSIS BR11003504

Sample Description	Method Analyte Units LOR	ME-MS61 Re ppm 0.002	ME-MS61 S % 0.01	ME-MS61 Sb ppm 0.05	ME-MS61 Sc ppm 0.1	ME-MS61 Se ppm 1	ME-MS61 Sn ppm 0.2	ME-MS61 Sr ppm 0.2	ME-MS61 Ta ppm 0.05	ME-MS61 Te ppm 0.05	ME-MS61 Th ppm 0.2	ME-MS61 Ti % 0.005	ME-MS61 Tl ppm 0.02	ME-MS61 U ppm 0.1	ME-MS61 V ppm 1	ME-MS61 W ppm 0.1
Tailings - 250		<0.002	0.30	0.53	4.1	1	1.1	16.8	0.24	0.07	5.1	0.106	0.87	1.5	21	0.9
Rejects + 250		0.002	2.43	0.51	7.8	6	4.8	34.9	1.20	0.16	14.5	0.477	5.05	4.5	25	2.9
Product + 250		0.002	0.39	0.83	5.0	2	1.0	18.5	0.22	0.11	5.5	0.101	0.53	1.6	23	0.7

***** See Appendix Page for comments regarding this certificate *****

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Finalized Date: 24-JAN-2011
Account: RGSENV

Project: Kevins Corner Project

CERTIFICATE OF ANALYSIS BR11003504

Sample Description	Method / Analyte / Units / LOR	ME-MS61 Y ppm 0.1	ME-MS61 Zn ppm 2	ME-MS61 Zr ppm 0.5
Tailings - 250		11.2	56	65.5
Rejects +250		20.2	23	95.5
Product +250		15.9	15	67.3

***** See Appendix Page for comments regarding this certificate *****

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www.alsglobal.com

Finalized Date: 24-JAN-2011
Account: RGSENV

Project: Kevins Corner Project

CERTIFICATE OF ANALYSIS BR11003504

Method	CERTIFICATE COMMENTS
ME-MS61	REE's may not be totally soluble in this method.

CERTIFICATE OF ANALYSIS

Work Order	: **EB1100418**	Page	: 1 of 6
Client	: **RGS ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Carsten Emrich
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 3856 5591	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 091040 Kevins Corner	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 10-JAN-2011
Sampler	: ----	Issue Date	: 27-JAN-2011
Site	: ----		
		No. of samples received	: 6
Quote number	: BN/567/10	No. of samples analysed	: 6

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Herman Lin	Laboratory Coordinator	Inorganics
Luke Witham	Senior Inorganic Chemist	Inorganics
Nanthini Coilparampil	Senior Inorganic Chemist	Inorganics
Nikki Stepniewski	Non-metallic Supervisor	Inorganics
Sarah Millington	Senior Inorganic Chemist	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

- **EG020: An unpreserved aliquot from the natural bottle was used for analysis**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	kevins Corner (Product Coal)	kevins Corner (Rejects)	kevins Corner (Tailings)	kevins Corner (Product Coal)	kevins Corner (Rejects)
			Client sampling date / time	17-DEC-2009 15:00	17-DEC-2009 15:00	17-DEC-2009 15:00	31-DEC-2010 15:00	31-DEC-2010 15:00
				EB1100418-001	EB1100418-002	EB1100418-003	EB1100418-004	EB1100418-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.56	3.70	6.69	5.35	3.62
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	292	1820	1250	396	2040
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	5	<1	64	3	<1
Total Alkalinity as CaCO3	----	1	mg/L	5	<1	64	3	<1
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	10	269	<1	10	77
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	43	458	283	34	182
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	43	245	150	83	528
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	14	84	96	19	105
Magnesium	7439-95-4	1	mg/L	4	25	28	6	46
Sodium	7440-23-5	1	mg/L	22	77	99	34	150
Potassium	7440-09-7	1	mg/L	2	10	10	3	12
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.08	4.46	<0.01	0.12	3.33
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	0.002	0.024	0.014	0.004	0.038
Cadmium	7440-43-9	0.0001	mg/L	0.0001	0.0021	0.0001	<0.0001	0.0010
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.065	0.002	0.001	0.073
Cobalt	7440-48-4	0.001	mg/L	0.008	0.062	0.012	0.004	0.080
Nickel	7440-02-0	0.001	mg/L	0.005	0.052	0.009	0.002	0.082
Lead	7439-92-1	0.001	mg/L	<0.001	0.046	<0.001	0.001	0.046
Zinc	7440-66-6	0.005	mg/L	0.034	0.168	0.149	0.018	0.496
Manganese	7439-96-5	0.001	mg/L	0.110	1.06	0.457	0.205	2.54
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.002	0.002	<0.001	0.005
Selenium	7782-49-2	0.01	mg/L	0.01	0.10	0.11	0.03	0.16
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Boron	7440-42-8	0.05	mg/L	0.07	<0.05	1.16	0.09	0.06
Iron	7439-89-6	0.05	mg/L	5.66	111	<0.05	0.59	12.9

