BHP Mitsubishi Alliance

Appendix B

Geochemistry Assessment

TERRENUS
EARTH SCIENCES

Geochemical Assessment of Potential Spoil, Coal and Coal Reject Materials

CAVAL RIDGE MINE: HORSE PIT EXTENSION PROJECT

Prepared for:

BM Alliance Coal Operations Pty Ltd

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EXECUTIVE SUMMARY

Terrenus Earth Sciences (Terrenus) has completed a geochemical assessment of potential mineral waste (sub-soil, rock and coal reject materials) from the Horse Pit Extension Project (the Project) at Caval Ridge Mine (CVM). The geochemical assessment was completed to assist with mine planning and as part of the environmental regulatory documentation for the Project.

BM Alliance Coal Operations Pty Ltd (BMA) proposes to expand the existing open-cut Horse Pit at CVM, located approximately seven kilometres (km) south of Moranbah, Queensland.

This Geochemical Assessment forms part of the supporting information for a major amendment to the Environmental Authority (EA) for CVM, and serves to document and understand the geochemical characteristics of mineral waste likely to be generated by the Project compared with the geochemical characteristics of the existing Horse Pit mining operation.

Terrenus has geochemically assessed potential overburden and interburden (collectively called spoil) and coal from drill-hole samples and coal reject samples obtained from the coal handling and preparation plant (CHPP) and from coal reject disposal areas at CVM.

Geochemical data was obtained from a range of sources – from the original data in 2007 (prior to CVM mining approvals), through to recent drill-hole data collected by BHP Minerals Australia (BHP) in 2020. All data is from samples collected within the Horse Pit and/or Project areas. The number of samples of each key mineral waste group/type are approximately proportional to the drill-hole meterage of the mineral waste type in the assessment drill-holes.

All samples were assessed with respect to their ability to generate acid and metalliferous drainage (AMD) and salinity. AMD includes acid/acidic drainage (AD), neutral mine drainage (NMD) and saline drainage from sulfide oxidation (SD). Samples representing materials likely to report to final landform surfaces also underwent assessment for sodicity and dispersion potential.

The geochemical characteristics associated with mineral waste materials are discussed by type:

- Non-carbonaceous spoil material (n=402 samples) – estimated to represent about 90 % of the total mineral waste. Of this, about 15 % will be weathered (mostly weathered Permian-age material).
- Carbonaceous spoil material (excluding coal reject) (n=41 samples) – estimated to represent approximately 5 % of the total mineral waste. Of this, essentially all will be unweathered (fresh). This material type comprises likely 'spoil' materials described as carbonaceous and/or coaly (excluding coal from target seams).
- Coal reject (n=31 samples) – mineral wastes (of varying particle sizes – fine to coarse) from the CHPP. Estimated to represent about 5 % of the total mineral waste.
- Coal (n=31 samples) – will predominantly report as run-of-mine (ROM) coal that is stored temporarily on a ROM pad pending processing, however a small proportion of coal from non-target seams/plys will report as waste.

Geochemical Characteristics of Non-Carbonaceous Mineral Waste

AMD Potential of Non-Carbonaceous Mineral Waste

- Non-carbonaceous overburden/interburden, as a bulk material, is expected to generate pH-neutral to alkaline contact water (run-off and seepage).
- The total sulfur (total S) concentration of this material is very low, with a maximum total S concentration of 0.46 % (90th percentile = 0.09 %). As such, and combined with moderate acid neutralising capacity (ANC) values and very low maximum potential acidity (MPA) values, almost all samples (98 % of samples) were classified as non-acid forming (NAF). Less than 1.5 % of samples were classified as potentially acid forming (PAF) – primarily due to low ANC values. The remaining samples had an 'Uncertain' acid classification. ANC is expected to be about 50-60 % available for non-carbonaceous overburden/ interburden, as a bulk material.
- Total metal and metalloid concentrations are generally very low compared to average element abundance in soil in the earth's crust. Some samples were enriched in tellurium (Te) with respect to average crustal abundance in soil, which is not a cause for concern.
- Soluble multi-element results indicate that leachate from non-carbonaceous material is expected to contain low concentrations of soluble metals and metalloids.

> Non-carbonaceous material – which represents about 90% of the total mineral waste at CVM – has a negligible potential to generate AMD as either AD and/or NMD. Additionally, due to the very low total S (and negligible sulfide) concentrations, the potential for saline drainage from sulfide oxidation is also negligible.

Salinity Potential of Non-Carbonaceous Mineral Waste

Non-carbonaceous overburden/interburden has EC values ranging from 113 to 3,720 µS/cm, with median and 90th percentile values of 546 and 839 µS/cm.

> Non-carbonaceous overburden/interburden is expected to generate low- to medium-salinity contact water (run-off and seepage). Due to the very low total S concentrations, the potential for sulfate-derived salinity (from sulfide oxidation) is negligible.

Sodicity and Dispersion Potential of Non-Carbonaceous Mineral Waste

Non-carbonaceous overburden/interburden samples (n=66) had relatively high cation exchange capacity (CEC) values and moderate-to-high exchangeable sodium percentage (ESP) values, resulting in 75 % of samples being classified as 'strongly sodic' and the remaining samples being classified as 'sodic'. The CEC and ESP values suggest that most materials would be subject to some degree of dispersion, however Emerson Class testing on 20 samples shows dispersion in only a small number of samples.

> Non-carbonaceous overburden/interburden is expected to be sodic to strongly sodic with some potential for dispersion.

Geochemical Characteristics of Carbonaceous Mineral Waste (excl. coal reject)

AMD Potential of Carbonaceous Mineral Waste

- Carbonaceous overburden/interburden, as a bulk material, is expected to generate pH-neutral to alkaline contact water (run-off and seepage).
- The total S concentration of this material is generally low, with a 90th percentile value of 0.38 %. As such, and combined with moderate ANC and low MPA values, 80 % of samples were classified as NAF and 5 % were classified as PAF. The remaining 15 % of samples had an 'Uncertain' acid classification [of which most are expected to achieve a final NAF classification]. ANC is expected to be about 50-60 % available for most carbonaceous overburden/ interburden materials.
- Total metal and metalloid concentrations are generally very low compared to average element abundance in soil in the earth's crust. Some samples were enriched in S and Te with respect to average crustal abundance in soil, which is not a cause for concern.
- Soluble multi-element results indicate that leachate from non-carbonaceous material is expected to contain low concentrations of soluble metals and metalloids – similar to non-carbonaceous materials.

Carbonaceous material has a low potential to generate AMD as either AD or NMD. Additionally, due to the low total S (and low sulfide) concentrations, the potential for saline drainage from sulfide oxidation is also low.

Salinity Potential of Carbonaceous Mineral Waste

Carbonaceous overburden and interburden has similar EC values to non-carbonaceous materials – ranging from 177 to 918 µS/cm, with median and 90th percentile values of 319 and 759 µS/cm.

Consistent with non-carbonaceous overburden/interburden, carbonaceous materials are expected to generate low- to medium-salinity contact water (run-off and seepage). Due to the low total S concentrations, the potential for sulfate-derived salinity (from sulfide oxidation) is low.

Sodicity and Dispersion Potential of Carbonaceous Mineral Waste

Carbonaceous overburden/interburden samples (n=11) had CEC and ESP values comparable to non-carbonaceous samples, resulting in all 11 samples being classified as 'strongly sodic'. The CEC and ESP values suggest that most materials would be subject to some degree of dispersion, however Emerson Class testing on nine samples shows no dispersion, resulting in some uncertainty regarding dispersion potential.

Consistent with non-carbonaceous overburden/interburden, carbonaceous materials are expected to be sodic to strongly sodic. The potential for dispersion is unclear, however would be expected to be similar to non-carbonaceous materials.

Geochemical Characteristics of Coal Reject

AMD Potential of Coal Reject

- Coal reject, as a bulk material, is expected to generate pH-neutral to alkaline contact water (run-off and seepage).
- The total S concentration of this material spans a much wider range compared to non-carbonaceous material, but is generally low to moderate, with a maximum total S concentration of 1.16 % and 90th percentile value of 1.0 %. The ANC of samples spanned a wide range – and the ANC is expected to be only partially available (approximately 50 % availability), with iron dolomite (+/- siderite) as the dominant acid neutralising mineral. As such, coal reject samples had a wide range of acid classifications, with 23 % of samples classified as NAF and 67% of samples classified as PAF or PAF Low Capacity (PAF-LC). The remaining 10% of samples (3 samples) had an Uncertain classification, however the available data suggests that all of these 'uncertain' samples are expected to be NAF [classified as UC (NAF)].
- Total metal and metalloid concentrations are very low compared to average element abundance in soil in the earth's crust.
- Soluble multi-element results indicate that leachate from coal reject material is expected to contain low concentrations of soluble metals and metalloids – similar to carbonaceous materials.

About two-thirds of coal reject samples were classified as PAF or PAF-LC and, therefore, have a moderate to high potential to generate AMD in an uncontrolled and unmitigated environment. Due to the moderate total S concentrations (median = 0.65 %), the potential for saline drainage from sulfide oxidation is also moderate to high.

When managed as per the current coal reject management strategy (*ie*. buried within overwhelmingly NAF and low- to medium-salinity in-pit bulk spoil), the potential for disposed coal reject to generate AMD is low.

Salinity Potential of Coal Reject

Coal reject has EC values similar to potential spoil materials – ranging from 213 to 1,730 µS/cm, with median and 90th percentile EC values of 407 and 1,065 µS/cm, respectively. The fine reject and tailings samples appear to span a greater range of EC compared to the coarse reject and Mixed Plant Reject (MPR) samples.

Coal reject is expected to generate low- to medium-salinity contact water (run-off and seepage). Due to the moderate-to-high total S concentrations, the potential for sulfate-derived salinity (from sulfide oxidation in an unmitigated environment) is moderate to high.

However, when managed as per the current coal reject management strategy (*ie*. buried within overwhelmingly NAF and low- to medium-salinity in-pit bulk spoil), the potential for sulphate-derived salinity from disposed coal reject is low.

Geochemical Characteristics of ROM Coal

AMD Potential of ROM Coal

- ROM coal, as a bulk material, is expected to generate pH-neutral to alkaline contact water (run-off and seepage).
- The total S concentration of this material is generally low, with similar total S distribution to carbonaceous spoil material (90th percentile value of 0.40 %). As such, and combined with ANC values that are generally significantly higher than their corresponding MPA values, 84 % of samples were classified as NAF and 10 % were classified as PAF. The remaining samples had an 'Uncertain' acid classification.
- Total metal and metalloid concentrations (from two test results) are very low compared to average element abundance in soil in the earth's crust.
- Soluble multi-element results (from two test results) indicate that leachate from ROM coal is expected to contain low concentrations of soluble metals and metalloids – similar to carbonaceous and non-carbonaceous spoil materials.

ROM coal material has a low potential to generate AMD as either AD or NMD, however some seams – such as P seam – are expected to pose a higher AMD potential. Additionally, due to the relatively low total S (and sulfide) concentrations, the potential for saline drainage from sulfide oxidation is also low.

Salinity Potential of ROM Coal

Coal has EC values similar to carbonaceous spoil and coal reject materials – up to 895 µS/cm, with median and 90th percentile EC values of 457 and 836 µS/cm, respectively.

On a ROM pad, coal is expected to generate low- to medium-salinity contact water (run-off and seepage). Due to the relatively low total S concentrations and the short exposure (temporary storage) of ROM coal, the potential for sulfate-derived salinity (from sulfide oxidation) is low.

Geochemical Comparison Between the Current Horse Pit Area and the Project

The assessment considered geological and geochemical data within the current Horse Pit area and the Project (focusing on the Horse Pit extension eastwards of the current pit disturbance area). The geological environment is consistent between the existing mining area and the Project. The assessment has demonstrated that the data collected since CVM commenced operations is consistent with the earlier data collected (and assessed) prior to mining operations. The assessment has demonstrated that the environmental geochemical characteristics of new mineral waste materials expected to be generated by the Project are consistent with current mineral waste materials being generated at CVM.

The AMD hazard posed by coal reject from the upper seams (*eg*. P seam) is slightly greater than coal reject from the middle and lower seams (*eg*. Dysart and Harrow Creek seams). As mining extends eastwards the upper seams will feature more prominently in coal reject compared to the current situation. However, despite the future increase in the proportion of upper seam coal reject the small proportion of all coal reject co-disposed within the much larger proportion of 'low AMD hazard' spoil will still pose the same low AMD hazard for bulk spoil within the Project area as per the current mining area and spoil disposal areas.

Management and Mitigation of Spoil Piles

The management of overburden and interburden (spoil) materials generated by the Project will be consistent with the current approved mine waste management strategy – comprising the disposal of overburden and interburden as low-wall spoil, then progressively rehabilitated – with run-off and seepage captured by the mine water management system.

Spoil is overwhelmingly NAF with excess ANC and has a negligible risk of developing acid conditions. Furthermore, spoil is expected to generate relatively low to moderate salinity surface water run-off and seepage with relatively low soluble metal/metalloid concentrations. However, spoil is expected to be sodic with some potential for dispersion and erosion (to varying degrees).

Where highly sodic and/or dispersive spoil is identified it should, wherever practicable, not report to final landform surfaces and should not be used in construction activities. Tertiary spoil has generally been found to be unsuitable for construction use or on final landform surfaces (Australian Coal Association Research Program [ACARP], 2004 and 2019).

It may not be practical to selectively handle and preferentially emplace highly sodic and dispersive spoil during operation of the Project. Therefore, in the absence of such selective handling, spoil landforms would need to be constructed with short and low (shallow) slopes and progressively rehabilitated to minimise erosion. Where practical, and where competent rock is available, armouring of slopes should be considered.

Where rock is used for construction activities, this should be limited (as much as practical) to unweathered Permian sandstone, as this material has been found (generally) to be more suitable for construction and for use as embankment covering on final landform surfaces. Regardless of the rock type, especially where engineering or geotechnical stability is required, laboratory testing and rehabilitation field trials should be undertaken to determine the propensity for dispersion and erosion of spoil landforms.

Surface water run-off and seepage from waste rock emplacements, including any rehabilitated areas, should be monitored for 'standard' water quality parameters including, but not limited to, pH, electrical conductivity (EC), major anions (sulfate, chloride and alkalinity), major cations (sodium, calcium, magnesium and potassium), total dissolved solids (TDS) and a broad suite of soluble metals/metalloids.

With the implementation of the proposed management and mitigation measures, the waste rock is regarded as posing a low risk of environmental harm.

Management and Mitigation of Coal Reject

The management of coal reject materials generated by the Project will be consistent with the current approved coal reject management strategy – comprising the disposal (burial) of dewatered tailings and MPR within low-wall spoil at designated disposal areas. Coal reject will also undergo monitoring for AMD and related environmental aspects.

Based on the current assessment, coal reject material is regarded as posing a moderate to high AMD hazard (unmitigated) with respect to generation of acidity and/or sulfate. As such, the burial and management of coal reject materials (as per the current approved CVM coal reject disposal practices) will continue, so as to minimise sulfide oxidation and potential generation of AMD. Seepage would be confined within the footprint of the open-cut pit and would drain into/towards open-cut pit areas (and therefore be captured by the mine water system). Surface water run-off would drain into mine dams/drains and also be captured by the mine water system. Therefore, when buried deeply amongst alkaline NAF spoil the overall risk of environmental harm and health-risk that emplaced coal reject poses is low.

The management measures for coal reject are addressed in the CVM Mining Waste Management Plan that is certified by an appropriately qualified person in accordance with Condition E12 of the CVM EA.

Validation of Coal Reject Characteristics

BMA will undertake validation test-work of coal reject during development of the Project (*ie*. as the Horse Pit transitions into the Project area), particularly whenever new seams/plys or ROM coal blends are being processed. Test-work would, at minimum, comprise a broad suite of environmental geochemical parameters, such as pH, EC (salinity), acid-base account parameters and total and soluble metals/metalloids.

Management of ROM Coal and ROM Stockpiles

ROM coal is not mining waste, and surface water run-off and seepage from ROM stockpiles would not report off-site and would be managed as part of the mine water management system. The available information suggests that ROM coal generated by the Project is expected to have a low degree of risk associated with potential acid, salt and soluble metals generation. Surface water run-off from ROM coal and product coal stockpiles is captured in the mine water management system.

ROM coal would be stored on-site for a relatively short period of time (days to weeks) compared to mineral waste materials, which would be stored at the site in perpetuity. Management practices are therefore different for ROM coal (compared to spoil) and would largely be based around the operational (day-to-day) management of surface water run-off from ROM coal stockpiles, as is currently accepted practice at coal mines in Australia.

The mine water management system is monitored for ‘standard’ water quality parameters including, but not limited to, pH, EC, major anions (sulfate, chloride and alkalinity), major cations (sodium, calcium, magnesium and potassium), TDS, acidity and a broad suite of soluble metals/metalloids.

Geochemical Assessment of Potential Spoil, Coal and Coal Reject Materials

CAVAL RIDGE: HORSE PIT EXTENSION PROJECT

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GLOSSARY of TERMS

Acid A measure of hydrogen ion (H^+) concentration; generally expressed as pH.

Acid-Base Account Evaluation of the balance between acid generation and acid neutralisation processes. Generally determined by the maximum potential acidity (MPA) and the inherent acid neutralising capacity (ANC), as defined below. See also "MPA" and "ANC".

AMD Acid and Metalliferous Drainage from mining waste material characterised by low pH, elevated metal concentrations, high sulfate concentrations and high salinity. The term AMD is used more recently to replace the term Acid Rock Drainage (ARD) as metalliferous and saline drainage can occur under pH-neutral conditions.

ANC Acid Neutralising Capacity, expressed as kg H_2SO_4 per tonne of rock/material. A measure of a sample's maximum potential ability to neutralise acid.

ANC/MPA ratio Ratio of the acid neutralising capacity (ANC) to the maximum potential acidity (MPA) of a sample. Used to assess the risk of a sample generating acid conditions. See also "ANC" and "MPA".

ASLP [modified] Australian Standard Leach Procedure [modified]. A method to determine the water-soluble parameters in soil. Solid samples undergo a bottle leach method where 10 g of pulped solid (85 per cent (%) passing 70 micrometres (µm)) is combined with 200 grams of de-ionised water into a glass bottle. The 1:20 solution (1 part solid to 20 parts water) is tumbled end-over-end for 18 hours. Solutes are leached from the soil by the continuous suspension and agitation. The water extract solution is measured for pH and electrical conductivity (EC) prior to filtering for solute analysis (*eg*. metals/metalloids and major ions). The modification involves the use of a pulp sample (instead of a fine crush sample used in the standard method).

Barren A sample classified as barren has negligibly low total sulfur (and sulfide) concentration and, essentially, has no acid generating capacity. In essence, it represents an 'inert' material with respect to acid generation.

CHPP Coal Handling and Preparation Plant.

Co-Disposal The practice of disposing different waste types together. For example, "MPR" is the co-disposal coal reject material comprising dewatered tailings and coarse reject.

Coal Reject The general term given to solid waste produced during the processing of coal, typically from a CHPP. Coal reject at the Project would typically comprise fine to coarse-grained siltstone, mudstone and sandstone, which is mined during extraction of ROM coal. Coal reject is produced in different size fractions – fine through to coarse reject and combinations thereof.

Coarse Reject	Coarse solid waste material (typically greater than 1.5 mm grain size) produced from the CHPP as part of the processing of coal. See also "Coal Reject, "Fine Reject" and "MPR".
Dewatered Tailings	Tailings processed through a belt press filter to reduce the water content prior to disposal. See also "Coal Reject", "Fine Reject", "MPR" and "Tailings".
EC	Electrical Conductivity, expressed as µS/cm.
Fine Reject	Fine-grained mining waste material (typically less than 1.5 mm grain-size) produced from the CHPP as part of the processing and washing of coal. Fine reject typically comprises mud/clay and silt present in CHPP wastewater, and is also known as "Dewatered Tailings". See also "Coarse Reject", "Coal Reject" and "MPR".
Interburden	Potential spoil material between mined coal seams. See also "Overburden", "Mining Waste" and "Spoil".
Kinetic test	Procedure used to measure the geochemical/weathering behaviour of a sample of mine material over time.
MPA	Maximum Potential Acidity. Calculated by multiplying the total sulfur (S) or sulfide-sulfur (Scr) content of a sample by 30.6 (stoichiometric factor) and expressed as kg H_2SO_4 per tonne of rock/material.
Mineral Waste	Overburden, interburden and similar 'waste rock' material mined and emplaced during extraction of coal. In this report, the definition of Mineral Waste also extends to coal reject from the CHPP. See "Coal Reject".
MPR	Mixed Plant Reject. A 'mixed' combination of all coal reject produced from a CHPP (fine reject through to coarse reject). See "Coal Reject" and "Co-disposal".
NAF	Non-Acid Forming. Geochemical classification criterion for a sample that would not generate acid conditions. A sample classified as NAF may, or may not, have a significant sulfur content but the availability of neutralising material within the sample is more than adequate to neutralise all the acid that theoretically could be produced by any contained sulfide minerals. As such, material classified as NAF is considered unlikely to be a source of acidic drainage.
NAPP	Net Acid Producing Potential, expressed as kg H_2SO_4 per tonne of rock/material. Calculated by subtracting the ANC from the MPA.
NATA accreditation	Accreditation by the National Association of Testing Authorities (Australia). NATA accreditation for a specific analytical test indicates that the test method and means of undertaking the test (following the method and achieving valid results) by the laboratory has been independently recognised by NATA. Accreditation provides a means of determining and formally recognising the competence of facilities to

	perform specific types of testing, inspection, calibration, and other related activities, on a routine basis.
Overburden	Potential spoil material overlying the uppermost mined (economic) coal seam. See also “Spoil”.
PAF	Potentially Acid Forming. Geochemical classification criterion for a sample that has the potential to generate acid conditions. A sample classified as PAF almost always has a significant sulfur content, the acid generating potential (MPA) of which exceeds the inherent acid neutralising capacity (ANC) of the material. This means there is a high risk that such a material, even if pH circum-neutral when freshly mined or processed, could oxidise and generate acidic drainage if exposed to atmospheric conditions. See also PAF-LC.
PAF-LC	Potentially Acid Forming (low capacity). Geochemical classification criterion for a sample that has the potential to generate weak acidity.
ROM	Run-of-Mine. Coal as it comes from the mine prior to screening or processing. ROM coal is typically trucked from the mine and dumped onto a ROM pad (or into a ROM hopper), and from there it typically undergoes some degree of crushing, screening and washing.
S	Sulfur.
Scr	Chromium reducible sulfur. Analytical procedure to determine the sulfide-sulfur concentration in a sample.
SO_4	Sulfate.
Spoil	Also called ‘waste rock’. Rock material overlying and between ‘target’ coal seams, which will report as waste. Waste rock overlying a mined coal seam is called overburden. Waste rock between mined coal seams is called interburden.
Static test	Procedure for characterising the geochemical nature of a sample at one point in time. Static tests may include measurements of mineral and chemical composition of a sample and the Acid-Base Account.
Tailings	Fine-grained mining waste material (typically less than 1.5 mm grain-size) produced from the CHPP as part of the processing and washing of coal. Tailings typically comprises mud/clay and silt present in CHPP wastewater. See also “Dewatered Tailings” and “Fine Reject”.
Uncertain	In the context of classifying a material (sample) as NAF or PAF. An ‘Uncertain’ classification (UC) applies when there is an apparent conflict in results such that neither NAF nor PAF classification can be given, or there is insufficient information to categorically classify as NAF or PAF. Uncertain samples are sometimes given a tentative sub-classification, such as UC(NAF) or UC(PAF) where preliminary data suggests the sample may be NAF or PAF, respectively.

Water extract	A method to determine the water-soluble parameters in soil. Solid samples undergo a bottle leach method where 10 g of pulped solid (85 % passing 75 µm) is combined with 20 grams or 50 grams of de-ionised water into a glass bottle. The 1:2 or 1:5 solution (1 part solid to 2 or 5 parts water) is tumbled end-over-end for one hour. Solutes are leached from the soil by the continuous suspension and agitation. The water extract solution is measured for pH and electrical conductivity (EC) prior to filtering for solute analysis (*eg*. metals/metalloids and major ions).

1 Introduction and Context

Terrenus Earth Sciences (Terrenus) has completed a geochemical assessment of potential mineral waste (sub-soil and rock) from the Horse Pit Extension Project (the Project) at Caval Ridge Mine (CVM). The geochemical assessment was completed to assist with mine planning and as part of the environmental regulatory documentation for the Project.

BM Alliance Coal Operations Pty Ltd (BMA) proposes to expand the existing open-cut Horse Pit at CVM, located approximately seven kilometres (km) south of Moranbah, within the Isaac Regional Council Local Government Area.

This Geochemical Assessment forms part of the supporting information for a major amendment to the Environmental Authority (EA) for CVM.

Terrenus has geochemically assessed potential overburden and interburden (collectively called potential spoil), coal seam material, and coal reject obtained from the coal handling and preparation plant (CHPP).

1.1 Objective

The overall objective of this geochemical assessment was to:

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

1.2 Geological Background

The lithology within the current approved mining area (Horse Pit) and the Project area is characterised by typical basin-fill sediments, comprising mudstone, claystone, siltstone, sandstone (typically fine-grained), carbonaceous sediments and coal seams. The depth to base of weathering averages about 20 metres (m) below natural surface but ranges from about 10 m to 30 m below natural surface, depending on the local topography.

The coal bearing sequences within the Horse Pit and the Project area are the Permian-age Moranbah Coal Measures (Q – P seam zone, Harrow Creek (HC) seams and Dysart (DY) seams). To date, almost all of the coal mined from Horse Pit has been from the HC and DY seams (predominantly DY seams). As mining progresses eastwards (down-dip) the upper seams such as the HC seams, followed by the P seam, will become more prevalent (**Figure 1-1**).

Seam splitting is prevalent along the length (north-south) of Horse Pit and the Project, and continuing southwards into Heyford Pit and neighbouring Peak Downs Mine. The Project proposes to mine coal from all seams where coal thickness and quality is economic.