Analytical Results

Sub-Matrix: **WATER**			Client sample ID	kevins Corner (Product Coal)	kevins Corner (Rejects)	kevins Corner (Tailings)	kevins Corner (Product Coal)	kevins Corner (Rejects)
			Client sampling date / time	17-DEC-2009 15:00	17-DEC-2009 15:00	17-DEC-2009 15:00	31-DEC-2010 15:00	31-DEC-2010 15:00
Compound	CAS Number	LOR	Unit	EB1100418-001	EB1100418-002	EB1100418-003	EB1100418-004	EB1100418-005
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**2.21**	**16.4**	**11.4**	----	**18.7**
Total Anions	----	0.01	meq/L	----	----	----	**3.11**	----
^ Total Cations	----	0.01	meq/L	**2.03**	----	**11.7**	----	----
Total Cations	----	0.01	meq/L	----	**15.8**	----	**3.00**	**16.9**
^ Ionic Balance	----	0.01	%	----	----	**1.17**	----	----
Ionic Balance	----	0.01	%	----	**1.95**	----	**1.83**	**4.95**

Analytical Results

Sub-Matrix: **WATER**			Client sample ID	kevins Corner (Tailings)	----	----	----	----
			Client sampling date / time	31-DEC-2010 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1100418-006	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**5.14**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**917**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	----	----	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	<1	----	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**315**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**61**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**83**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**22**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**48**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**6**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	----	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.007**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.003**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.100**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.518**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	**0.02**	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**0.87**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: WATER			Client sample ID	kevins Corner (Tailings)	----	----	----	----
			Client sampling date / time	31-DEC-2010 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	**EB1100418-006**	**----**	**----**	**----**	**----**
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**8.28**	----	----	----	----
^ Total Cations	----	0.01	meq/L	**8.21**	----	----	----	----
^ Ionic Balance	----	0.01	%	**0.37**	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EB1101253**	Page	: 1 of 4
Client	: **RGS ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Carsten Emrich
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 3856 5591	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 091040 Kevins Corner	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 24-JAN-2011
Sampler	: A. Robertson	Issue Date	: 07-FEB-2011
Site	: ----		
		No. of samples received	: 3
Quote number	: BN/567/10	No. of samples analysed	: 3

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

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

General Comments

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

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

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

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

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

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

- **Ionic Balance out of acceptable limits for sample 2 (Coarse Reject 2) due to analytes not quantified in this report.**
- **LCS recovery for ED045G Chloride fall outside Dynamic Control Limits. They are however within ALS Static Control Limits and hence deemed acceptable. No further action is required.**