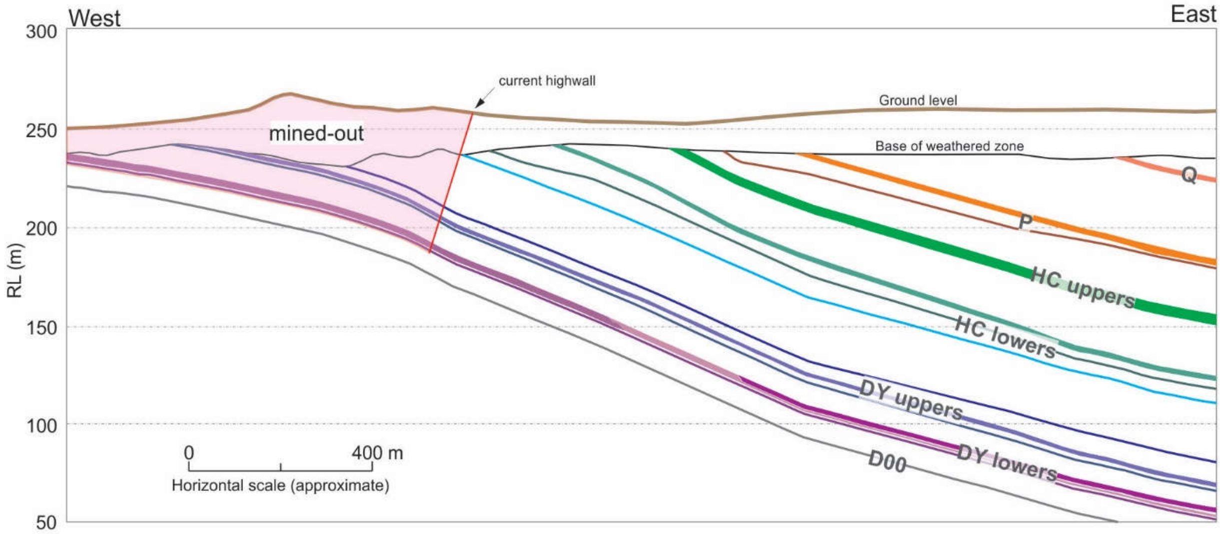
Overlying the Moranbah Coal Measures is a thin veneer of Quaternary- and Tertiary-age sediments. At the Project the Quaternary and Tertiary sediments are highly weathered, semi-consolidated and typically comprise sand, clay and gravel.

The Project will utilise the existing mining and coal processing infrastructure at CVM and will adopt the current approved mining, coal processing and mineral waste disposal practices. Coal will be mined by conventional open-cut methods and spoil (waste rock) will be placed behind the active mining face into in-pit spoil dumps. Run-of-mine (ROM) coal will be processed at the existing

CHPP on-site. Coal reject materials generated at the CHPP (dewatered tailings [producing fine reject], mid/coarse reject and mixed plant reject) will be trucked to in-pit spoil piles and buried, as required under the CVM EA.

Figure 1-1. Geological Cross-Section at Horse Pit

Located at approximately Ramp 50N. Refer to Figure 1-2 for section location



2 Geochemical Assessment Methodology

This section provides the methodology used for the geochemical assessment of potential spoil and coal reject expected to be generated by the Project.

2.1 The Assessment Approach – What are we trying to understand?

The data was assessed with regard to the samples potential to generate acid and metalliferous drainage (AMD) – and how the AMD potential of newer samples (assessed for the Project) compares to existing data assessed at the time of the Environmental Impact Statement (EIS). Only after making such an assessment to understand the potential AMD risks (of all samples) can we formulate appropriate management measures to adequately mitigate the risks.

The term 'AMD' is used to describe low-quality seepage or drainage that has been affected by the oxidation of sulfide minerals (primarily pyrite and marcasite) and/or by the dissolution of acid generating sulfate minerals (such as jarosite and alunite), regardless of final drainage chemistry.

AMD may be produced when sulfide minerals (such as pyrite) are exposed to oxygen and water. Oxidation of sulfide minerals may result in the production of acid(ity), sulfate (SO_4) and, depending on mineralogy, the release of metals and salinity. AMD can be acidic, pH circum-neutral, alkaline and/or saline (INAP, 2009[1], DIIS, 2016[2]). Whether contact water is acidic and metalliferous (Acid Rock Drainage [ARD]), pH-neutral/alkaline and metalliferous (Neutral and Metalliferous Drainage [NMD]) or saline due to elevated sulfate (Saline Drainage [SD]) largely depends on the relative proportion of sulfide minerals (acid generating) and carbonate minerals (acid neutralising) in the source materials. In this assessment unless specified otherwise, the term AMD is broadly used to describe ARD, NMD and/or SD, which is consistent with BHP's definition of AMD (BHP, 2019).

2.2 Desktop Review of Existing Information

A desktop review of available project data and information was completed to provide a better understanding of the Project. The review included geological and geochemical data, coal exploration drilling programs, mining methods and mine plan, coal handling and processing methods, and mining waste disposal and management strategies. Discussions were held throughout 2020 with BHP personnel (predominantly Project geologists and Closure Planning specialists) to identify and discuss relevant technical information. Geological information was obtained from drill-hole logs from the Project site, including the existing Horse Pit area at CVM, coupled with discussions with the Project geologists.

Geochemical data (predominantly from drill-hole sampling) was obtained from samples collected by URS in 2006 as part of the original geochemical assessment work for the EIS for CVM (URS 2007; Terrenus 2009); from samples collected in 2013 at the commencement of mining (PW Baker 2013) and from samples collected since 2013 by BMA and by BHP Minerals Australia Closure Planning (BHP). **Figure 2-1** shows the Project layout and the geochemical sampling locations, which comprise:

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1 INAP, 2009. Global Acid Rock Drainage Guide.

2 DIIS, 2016, Preventing Acid and Metalliferous Drainage. Handbook from Australian Federal Government's Leading Practice Sustainable Development Program for the Mining Industry. https://www.industry.gov.au/data-and-publications/leading-practice-handbook-preventing-acid-and-metalliferous-drainage.

- sampling and geochemical analysis undertaken in 2006 from six (6) drill-holes prior to mining (as reported by Terrenus 2009);
- sampling and geochemical analysis undertaken in 2013 from four (4) drill-holes at the start of mining during early-stage mine construction (as reported by PW Baker 2013);
- sampling and geochemical analysis undertaken in 2020 from three (3) exploration drill holes (reported herein);
- sampling and geochemical analysis of in-place disposed coal reject samples undertaken in 2020 (as reported by Highlands Environmental 2020); and
- geochemical data available from the BHP Geochemical Database for tailings and coal reject samples from the CVM CHPP and from coal reject samples collected in-place at the CVM reject disposal areas.

Some of the above geochemical sampling and assessment programs included sample locations and data collection unrelated to Horse Pit (for example, sites south of Peak Downs Highway). Data not directly relevant to Horse Pit or to the Project has been excluded from the current assessment.

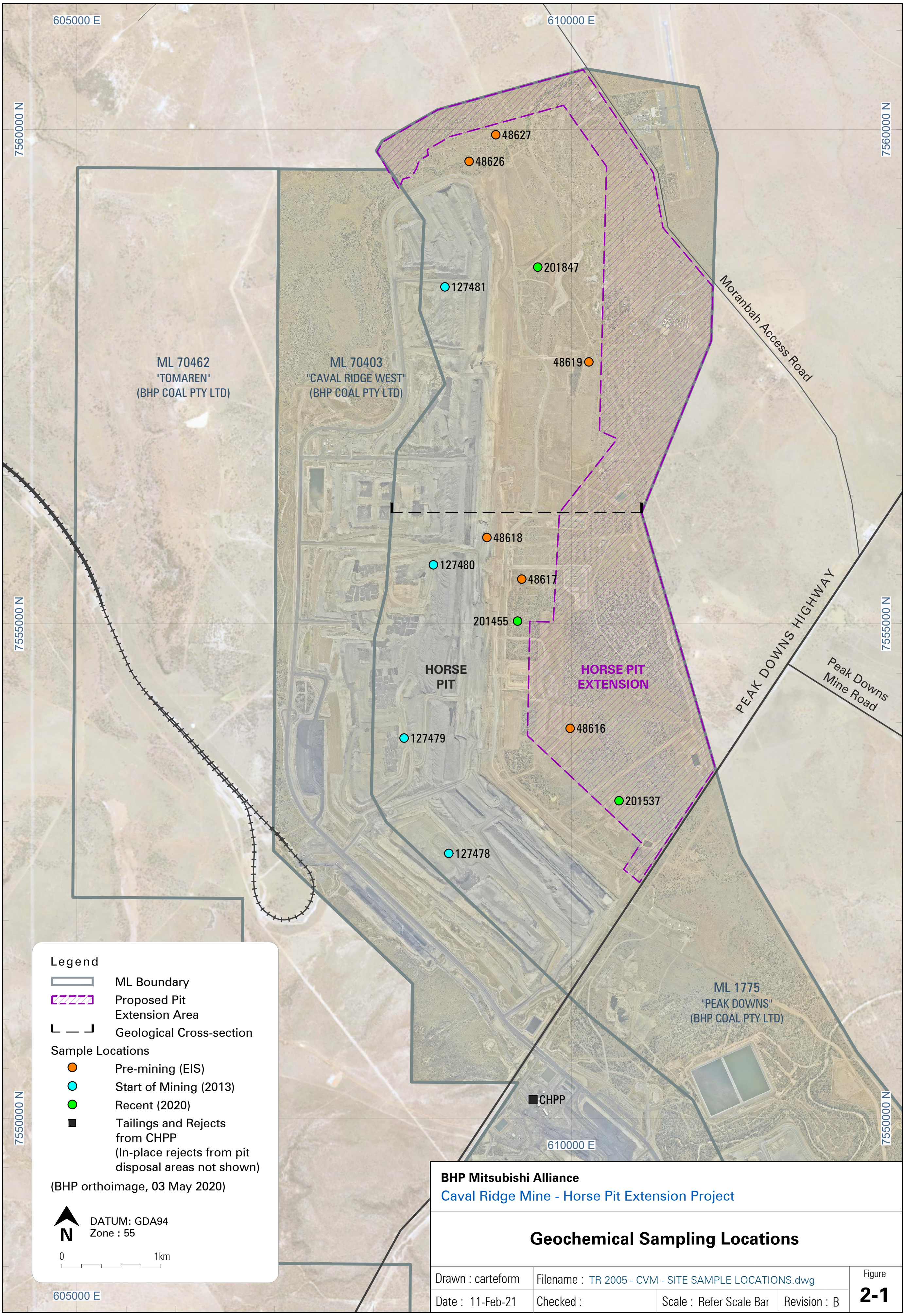
Based on the desktop review and previous experience at CVM (from the EIS and through to recent times) and neighbouring Peak Downs Mine, Terrenus has a very good understanding of the geological and geochemical environment at CVM and surrounding areas.

2.3 Sample Data

As discussed in **Section 2.2**, geochemical samples are available from a range of programs undertaken between 2006 (before mining commenced) through to recently (2020).

There are currently no specific regulatory requirements regarding the number of samples required to be obtained and tested for coal, spoil (waste rock) or potential coal reject material for mines in Queensland. Whilst historical guidelines do exist in Queensland (Department of Minerals and Energy [DME] 1995), more recent Australian and international guidelines (Department of Industry, Innovation and Science [DIIS] 2016; International Network on Acid Prevention [INAP] 2009) advocate a risk-based approach to sampling, especially for proposed coal mines/projects where the geology and environmental geochemistry is well understood (from primary and secondary information sources).

BHP Coal Geoscience geologists supervised the drilling and sampling of two partially cored exploration drill-holes and one drill-chip exploration hole within the Horse Pit and Project area during 2020. This 2020 sampling program was to supplement existing data from sampling and analysis undertaken as part of the EIS (URS 2007; Terrenus 2009) and by PW Baker (2013). The drill-hole locations are shown on **Figure 2-1** and co-ordinates provided in **Appendix A**.



BHP Mitsubishi Alliance

Caval Ridge Mine - Horse Pit Extension Project

Geochemical Sampling Locations

Drawn : carteform	Filename : TR 2005 - CVM - SITE SAMPLE LOCATIONS.dwg			Figure
Date : 11-Feb-21	Checked :	Scale : Refer Scale Bar	Revision : B	2-1

Geochemical data is available for 474 drill-hole samples from the Horse Pit and Project area, comprising the following number of samples of each key mineral waste type – which have been labelled Gp1 to Gp6:

- Gp1: Tertiary, all weathered. 11 samples;
- Gp2: Permian, weathered, non-carbonaceous. 51 samples;
- Gp3: Permian, weathered, carbonaceous [includes weathered coal]. 6 samples;
- Gp4: Permian, fresh, non-carbonaceous. 340 samples;
- Gp5: Permian, fresh, carbonaceous. 35 samples; and
- Gp6: Permian, fresh, coal. 31 samples.

Carbonaceous material refers to lithologies such as carbonaceous siltstone, (carb) sandstone or (carb) mudstone, which contain appreciable concentrations of organic carbon. Comparatively, non-carbonaceous lithologies are essentially void of (or have negligible) carbonaceous material. In coal environments (*ie*. at coal mines) fresh carbonaceous materials typically have higher sulfide concentrations compared with fresh non-carbonaceous materials and, as such, typically pose a greater environmental geochemical hazard compared with fresh non-carbonaceous material.

It is understood that coal (Gp6), generally, is not waste, however not all coal is mined as product due to coal quality and mining considerations. Therefore, coal is conservatively included in the waste assessment as ‘potential spoil’ (as Gp6) to assess the small proportion of coal that may report to waste (as mine spoil).

Coal reject geochemical data (samples collected from the CHPP and samples collected from in-place reject disposal areas) was obtained from the BHP Geochemical Database and from Highlands Environmental (2020). Data is available for 31 coal reject samples, comprising:

- Tailings (from tailings slurry from the CHPP prior to dewatering) – 6 samples;
- Fine reject (dewatered tailings) – 5 samples;
- Mid/coarse reject samples (referred herein as ‘coarse reject’) – 6 samples; and
- Mixed plant reject (MPR) [*ie*. combined fine, mid and coarse reject] – 14 samples.

The sample types and sources are summarised in **Table 2-1**.

Drill-hole information is provided in **Appendix A** and the drill-hole (sampling) locations are shown on **Figure 1-2**. Sample descriptions are provided in **Appendix B – Table B1** for drill-hole samples and **Appendix C – Table C1** for coal reject samples.

Table 2-1. Summary of Samples Collected and the Data Sources

Sample Type	URS (2007) [EIS]	PW Baker (2013) [start of mining]	Highlands Environmental (2020)	BHP Coal Geochemical Database
Drill-hole samples [Potential spoil samples]				
Gp1: Tertiary, weathered	3	-	-	8
Gp2: Permian, weathered, non-carbonaceous	4	13	-	34
Gp3: Permian, weathered, carbonaceous	1	-	-	5
Gp4: Permian, fresh, non-carbonaceous	48	18	-	274
Gp5: Permian, fresh, carbonaceous	4	1	-	30
Gp6: Permian, fresh, coal	1	1	-	29
				Total = 474 samples
Coal reject samples				
Tailings	-	-	-	6
Fine Reject	-	-	-	5
Coarse Reject	-	-	-	6
MPR	-	-	9	5
				Total = 31 samples

2.4 Sample Representativeness

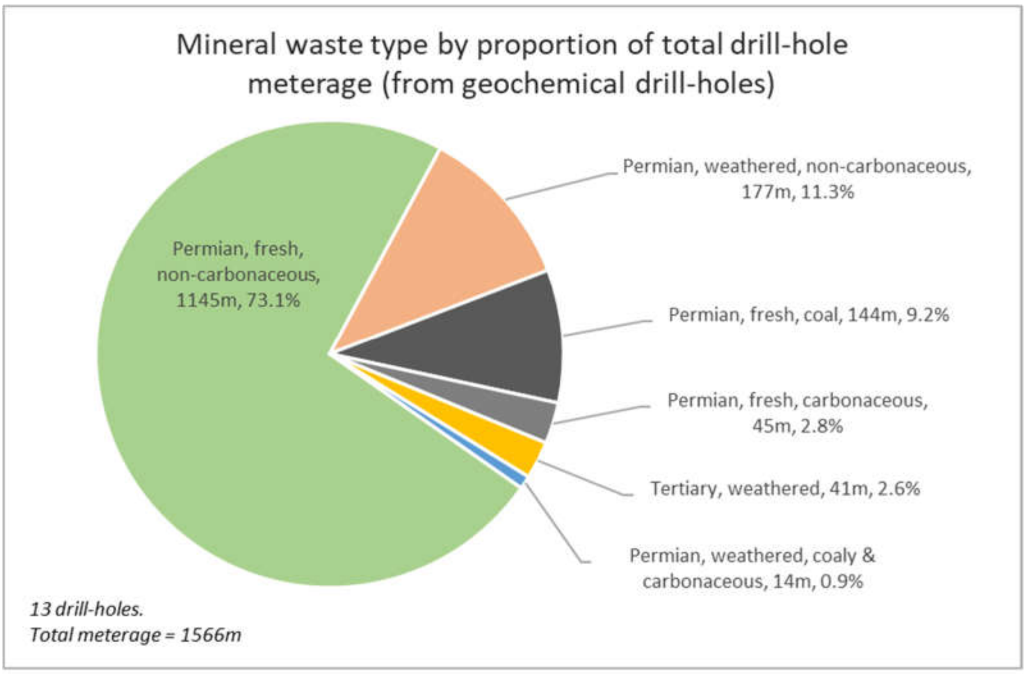
The drill-hole sampling undertaken (from all programs combined) has been highly representative and proportional to the types of mineral wastes and the relative proportions of those mineral waste types in the drill-hole logs – as evident in **Figure 2-1**. The dominant mineral waste type at CVM is fresh Permian non-carbonaceous material (claystone, siltstone and very fine- to medium-grained sandstone), which comprises about 73 per cent (%) of the drill-hole meterage (from 1,566 m of drilling from 13 drill-holes), followed by non-carbonaceous weathered material (Tertiary and Permian combined), which comprises about 14 % of the drill-hole meterage. As evident in **Figure 2-1**, the sampling undertaken at CVM closely approximates these waste type proportions.

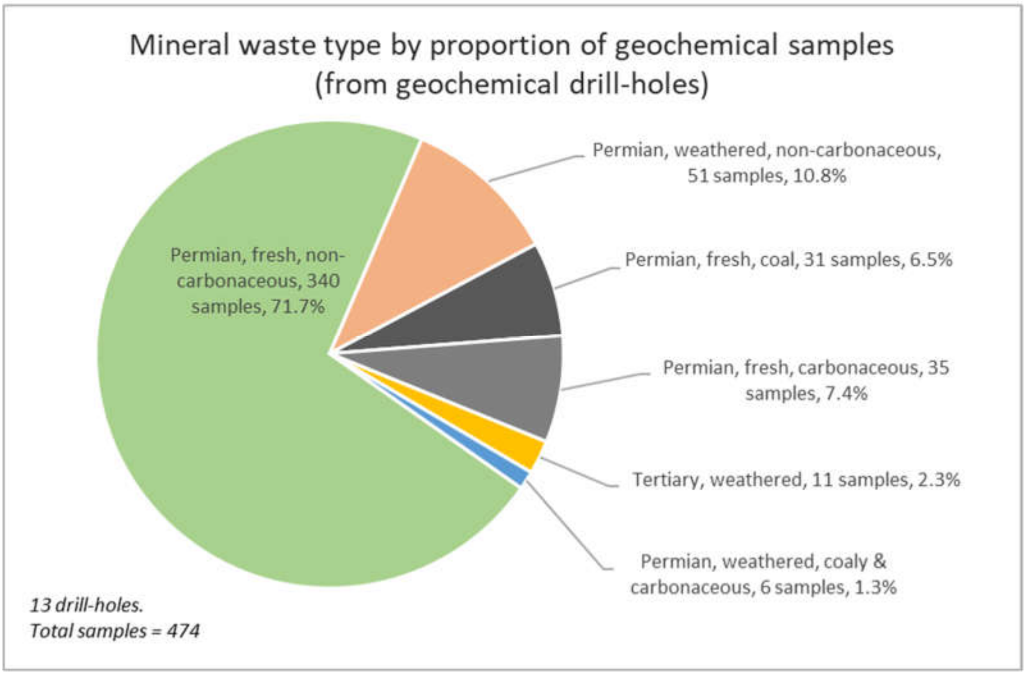
Coal reject sample data is from actual coal reject materials produced at CVM. Coal reject geochemical characteristics are a function of the coal seam (and blends) being processed. Over time, coal seams/blends at CVM will change as different seams are mined. The seams/blends represented by the reject data available are representative of seams/blends that will be processed as the Horse Pit extends eastwards (*ie*. a mix of DY, HC and P seam run-of-mine (ROM) coal).

The initial geochemical assessment (for the CVM EIS) was undertaken by Terrenus (2009) using the data collected for the EIS (URS 2007). The current assessment is being undertaken for an extension of the existing Horse Pit. As such, it is reasonable to undertake a comparison of the earlier (EIS) data with more recent data collected since the initial mining approvals were granted to compare the geochemical characteristics of mineral waste materials likely to be generated by the Project with those from the earlier assessment.

The key finding of this assessment is that the potential spoil samples collected since the initial assessment (ie. samples from Baker (2013) and the BHP database) are geochemically consistent with the samples from the EIS program (URS 2007) [referred to herein as the EIS samples]. That is, the newer data is consistent with the EIS data and, as such, the entire dataset is representative of the current Horse Pit and the Project. To illustrate this, the geochemical results for all drill-hole samples are presented and discussed (in Section 3) with reference to the geochemical characteristics of material represented by the EIS samples. Furthermore, to aid in the broader assessment of mineral waste materials from Horse Pit and the Project, data is also presented and discussed by mineral waste type (Gp1 to Gp6).

Figure 2-2. Mineral Waste and Drill-Hole Sample Proportions





2.5 Geochemical Tests

The samples were characterised using static geochemical test methods, which provide the fundamental geochemical characteristics of a sample. Static tests involve discrete analytical tests undertaken on samples, where the results represent the geochemical characteristics of the sample at a single point in time and under simple experimental conditions as a 'snapshot' of the sample's likely environmental geochemical characteristics.

Samples collected by URS (2007), Highlands Environmental (2020) and BHP were prepared for static testing by pulverising each sample to a particle size of less than 75 micrometres (µm) in diameter. This is a standard preparation method that provides a homogenous sample for testing and creates a large surface contact area. This, in turn, provides a large potential for sample dissolution and reaction and therefore represents an initial 'assumed worst case' scenario for the potential spoil and coal reject material. Sample preparation methods for the Baker (2013) samples are unclear, however do include a very fine crush process (at least less than 0.5 mm).

The static testing has confirmed the non-carbonaceous and non-coal material to have a low environmental geochemical risk (**Section 5**) and, as such, kinetic leaching tests were not required on these materials as part of this assessment. For non-carbonaceous and non-coal material the static test results alone have been adequate and defining, in the context of the assessment objectives for the purposes of the assessment.

The unmitigated environmental geochemical risks associated with carbonaceous and coaly material (*eg*. coal reject and coal seam material) have been found to be greater (compared with non-carbonaceous and non-coal material) (**Section 5**), however the static test results alone, for these carbonaceous and coaly materials, have been defining in the context of the assessment objectives for the purposes of the assessment. Further assessment of coal reject and coal seam material (and also bulk spoil material) will be undertaken by BMA and BHP as the project develops to assist with management measures, including progressive rehabilitation and closure planning requirements.

Static Test Methodology

The test methods employed on each sample varies between the different sampling programs. Generally, most samples have undergone 'screening' tests for:

- pH and electrical conductivity (EC) (1:5 weight:volume [w:v]) on sample pulps [except Highlands (2020) samples, which underwent a 1:2 w:v extract]; and
- Net Acid Producing Potential (NAPP), which comprises total sulfur (S) and acid neutralising capacity (ANC). The NAPP test provides the fundamental information about the theoretical maximum amount of acid-producing and acid-neutralising material that a sample could produce.

Based on the results of the screening tests (or instead of these tests), selected samples have been subjected to some or all of the following tests:

- Sulfur as sulfide [chromium reducible sulfur (Scr)];
- Net Acid Generation (NAG) [single addition] – a test that encourages the oxidation of a sample to determine if acid can be produced, and how much acid could be produced;

- Acid buffering characterisation curve (ABCC) – a test to determine the proportion of ANC that's in a readily-available form and to provide an indication of the mineralogy of the neutralising material;
- Extended boil net acid generation test (NAG Extended) – a refinement of the single addition NAG test to resolve uncertainty due to potential organic acid interference (where non-acid generating organic acids can provide false positive results in the single addition NAG test);
- Sequential net acid generation test (S-NAG) – a refinement of the single addition NAG test to resolve potential issues associated with incomplete oxidation of samples with high sulfide concentrations;
- Kinetic net acid generation test (K-NAG) – undertaking a single addition NAG test whilst logging the change in temperature and pH of the sample during the oxidation reaction;
- Total metals and metalloids by 4-acid (mixed) or 2-acid (aqua regia) digest with analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and/or Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES);
- Quantitative x-ray diffraction (QRD) – to determine the mineralogical composition;
- Simple water extract leach procedure – a 1 hour end-over-end bottle leach on pulp[3] samples at 1:5 solid:water ratio using de-ionised water, with filtered leachate analysed for:
    - EC and pH;
    - Major and minor ions [calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), sulfate (SO_4), chloride (Cl) and fluoride (F)];
    - Alkalinity [total alkalinity, bicarbonate (HCO_3) and carbonate (CO_3)];
    - Acidity (pH dependent);
    - Soluble metals and metalloids [approximately 28 elements by ICP-MS, ICP-AES and Flow Injection Mercury System (FIMS)].
- Australian Standard Leaching Procedure [modified] – an 18 hour end-over-end bottle leach on pulp samples at 1:20 solid:water ratio using de-ionised water. Filtered leachate (through a 0.8µm membrane) was analysed for the same suite of soluble parameters as listed above. The 'modification' from the standard ASLP was the use of a pulp sample (85 % passing 75 µm) instead of a fine crush sample (100 % passing 2.4 mm).
- Exchangeable cations (Calcium [Ca], Magnesium [Mg], Sodium [Na], Potassium [K]) (with pre-treatment for salinity, if required). Results were used to calculate the cation exchange capacity (CEC); and
- Emerson Aggregate Class testing (in accordance with Standards Australia method AS1289-3.8.1).

The geochemical test work program is summarised in **Table 2-2** by sample type, with reference to data source where relevant. Laboratory test work for the URS (2007), Highlands Environmental (2020) and BHP database samples was undertaken by ALS Limited (ALS) Brisbane, using National Association of Testing Authorities (NATA) accredited methods (where such accreditation exists). Laboratory test-work was undertaken by SGS Laboratory for the PW Baker (2013)

3 Samples crushed and ground to 85 % passing (minus) 75 µm

samples. Mineralogical analysis (QXRD) was undertaken by a university mineralogical laboratory in Melbourne (via Earth Systems Consulting).

The Acid-Base Account (ABA) method was used to assess the acid-neutralising and acid-generating characteristics of the samples. The total and water-soluble element data was used to indicate the potential for the samples to leach metals and metalloids (under existing pH and oxygen [redox] conditions) at concentrations that could warrant further investigation (in a 'worst-case' leaching scenario).