Analytical Results

Sub-Matrix: **LIQUID**			Client sample ID	Product Coal 1	Coarse Reject 2	Taillings 3	----	----
			Client sampling date / time	13-JAN-2011 15:00	13-JAN-2011 15:00	13-JAN-2011 15:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1101253-001**	**EB1101253-002**	**EB1101253-003**	**----**	**----**
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**4.33**	**2.97**	**5.30**	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**507**	**2220**	**560**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	**1**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	**1**	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	**7**	**85**	**3**	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**32**	**212**	**265**	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**140**	**852**	**8**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**26**	**126**	**58**	----	----
Magnesium	7439-95-4	1	mg/L	**9**	**56**	**15**	----	----
Sodium	7440-23-5	1	mg/L	**55**	**134**	**31**	----	----
Potassium	7440-09-7	1	mg/L	**3**	**12**	**4**	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.09**	**5.94**	<0.01	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.024**	**0.085**	**0.003**	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	**0.0014**	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	**0.002**	**0.076**	<0.001	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.004**	**0.125**	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.127**	**0.001**	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	**0.039**	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	**0.020**	**0.828**	**0.070**	----	----
Manganese	7439-96-5	0.001	mg/L	**0.371**	**4.53**	**0.013**	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	**0.10**	**0.32**	**0.02**	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Boron	7440-42-8	0.05	mg/L	**0.14**	**0.08**	**0.75**	----	----
Iron	7439-89-6	0.05	mg/L	**0.08**	**2.67**	<0.05	----	----
EG035F: Dissolved Mercury by FIMS								

Analytical Results

Sub-Matrix: LIQUID			Client sample ID	Product Coal 1	Coarse Reject 2	Taillings 3	----	----
			Client sampling date / time	13-JAN-2011 15:00	13-JAN-2011 15:00	13-JAN-2011 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1101253-001	EB1101253-002	EB1101253-003	----	----
EG035F: Dissolved Mercury by FIMS - Continued								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**4.62**	**28.4**	**5.76**	----	----
^ Total Cations	----	0.01	meq/L	**4.51**	**17.0**	**5.57**	----	----
^ Ionic Balance	----	0.01	%	**1.16**	**25.0**	**1.66**	----	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1102118**	Page	: 1 of 4
Client	: **RGS ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Carsten Emrich
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 3856 5591	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 091040 Kevins Corner	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 07-FEB-2011
Sampler	: ----	Issue Date	: 24-FEB-2011
Site	: ----		
		No. of samples received	: 3
Quote number	: BN/567/10	No. of samples analysed	: 3

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

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- General Comments
- Analytical Results

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Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Herman Lin	Laboratory Coordinator	Inorganics
Kim McCabe	Senior Inorganic Chemist	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.

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

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Product Coal 1	Coarse Reject 2	Tailings 3	----	----
			Client sampling date / time	27-JAN-2011 15:00	27-JAN-2011 15:00	27-JAN-2011 15:00	----	----
				EB1102118-001	**EB1102118-002**	**EB1102118-003**	**----**	**----**
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**4.59**	**3.05**	**5.27**	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**425**	**1860**	**513**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	**4**	**107**	**4**	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**29**	**209**	**225**	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**115**	**573**	**13**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**20**	**92**	**57**	----	----
Magnesium	7439-95-4	1	mg/L	**7**	**45**	**14**	----	----
Sodium	7440-23-5	1	mg/L	**42**	**100**	**20**	----	----
Potassium	7440-09-7	1	mg/L	**3**	**10**	**4**	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.04**	**5.54**	<0.01	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	**0.0015**	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	**0.079**	<0.001	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.003**	**0.097**	**0.007**	----	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.113**	**0.003**	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	**0.039**	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	**0.018**	**0.635**	**0.105**	----	----
Manganese	7439-96-5	0.001	mg/L	**0.341**	**3.72**	**0.471**	----	----
Molybdenum	7439-98-7	0.001	mg/L	**0.002**	**0.005**	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	**0.02**	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Boron	7440-42-8	0.05	mg/L	**0.13**	**0.09**	**0.64**	----	----
Iron	7439-89-6	0.05	mg/L	**0.26**	**5.96**	<0.05	----	----
EG035F: Dissolved Mercury by FIMS								