Table 2-2. Summary of the Geochemical Test Program
(Number of samples subjected to each test regime; and data source)

Analytical tests	Drill-hole samples	Coal Reject
pH and EC on 1:2 water extracts	-	9 samples (Highlands)
pH and EC on 1:5 water extracts	284 samples (URS, Baker, BHP)	27 samples (BHP)
Total sulfur (S)	441 samples (URS, Baker, BHP)	31 samples (BHP, Highlands)
ANC	474 samples (URS, Baker, BHP)	31 samples (BHP)
NAG	57 samples (Baker, BHP)	31 samples (BHP)
NAG Extended	7 samples (BHP)	4 samples (BHP)
S-NAG	-	1 sample (BHP)
K-NAG	-	2 samples (BHP)
ABCC	23 samples (BHP)	3 samples (BHP)
Sulfide (Scr)	64 samples (URS, BHP)	31 samples (BHP)
Total Sulfate (SO_4)	16 composite samples (URS)	6 samples (BHP)
QXRD	10 samples (URS)	-
Total elements in solids	45 samples (BHP) 16 composite samples (URS)	22 samples (BHP)
Soluble elements and major ions in 1:5 water extracts	45 samples (BHP) 16 composite samples (URS)	18 samples (BHP)
Soluble elements and major ions in 1:20 modified ASLP	-	2 samples (BHP)
Exchangeable cations	62 samples (Baker, BHP) 16 composite samples (URS)	-
Emerson Aggregate Class	29 samples (BHP)	-

<u>URS</u> = URS, 2007 (as reported in Terrenus, 2009); <u>Baker</u> = PW Baker (2013); <u>Highlands</u> = Highlands Environmental (2020); <u>BHP</u> = BHP coal geochemical database.

Assessment of Element Enrichment

From an environmental perspective, multi-element scans are typically undertaken to identify any elements (particularly metals and metalloids) present in a material at concentrations that *may* be of environmental concern with respect to surface and seepage water quality.

To assess the potential environmental enrichment, the total concentration result for each element were compared to average element abundance in soil in the earth's crust (Bowen, 1979) to measure how the total elemental concentrations in the samples compare against average elemental concentrations in unmineralised soil (worldwide). Such a comparison is undertaken to identify samples that contain what may be regarded as 'elevated' concentrations of metals and metalloids to assess any potential concerns related to disposal and rehabilitation. However, enrichment in any metals/metalloids in the solids does not translate to enhanced leachability or mobilisation of that specific element.

From the comparison with average crustal abundance in rocks a geochemical abundance index (GAI) was calculated. The GAI quantifies an assay result for a particular element in terms of the average abundance for that element (in sedimentary rocks). The index, based on a log 2 scale, is expressed in seven integer increments (0 to 6), which correspond to enrichment factors from 0 to over 96 times average crustal abundance, as shown in **Table 2-3**.

Table 2-3. Geochemical Abundance Index (GAI)

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

As a general rule, a GAI greater than or equal to three indicates enrichment to a level that potentially warrants further investigation or provides an indication of which elements may potentially be problematic with respect to environmental impacts.

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

Assessment of Element Solubility

Solubility data is available for 45 discrete drill-hole samples from the BHP database, 16 composite drill-hole samples from the EIS program and 18 coal reject samples from the BHP database. All samples have undergone a 1:5 w:v (solid:water) water extract procedure to determine the immediate solubility and potential mobility of elements under highly agitated and solubility-inducing conditions. Two coal reject (tailings) samples also underwent a 1:20 w:v (solid water) water leach procedure [modified Australian Standard leach procedure (ASLP)]:

The leaching tests were performed on pulped samples (85 % passing 75 µm in diameter), which means the available surface area for dissolution/solubility and/or geochemical reaction is relatively high compared to dissolution/solubility of soil and rock at much greater grain sizes.

The 'modification' of the ASLP procedure refers to the use of a pulp (85 % passing 75 µm in diameter) sample instead of a minus 2.4 mm crush sample as per the method. Leaching tests were used to determine the solubility and potential mobility of elements under existing pH and oxygen (redox) conditions.

No comparison is made between bottle leachate results and water quality guideline values, such as ANZECC (2000), as such a comparison is inappropriate. The guideline values provided in ANZECC (2000) are for receiving water environments (eg. creeks and rivers), whereas the soluble element data in this assessment is 'point source' obtained from a finely-pulped sample subjected to rigorous and artificial extraction to obtain a concentration approaching 'near maximum'. Furthermore, as contact water reports to the receiving environments a number of geochemical reactions will take place, including: retardation, adsorption and precipitation – and also likely dilution, which will attenuate the concentration as seepage/contact water migrates from the source. These processes are not accounted for in a laboratory setting.

2.6 Acid Classification Criteria

Sample classification of mineral waste material follows some general rules. Samples were classified, with respect to acid generation, using NAPP (and NAG data, where available) into three broad categories:

- NAF — Non-acid Forming;
- Uncertain — Those samples with inconclusive results, leading to a degree of uncertainty about their ability to generate acid; and
- PAF — Potentially Acid Forming.

Within these three broad categories the sample classification was further refined with the aid of Total S data, as follows:

***NAF (NAF)*:**

NAPP <0 kg sulfuric acid [H_2SO_4] per tonne of sample (kg H_2SO_4/t) and NAGpH ≥4.5 and S ≤1 %

***NAF-Sulfur (NAF-S)*:**

NAPP <0 kg H_2SO_4/t and NAGpH ≥4.5 and S >1 %

***PAF – Low Capacity (PAF-LC)*:**

NAPP ≥0 and <10 kg H_2SO_4/t and NAGpH <4.5 and NAG at pH4.5 ≤5 kg H_2SO_4/t

***PAF*:**

NAPP ≥10 kg H_2SO_4/t and NAGpH <4.5 and NAG at pH4.5 >5 kg H_2SO_4/t

Uncertain: Any result outside of the above criteria, or results that appear to significantly conflict with the expected result based on lithology or mineralogy.

Heterogeneity is a characteristic of natural geological (soil and rock) material. Sometimes an analytical result for a rock sample can vary to that which may be expected based on the known rock type (from information contained in the lithological logs). In this case, a degree of conservatism is applied to the result (*ie*. the precautionary principle prevails) and the sample is classified as 'Uncertain' until further information becomes available. Depending on the level of risk, from a mineral waste management perspective 'Uncertain' samples are usually managed conservatively.

3 Geochemical Test Results – Potential Spoil Samples

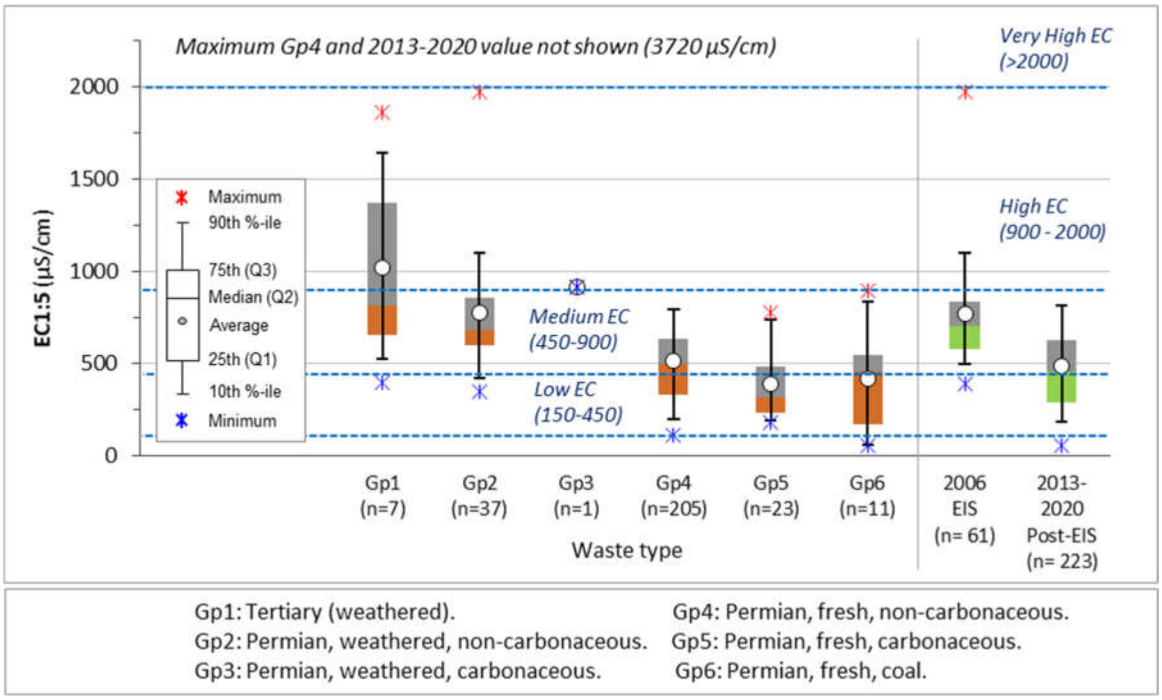
The static geochemical results for drill-hole samples (potential spoil samples, including coal samples as discussed earlier) are tabulated in **Appendix B**. The laboratory reports can be provided on request.

3.1 Salinity and pH

EC and pH results were measured on 284 sample pulps – enabling a high level of reaction and dissolution.

The $EC_{1:5}$ of the samples ranged from 54 to 3,720 µS/cm, with median and 90th percentile $EC_{1:5}$ values of 529 and 837 µS/cm, respectively. As evident in **Figure 3-1**, the weathered samples had greater $EC_{1:5}$ values compared to the fresh (unweathered) samples. The samples, generally, are regarded as having 'low' to 'medium' EC. The EIS samples generally had marginally higher $EC_{1:5}$ compared to the more recent samples, suggesting that mineral waste material from the Project can be expected to have similar EC to existing materials.

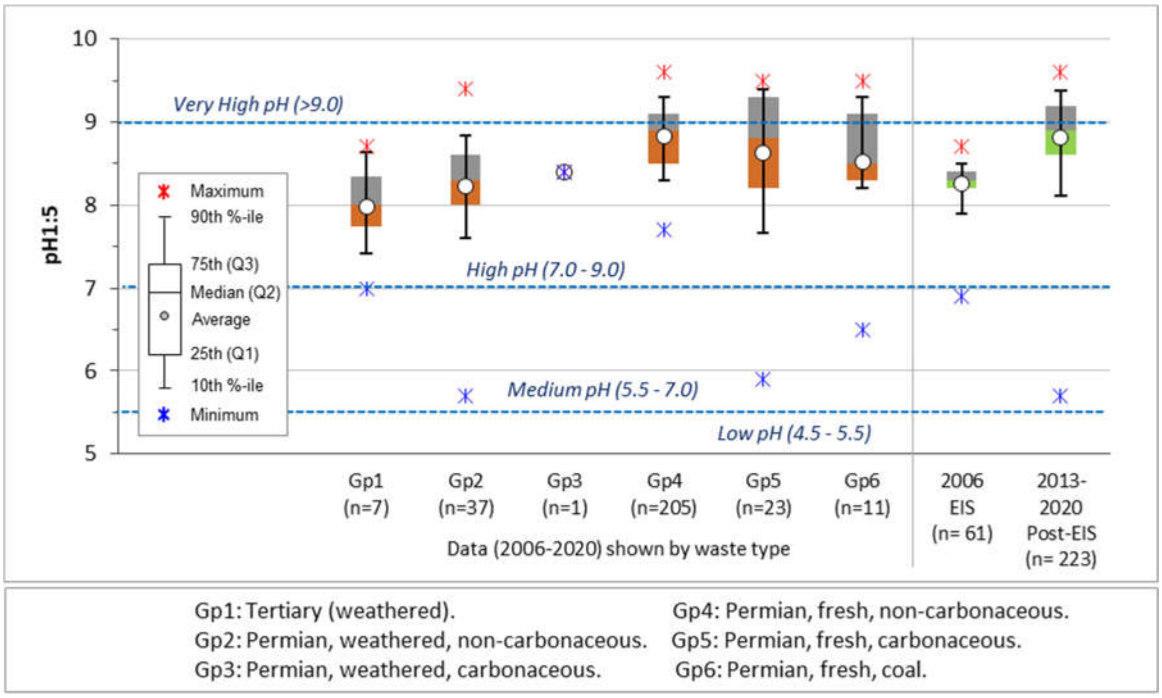
Figure 3-1. Electrical Conductivity (EC) Distribution of Potential Spoil



The samples are almost all pH-neutral to alkaline, with $pH_{1:5}$ values ranging from pH 5.7 to 9.6, with a median $pH_{1:5}$ of 8.8 and 10th percentile $pH_{1:5}$ of 8.1 – indicating a general lack of readily soluble acidity. These results place them in the 'high' to 'very high' soil pH range (**Figure 3-2**). The samples from the EIS had lower $pH_{1:5}$ values compared to more recent samples, however the results are broadly comparable.

The $pH_{1:5}$ and $EC_{1:5}$ values of all samples tested are generally typical for mineral waste (spoil) from Permian coal measures in Queensland[4] – and the results are as expected.

Figure 3-2. Soil pH Distribution of Potential Spoil



3.2 Acid-Base Accounting (Potential for Acid Generation)

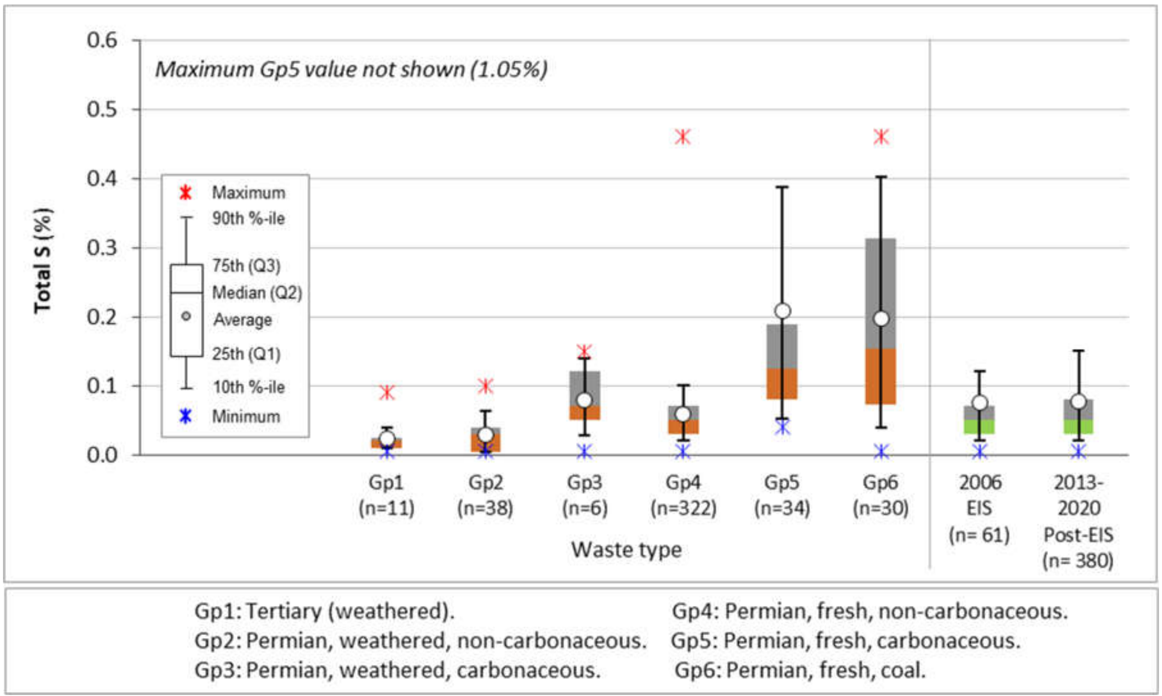
The ABA is the theoretical balance between the potential for a sample to generate acid and neutralise acid and is expressed in units of kg H_2SO_4/t.

Sulfur and Sulfide

The total sulfur (total S) concentration values of all samples (n=441) ranged from less than 0.01 % to 1.05 %, with very low median and 90th percentile values of 0.05 % and 0.15 %, respectively (**Figure 3-3**). Chromium reducible sulfur (Scr) was measured on 64 samples – generally those samples with total S values generally greater than 0.1 %. The Scr values ranged from 0.01 % to 0.58 %, with very low median and 90th percentile Scr values of 0.06 % and 0.21 %. These results indicate that the maximum potential acidity (MPA) that could be generated by these samples is very low. As evident in **Figure 3-3** the total S concentrations were much higher in the carbonaceous materials (particularly Gp5 and Gp6) compared to the non-carbonaceous materials. The total S distribution was very similar between the EIS samples compared with the newer samples.

4 Based on Terrenus's significant experience working in Permian coal deposits.

Figure 3-3. Distribution of Total Sulfur of Potential Spoil



Maximum Potential Acidity and Acid Neutralising Capacity

The maximum potential acidity (MPA) and acid neutralising capacity (ANC) represent each side of the acid-base account. MPA is calculated from total S and is the theoretical maximum potential acidity that can be generated if all of the S (assumed as sulfide) is able to oxidise and generate acid (H_2SO_4). ANC represents the theoretical maximum amount of acid-neutralising capacity of a sample assuming all neutralising material is in a readily available form. The net acid producing potential (NAPP) – discussed below – is the difference between the MPA and the ANC. In simple terms, a negative NAPP indicates an excess of ANC and the sample is likely to be non-acid forming (NAF) and a positive NAPP indicates an excess of MPA and the sample is likely to be potentially acid forming (PAF) – though there can be exceptions to this simplified interpretation.

Due to the very low total S values the MPA for all samples is very low, with a 90th percentile MPA value for all samples of 4.6 kg H_2SO_4/t (*ie*. 90 % of samples have an MPA less than 4.6 kg H_2SO_4/t). The coal (Gp6) and fresh carbonaceous (Gp5) samples have greater MPA values, generally (compared to all other samples), as expected by the typically greater sulfur and sulfide concentrations of coaly and carbonaceous material. Almost all of the Gp5 and Gp6 samples were collected after the EIS.

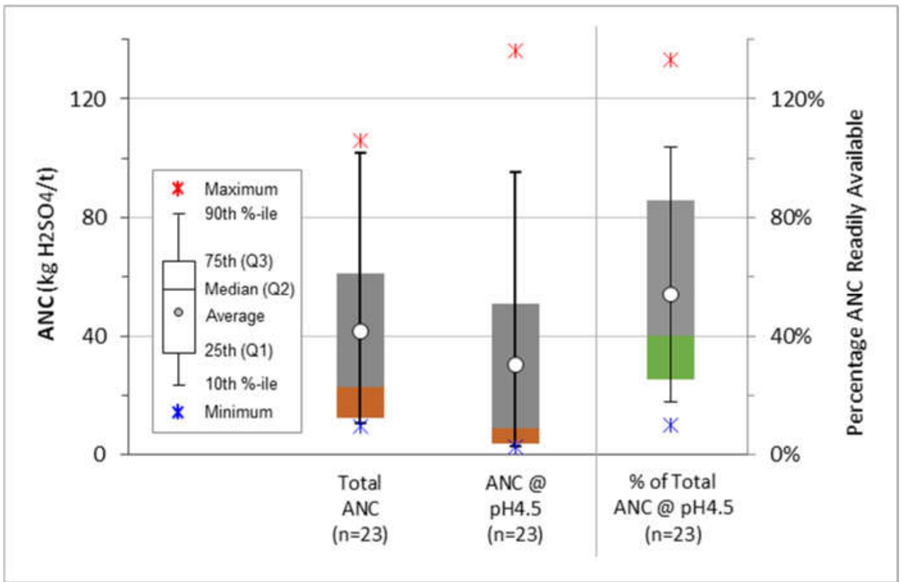
The ANC values are typically well in excess of the MPA values and span a very large range, from less than 0.5 to 321 kg H_2SO_4/t, with a median ANC value for all samples of 35 kg H_2SO_4/t and a relatively low 10th percentile value of 9 kg H_2SO_4/t, respectively (*ie*. 90 % of samples have an ANC greater than 9 kg H_2SO_4/t which, if all ANC was readily available, would neutralise the acidity generated by material containing 0.3 wt% S).

Available Neutralising Capacity

The availability of neutralising material is generally determined by the mineralogy of the sample – with calcite and dolomite (carbonate minerals) being more readily-available to neutralise acidity compared with, for example, silicates. Siderite, although a carbonate, has no net acid neutralising capacity. Twenty-three (23) samples collected by BHP in 2020 underwent an acid buffering characterisation curve (ABCC) test to assess the proportion of ANC that may be 'readily available' (*ie*. short-acting) in these materials and provide some indication of what carbonate minerals are providing the ANC. 'Ready availability' is regarded as the proportion of ANC that is available for buffering reaction at pH 4.5.

For the 23 samples where ABCC data is available, the results showed that the proportion of ANC likely available under field conditions ranged from 10 % to greater than 100 % (133 %) of the total ANC, with 25th, median (50th) and 75th percentile values of 26 %, 40 % and 104 %, respectively (**Figure 3-4**). Note: because the ABCC test is a separate test to the ANC test – performed on different sample splits – it is possible to achieve results with greater than 100 % ANC being readily available for the same sample. Such a result effectively means that all of the ANC for that sample is in a readily available form. Similarly, at the lower end, the lowest 'readily available' amount may actually be slightly greater.

Figure 3-4. Distribution of Acid Neutralising Capacity (ANC [total], ANC at pH4.5 and proportion (%) of ANC Expected to be Readily Available for Potential Spoil



The shape of the ABCC curves (the reaction rate) can also be used to infer likely carbonate mineralogy based on standard curves/data for different carbonate minerals at varying ANC values. ABCC reaction rate curves are provided in **Appendix D**. For approximately half of the samples, iron dolomite (Fe-dolomite) appears to be the dominant carbonate mineral – and this is typical for most of the Bowen Basin. Of the remaining samples, several have combined Fe-dolomite and siderite influence, which is also relatively common in the Bowen Basin, and two samples appeared to have siderite or magnesite (alone) as the dominant carbonate mineral. Siderite is fairly common throughout the Permian sediments of the Bowen Basin, albeit in relatively small amounts. It is uncommon in the Bowen Basin to have siderite as the dominant carbonate mineral in any significant quantity. The remaining few samples appear to be dominated by calcite and dolomite.

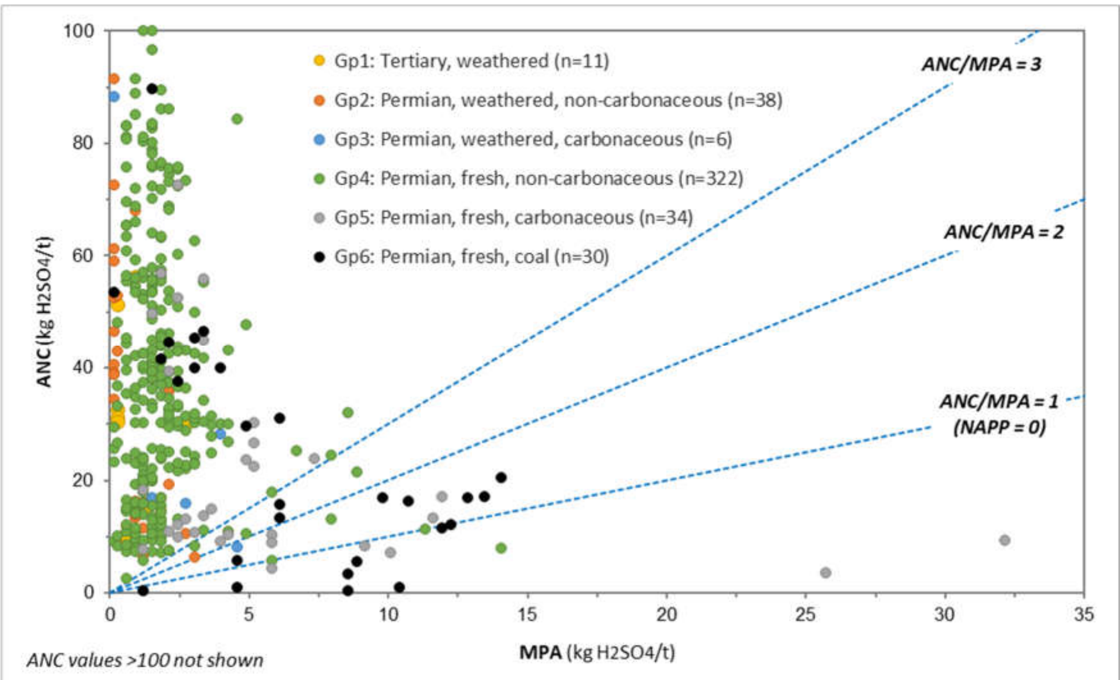
Based on the above, the carbonate mineral in bulk spoil is likely to be Fe-dolomite with varying influence from siderite, calcite and dolomite. Mineralogy is discussed in further detail in **Section 3.4**.

No ABCC data was available until recent test-work undertaken on samples collected by BHP in 2020, therefore the ABCC test-work on the Project samples provides an important insight into the potential efficiency of buffering reactions within potential spoil materials. The data show that the dominant acid neutralising mineral is represented by iron dolomite, and subordinately by a mixture of iron dolomite / dolomite; calcite / dolomite; and iron dolomite / siderite. Samples containing calcite and dolomite tend to show higher laboratory measured and field available ANC. Samples dominated by Fe-dolomite have ANC, but generally this carbonate is slow(er) reacting and cannot sustain long-term buffering at high pH, as is the case for dolomite / calcite. Samples dominated by siderite have no buffering capacity. This means that the efficiency of acid neutralisation reactions by iron dolomite (alone) may decrease overtime, however the substantial presence of dolomite and calcite is expected to boost the efficiency. However, with all of this in mind, the ability for the large bulk of the mineral waste to generate notable acidity is very low due to the very low total S (and sulfide) concentrations.

ANC/MPA Ratios

Generally, those samples with an ANC/MPA mass ratio greater than two are considered to have a negligible/low risk of acid generation (DIIS, 2016; INAP, 2009[5]). The results, illustrated in **Figure 3-5**, show that 412 samples (93 % of samples) have an ANC/MPA ratio greater than two, and 91% of samples have ANC/MPA ratios greater than three.

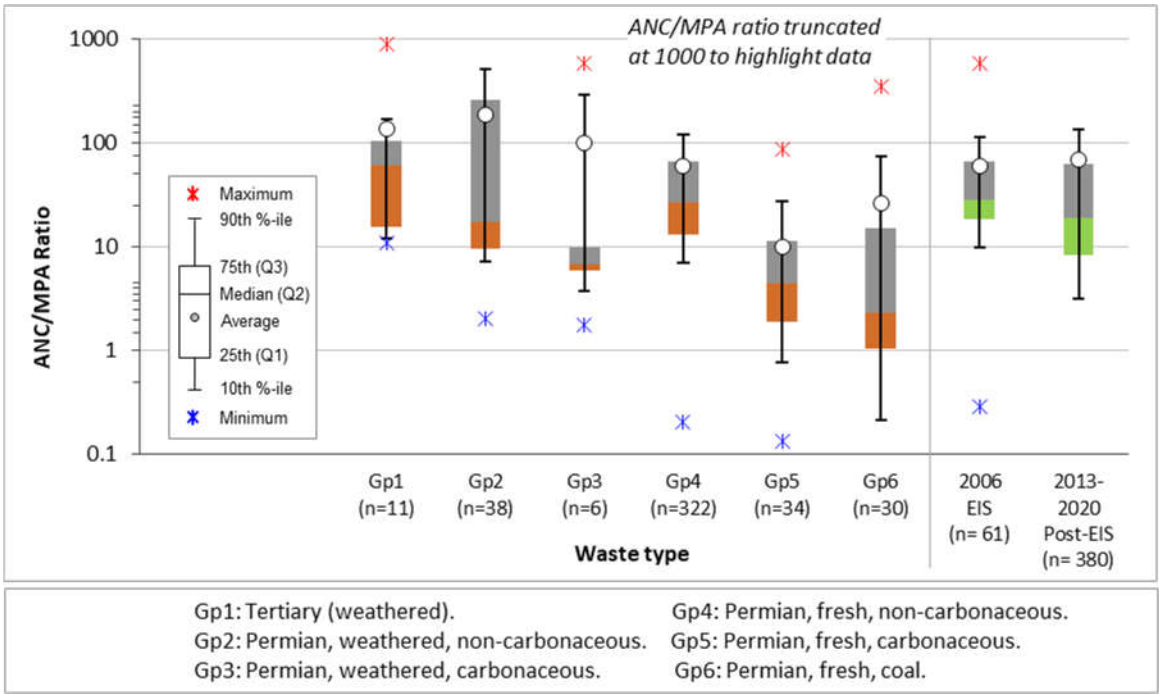
Figure 3-5. Acid Neutralising Capacity (ANC) versus Maximum Potential Acidity (MPA) of Potential Spoil



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

The lowest MPA/ANC ratios were found in the fresh carbonaceous and coal samples (Gp5 and Gp6), as evident in **Figures 3-5 and 3-6**. The non-carbonaceous samples, generally, had significantly excess ANC relative to MPA, producing corresponding high ANC/MPA ratios. The overall distribution of ANC/MPA ratios for the samples was comparable between samples from the EIS compared to post-EIS samples (**Figure 3-6**).