Analytical Results

Sub-Matrix: WATER			Client sample ID	Product Coal 1	Coarse Reject 2	Tailings 3	----	----
			Client sampling date / time	27-JAN-2011 15:00	27-JAN-2011 15:00	27-JAN-2011 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1102118-001	EB1102118-002	EB1102118-003	----	----
EG035F: Dissolved Mercury by FIMS - Continued								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EB1103167**	Page	: 1 of 4
Client	: **RGS ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3856 5591	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 091040 Kevins Corner	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 091040		
C-O-C number	: ----	Date Samples Received	: 21-FEB-2011
Sampler	: A Robertson	Issue Date	: 03-MAR-2011
Site	: ----		
		No. of samples received	: 3
Quote number	: BN/567/10	No. of samples analysed	: 3

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

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- Analytical Results

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WORLD RECOGNISED ACCREDITATION

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Signatories

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

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

General Comments

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

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

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

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

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

Analytical Results

Sub-Matrix: **LIQUID**			Client sample ID	Product Coal 1	Coarse Reject 2	Tailings 3	----	----
			Client sampling date / time	10-FEB-2011 15:00	10-FEB-2011 15:00	10-FEB-2011 15:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1103167-001**	**EB1103167-002**	**EB1103167-003**	**----**	**----**
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**5.62**	**3.13**	**5.36**	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**840**	**1880**	**548**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**1**	<1	**1**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**1**	<1	**1**	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	**4**	**127**	**4**	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**41**	**316**	**243**	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**141**	**558**	**1**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**26**	**104**	**65**	----	----
Magnesium	7439-95-4	1	mg/L	**9**	**60**	**15**	----	----
Sodium	7440-23-5	1	mg/L	**50**	**107**	**15**	----	----
Potassium	7440-09-7	1	mg/L	**3**	**8**	**3**	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.06**	**9.48**	<0.01	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.023**	**0.065**	**0.001**	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	**0.0014**	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	**0.001**	**0.069**	<0.001	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.004**	**0.128**	**0.011**	----	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.150**	**0.006**	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	**0.024**	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	**0.024**	**0.781**	**0.209**	----	----
Manganese	7439-96-5	0.001	mg/L	**0.491**	**6.32**	**0.791**	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	**0.10**	**0.25**	**0.02**	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Boron	7440-42-8	0.05	mg/L	**0.11**	<0.05	**0.46**	----	----
Iron	7439-89-6	0.05	mg/L	**0.42**	**11.4**	<0.05	----	----
EG035F: Dissolved Mercury by FIMS								

Analytical Results

Sub-Matrix: LIQUID			Client sample ID	Product Coal 1	Coarse Reject 2	Tailings 3	----	----
			Client sampling date / time	10-FEB-2011 15:00	10-FEB-2011 15:00	10-FEB-2011 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1103167-001	EB1103167-002	EB1103167-003	----	----
EG035F: Dissolved Mercury by FIMS - Continued								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EB1104286**	Page	: 1 of 6
Client	: **RGS ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALAN ROBERTSON	Contact	: Customer Services
Address	: 18 INGLIS STREET GRANGE QLD, AUSTRALIA 4051	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alan@rgsenv.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3856 5591	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3856 5591	Facsimile	: +61 7 3243 7218
Project	: 091040 Kevins Corner	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 07-MAR-2011
Sampler	: A.Robertson	Issue Date	: 18-MAR-2011
Site	: ----		
		No. of samples received	: 6
Quote number	: BN/567/10	No. of samples analysed	: 6

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

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

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

- **EG020A-F (Dissolved Metals): LCS recovery for Sb falls outside Dynamic Control Limits. It is however within ALS Static Control Limits and hence deemed acceptable.**
- **EG020F (Dissolved Metals): Sample EB1104281-010 shows poor matrix spike recovery due to matrix interference. Confirmed by re-extraction and re-analysis.**
- **Ionic Balance out of acceptable limits for samples Kevins Corner Coarse Reject 2 and Kevins Corner 5 due to analytes not quantified in this report.**
- **Ionic balances are within acceptable limits as detailed in the 21st Ed. APHA "Standard Methods for the Examination of Water and Wastewater".**