Figure 3-6. Distribution of the Ratio of Acid Neutralising Capacity (ANC) to Maximum Potential Acidity (MPA) [ANC/MPA ratio] of Potential Spoil



Net Acid Producing Potential and Net Acid Generation Capacity

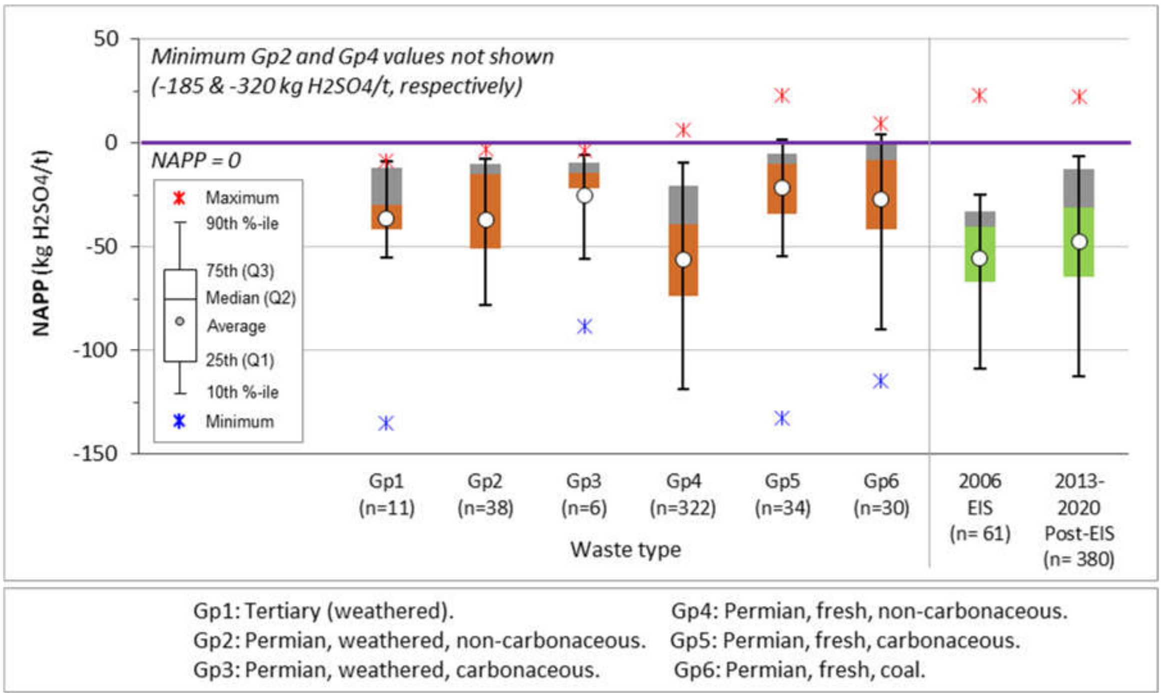
The calculated NAPP values for all drill-hole samples are summarised in **Table 3-1**. Based on the very low MPA and significantly higher ANC values (relative to the MPA), the calculated NAPP values are negative for almost all samples and strongly negative for a significant number of samples (**Figure 3-7**).

Of the 30 coal (seam) samples [Gp6], eight samples had near-zero to low positive NAPP values ranging from approximately 0 to 9.4 kg H_2SO_4/t. Of the 34 fresh carbonaceous samples [Gp5], four had positive NAPP values ranging from 1 to 22 kg H_2SO_4/t. Of the 322 fresh non-carbonaceous samples [Gp4], four had positive NAPP values ranging from 0 to 6.3 kg H_2SO_4/t – and all four samples were located very close to coal seams. The results indicate a significantly greater proportion of neutralising capacity (ANC) compared to potential acidity (MPA).

Table 3-1. Summary Net Acid Producing Potential (NAPP) Values of Potential Spoil

Sample Material	Min.	Max.	Median	10th / 90th percentile	General Comments
	NAPP kg H_2SO_4/t				
Gp1. Tertiary, weathered (n=11)	-135	-9	-30	-55 / -9	Low (all negative)
Gp2. Permian, weath., non-carb. (n=38)	-186	-3	-15	-78 / -8	Low (mostly strongly negative)
Gp3. Permian, weath., carb. (n=6)	-88	-4	-14	-56 / -6	Low (all negative)
Gp4. Permian, fresh, non-carb. (n=322)	-320	+6	-39	-118 / -10	Low (mostly strongly negative)
Gp5. Permian, fresh, carb. (n=34)	-133	+23	-10	-54 / +1.4	Low (mostly strongly negative; few marginally positive)
Gp6. Permian, fresh, coal (n=30)	-115	+9	-8	-89 / +4	Low (mostly strongly negative, small number of neutral and positive samples)
EIS samples (n=61)	-210	+23	-40	-109 / -25	Low (mostly strongly negative)
Post-EIS samples (n=380)	-320	+22	-31	-113 / -6	Low (mostly strongly negative)
All samples (n=441)	*-320*	*+23*	*-35*	*-112 / -7*	*Low (mostly strongly negative)*

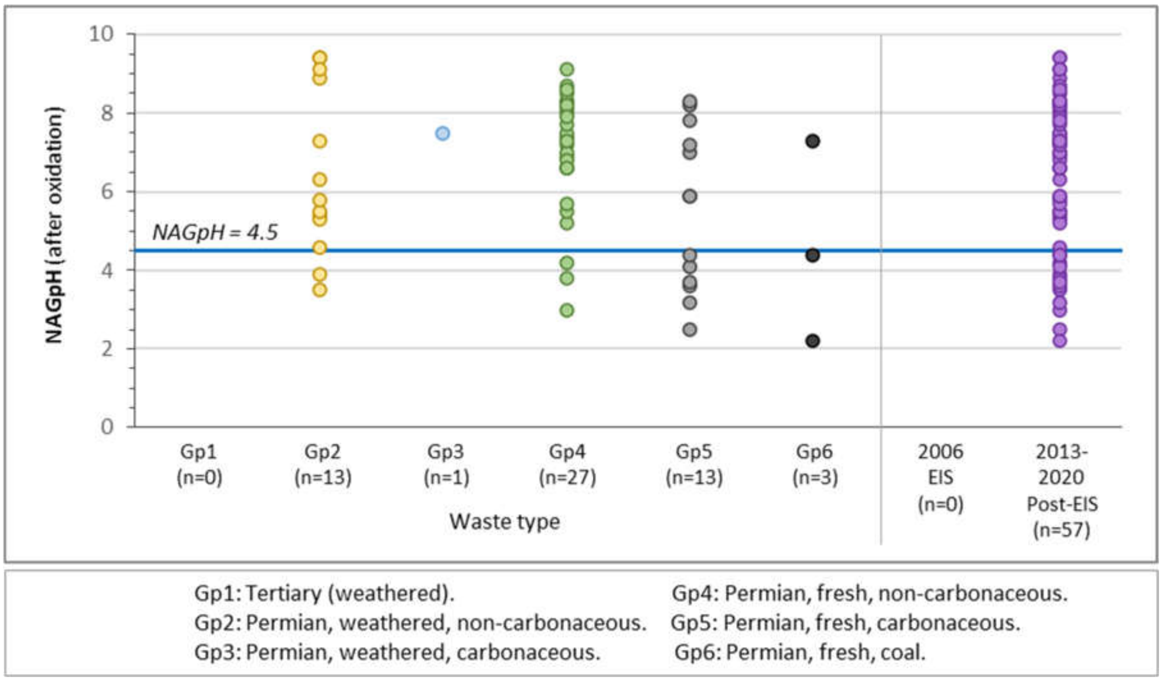
Figure 3-7. Net Acid Producing Potential (NAPP) Distribution of Potential Spoil



NAG test results are used in conjunction with NAPP values in determining the acid classification of samples. The calculated NAPP value assumes that all sulfur (or sulfide) will oxidise to generate acid (MPA) and that all neutralising material in a sample is in a readily available form to neutralise any acid that could be generated (ANC). Unlike the theoretical basis of the NAPP test, in a NAG test a sample is encouraged to oxidise by reaction with hydrogen peroxide and any acid generated through oxidation may be consumed by neutralising components in the sample. Any remaining acidity is measured and expressed as kg H_2SO_4/t. Samples with NAGpH values greater than pH 4.5 are considered to be NAF. Samples with NAGpH values less than or equal to pH 4.5 (*ie.* acid-generating) would also be expected to have measurable NAG capacity (*ie*. NAG capacity >0.1 kg H_2SO_4/t). As a guide, NAG capacity values between 0.1 and 5 kg H_2SO_4/t are considered 'low capacity' (AMIRA, 2002).

NAG tests were undertaken on 57 samples collected since the original EIS assessment, of which about 78 % of samples had NAGpH values greater than pH4.5 (**Figure 3-9**). NAPP and NAG data is only available for 24 samples – of which about two-thirds have NAGpH values greater than pH4.5.

Figure 3-8. Net Acid Generation pH (NAGpH) of Potential Spoil



The NAG test can be influenced by organic acid (*ie*. organic acid can produce NAGpH <4.5, thus providing a 'false positive' for sulfuric acid). Organic acid is typically produced by samples with high organic carbon content – such as coal and highly carbonaceous samples. To attempt to resolve some of the uncertainty with the 'single addition' NAG test (for coaly samples), seven coal and carbonaceous samples (all initially classified as 'Uncertain' with respect to acid generation) underwent an Extended Boil NAG method (NAG Extended). Five of the seven samples returned Extended NAGpH values greater than pH4.5 – thus indicating that these five samples were likely influenced by organic acid.

Geochemical Classification of Potential Spoil Samples

The ABA results presented in this section have been used to classify the acid forming nature of the drill-hole samples as shown in **Appendix B**, following the classification criteria outlined in **Section 2.4** and taking into account all additional relevant data, such as NAG-Extended and ABCC test results. The acid forming nature of these samples is summarised in **Table 3-2**.

The results in **Table 3-2** show that approximately 96 % of samples were classified as NAF, meaning the samples (and spoil material represented by these samples) has very low sulfur concentration, excess ANC (relative to the MPA) and clearly has negligible capacity to generate acidity or sulfate (*ie*. negligible capacity to generate AMD or SD from sulfide oxidation). Eleven samples (approximately 2 % of samples) were classified as PAF-LC or PAF. Ten 'fresh' samples from Gp4, Gp5 and Gp6 had an 'uncertain' classification, however the available data suggests that half of these are expected to be NAF [classified as UC (NAF)].

Spoil samples: Gp1 to Gp5

From an acid generating perspective, spoil (as a bulk material – excluding coal from target seams) would be overwhelmingly NAF – including both existing spoil from the current Horse Pit and new spoil from the Project. This has implications for soluble metals/metalloids transport, as alkaline spoil would inhibit the release of soluble metals/metalloids, compared to the relatively high soluble metals/metalloids concentrations possible in acidic drainage. Furthermore, the very low (negligibly low) sulfur concentrations in potential spoil indicate that the sulfate concentration that could be generated in spoil from sulfide oxidation (in addition to any salinity unrelated to sulfide oxidation) would also be very low.

Table 3-2. Geochemical Classification of Potential Spoil

Waste Group	NAF	NAF-S	UC (NAF)	UC	UC (PAF)	PAF-LC	PAF
	No. and (%) of samples						
Gp1. Tertiary, weathered (n=11)	11 (all)	-	-	-	-	-	-
Gp2. Permian, weath., non-carb. (n=51)	48 (94 %)	-	-	1	-	-	2
Gp3. Permian, weath., carb. (n=6)	6 (all)	-	-	-	-	-	-
Gp4. Permian, fresh, non-carb. (n=340)	335 (99 %)	-	1	1	-	1	2
Gp5. Permian, fresh, carb. (n=35)	27 (77 %)	-	4	1	1	-	2
Gp6. Permian, fresh, coal (n=31)	26 (84 %)	-	-	2	-	1	2
EIS samples (n=61)	59 (97 %)	-	-	1	-	-	1
Post-EIS samples (n=413)	394 (95 %)	-	4	3	1	2	8
All samples (n=474)	453 (96 %)	-	5	4	1	2	9

Coal samples: Gp6

Most of the coal samples were from the HC and DY seams, with the remainder from the P seam and from small unknown seams. Coal samples had similar characteristics to the non-coal samples – albeit with marginally higher total S values and marginally lower ANC. Approximately 84 % of coal samples tested (26 out of 31 samples) fall in the NAF category, and seam material represented by these samples has very low sulfur values, excess ANC (relative to the MPA) and clearly has a low capacity to generate significant acidity or sulfate. Three coal samples (two from the P seam and one sample from the DY seam) were classified as PAF. Two coal samples had an 'uncertain' classification. These results suggest that coal – represented by these samples – stored on a ROM pad, located within pit walls or floor, and un-economic coal seam material reporting as spoil (mixed with non-coal spoil) would likely be NAF. As mentioned earlier, the HC and DY seams comprise the majority of coal at CVM (including the current Horse Pit and the Project). Future extension of Horse Pit (the Project) will uncover greater proportion of P seam than currently mined.