Analytical Results

Sub-Matrix: **LIQUID**			Client sample ID	Kevins Corner Product Coal 1	Kevins Corner Coarse Reject 2	Kevins Corner Fine Rejects 3	Kevins Corner 4	Kevins Corner 5
			Client sampling date / time	24-FEB-2011 15:00	24-FEB-2011 15:00	24-FEB-2011 15:00	24-FEB-2011 15:00	24-FEB-2011 15:00
Compound	CAS Number	LOR	Unit	EB1104286-001	EB1104286-002	EB1104286-003	EB1104286-004	EB1104286-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.13	2.86	4.62	7.22	3.70
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	693	2620	490	522	2010
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	1	36	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	1	36	<1
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	8	330	3	5	108
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	48	454	200	160	227
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	178	825	6	41	720
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	36	121	55	42	129
Magnesium	7439-95-4	1	mg/L	14	91	12	8	21
Sodium	7440-23-5	1	mg/L	64	122	13	51	170
Potassium	7440-09-7	1	mg/L	3	8	3	4	8
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.09	27.9	0.01	<0.01	2.06
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	0.009	<0.001	<0.001	<0.001	0.008
Cadmium	7440-43-9	0.0001	mg/L	0.0001	0.0032	0.0001	<0.0001	0.0018
Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.001	0.107	<0.001	<0.001	0.032
Cobalt	7440-48-4	0.001	mg/L	0.006	0.237	0.013	0.001	0.035
Nickel	7440-02-0	0.001	mg/L	0.003	0.291	0.007	0.001	0.013
Lead	7439-92-1	0.001	mg/L	<0.001	0.036	<0.001	<0.001	0.051
Zinc	7440-66-6	0.005	mg/L	0.039	1.78	0.241	0.138	0.113
Manganese	7439-96-5	0.001	mg/L	0.734	12.2	0.766	0.182	1.88
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	0.05	<0.01	0.01	0.02	0.05
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Boron	7440-42-8	0.05	mg/L	0.30	0.16	0.66	0.58	0.27
Iron	7439-89-6	0.05	mg/L	0.13	2.83	<0.05	<0.05	38.9

Analytical Results

Sub-Matrix: **LIQUID**			Client sample ID	Kevins Corner Product Coal 1	Kevins Corner Coarse Reject 2	Kevins Corner Fine Rejects 3	Kevins Corner 4	Kevins Corner 5
			Client sampling date / time	24-FEB-2011 15:00	24-FEB-2011 15:00	24-FEB-2011 15:00	24-FEB-2011 15:00	24-FEB-2011 15:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1104286-001**	**EB1104286-002**	**EB1104286-003**	**EB1104286-004**	**EB1104286-005**
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**6.01**	**32.7**	**4.35**	**5.20**	**25.0**
^ Total Cations	----	0.01	meq/L	**5.82**	**19.0**	**4.41**	**5.08**	**15.8**
^ Ionic Balance	----	0.01	%	**1.62**	**26.5**	**0.76**	**1.19**	**22.7**

Analytical Results

Sub-Matrix: **LIQUID**			Client sample ID	**Kevins Corner 6**	----	----	----	----
			Client sampling date / time	24-FEB-2011 15:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1104286-006**	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**6.04**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**170**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**2**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**2**	----	----	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	**5**	----	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**58**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**4**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**1**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
Sodium	7440-23-5	1	mg/L	**30**	----	----	----	----
Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.08**	----	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.007**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	**0.03**	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**0.16**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	----	----	----	----
EG035F: Dissolved Mercury by FIMS								

Analytical Results

Sub-Matrix: **LIQUID**			Client sample ID	**Kevins Corner 6**	----	----	----	----
			Client sampling date / time	24-FEB-2011 15:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1104286-006**	**----**	**----**	**----**	**----**
EG035F: Dissolved Mercury by FIMS - Continued								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**1.37**	----	----	----	----
^ Total Cations	----	0.01	meq/L	**1.38**	----	----	----	----