3.3 Metals and Metalloids

Multi-element (metal and metalloid) data is available for 45 potential spoil samples (all from post-EIS sampling by BHP) and 16 composite potential spoil samples from the EIS data. The test results are presented in **Appendix B**.

The results are compared to background concentrations for each element, based on average elemental abundance in soil in the earth's crust. The comparison is determined by the GAI, as outlined in **Section 2.4**. GAI values of two are regarded as 'slightly to moderately' enriched (with respect to average elemental abundance), GAI values of three or more are regarded as 'significantly' enriched. The GAI values are presented in **Appendix B** alongside the multi-element data. The post-EIS samples were all analysed by a higher resolution method compared to the earlier EIS samples. As such, the EIS samples have laboratory limits of reporting (LOR) that are typically greater or similar to the median soil abundance concentration used to calculate the GAI. Therefore, all earlier (EIS) samples have very low GAI values for all elements.

The GAI values for the post-EIS samples (analysed by a higher resolution method) show that some samples were significantly enriched (GAI = 3 or 4) with respect to beryllium (Be), calcium (Ca), sulfur (S) and/or tellurium (Te) (**Table 3-3**), however none of these levels of 'enrichment' for the respective elements is cause for concern.

Table 3-3. Summary of Metal and Metalloid Enrichment of Potential Spoil

Waste Group	Enrichment Summary
Gp1. Tertiary, weathered (n=2)	No enrichment in any samples
Gp2. Permian, weath., non-carb. (n=6)	Two samples for Te (GAI=3)
Gp3. Permian, weath., carb. (n=0)	No samples analysed
Gp4. Permian, fresh, non-carb. (n=25)	One sample for Be (GAI=3); Seven samples for Te (GAI=3 or 4)
Gp5. Permian, fresh, carb. (n=10)	Four samples for Te (GAI=3 or 4); One sample for Ca and S (GAI=3)
Gp6. Permian, fresh, coal (n=2)	No enrichment in any samples
EIS samples (n=61)	No enrichment in any samples
Post-EIS samples (n=45)	As per Gp1 to Gp6 above

It is notable that the significant enrichment in Ca in one of the Gp5 samples was accompanied by a relatively high concentration of iron (GAI=2). Mineralogical analysis of this sample showed that siderite was a dominant carbonate mineral (with lesser concentrations of calcite and ankerite) – which likely accounts for the high Fe concentration. Mineralogy is discussed in further detail below in **Section 3.4**.

3.4 Mineralogy

Data is available (from the BHP database) for 10 potential spoil samples from Gp2, Gp4 and Gp5 that underwent mineralogical analysis by Quantitative X-Ray Diffraction (QXRD). The samples tested comprised:

- Gp2: Permian, weathered, non-carbonaceous. 2 samples;
- Gp4: Permian, fresh, non-carbonaceous. 3 samples; and
- Gp5: Permian, fresh, carbonaceous. 5 samples.

The QXRD results (**Figures 3-9 and 3-10**) show that most samples are dominated by quartz and clay minerals. The Gp5 samples are also dominated by non-crystalline (amorphous) material – which in this case is likely to be coal or similar organic material – as expected from carbonaceous samples. One weathered Permian sample (201847_WCC_33) also has a high concentration of non-crystalline material. This sample is described in the lithological logs as "Sandstone, fine" with no further descriptors – as such the source of the non-crystalline material is unknown. Weathered Permian sample 201537_WCC_59 (**Figure 3-9**, *upper left*) is unique with a high concentration of apatite – a phosphate mineral – and carbonate almost exclusively present as siderite.

Figure 3-9. Mineralogy of Potential Spoil [Gp2 and Gp4 materials]

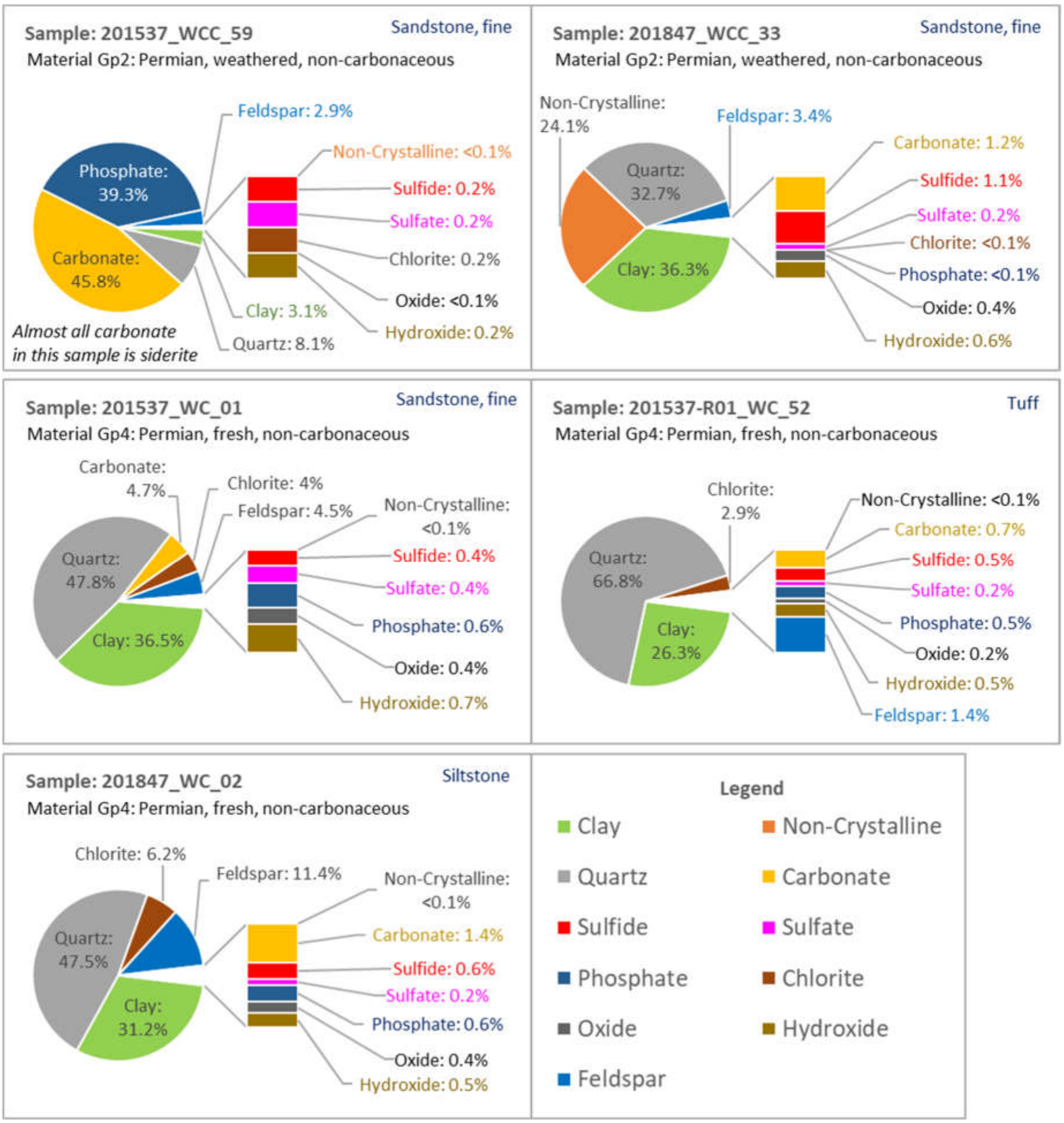
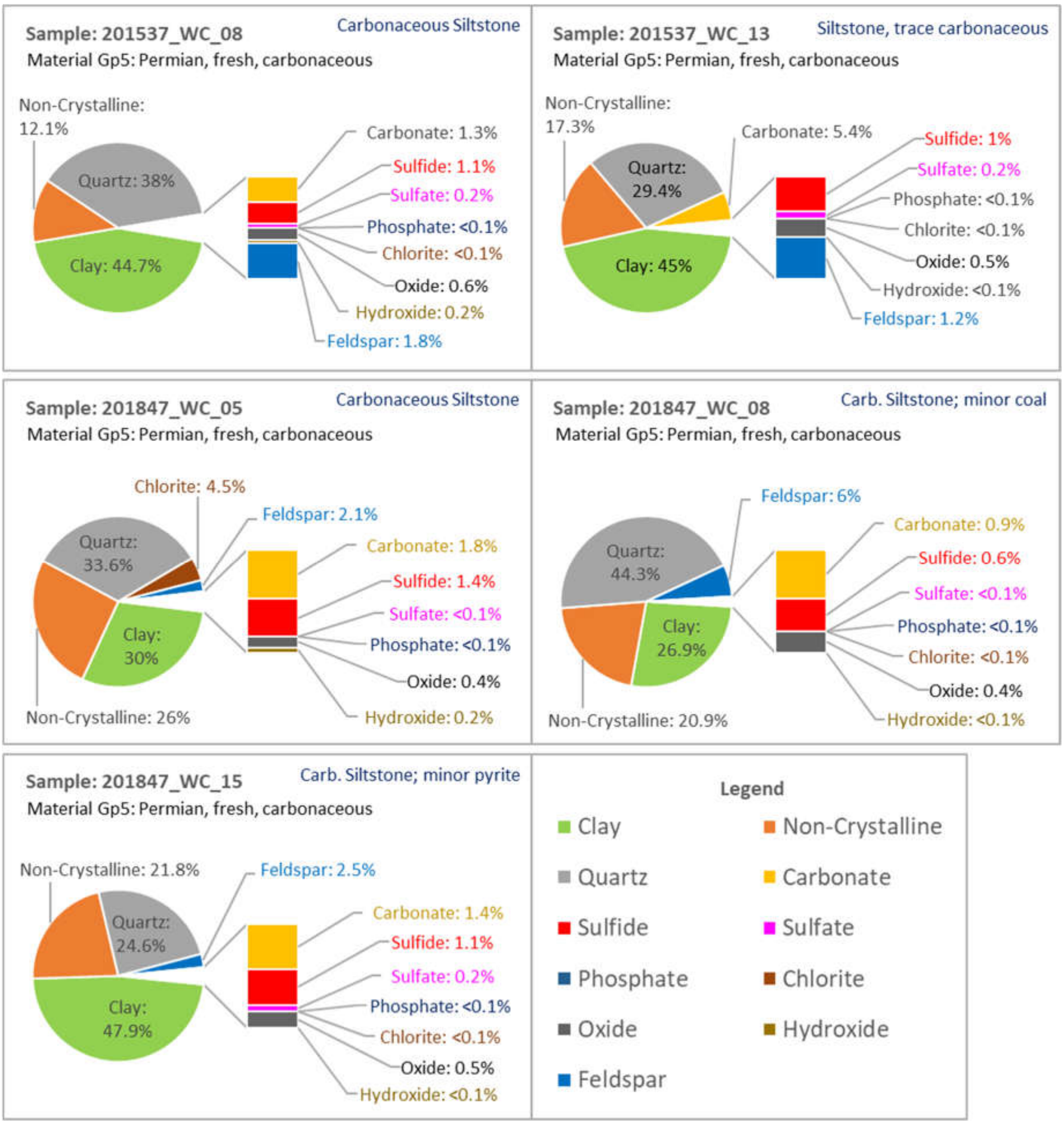


Figure 3-10. Mineralogy of Potential Spoil [Gp5 materials]



The sulfide minerals in each sample comprise near-equal proportions of pyrite and marcasite (marcasite is another form of FeS_2, similar to pyrite). All samples have low sulfate concentrations.

Carbonate group minerals comprise ankerite, calcite and siderite in near equal proportions (except for sample 201537_WCC_59, which is almost exclusively dominated by siderite). ABCC data for these samples (where available) indicated that an Fe-carbonate (Fe-dolomite with siderite) was the likely dominant carbonate mineral, which is broadly consistent with the mineralogy data.

3.5 Initial Solubility

To evaluate the initial solubility of multi-elements in samples, water extract tests were completed for 16 composite samples from the EIS program and 45 samples collected in 2020 by BHP (data from the BHP database). For both sampling programs the samples underwent a 1:5 w:v (solid:water) water extract procedure on pulps. The post-EIS samples (BHP database samples) were all analysed by a higher resolution method compared to the earlier EIS samples. As such, the EIS samples have laboratory LOR values that are generally greater than the laboratory LOR for the BHP samples.

The results from these tests are provided in **Appendix B** and found that the soluble metals and metalloid concentrations were very low (for both sampling programs), and within the range typical for Permian sedimentary materials in Queensland. For most samples, the soluble metals and metalloids are at concentrations below or marginally above the laboratory limit of reporting (LOR).

The pH was generally pH-neutral to alkaline (as discussed earlier) and the samples generally had ‘low’ to ‘medium’ EC (as discussed earlier).

It is important to note that the soluble metal/metalloid results presented in this report represent an ‘assumed worst case’ scenario. For both methods the leaching was undertaken on a pulped sample (85 % passing 75 µm) – therefore these samples have a very high surface area compared to similar material in the field.

No comparison has been made between bottle leachate results and water quality guideline values, such as ANZECC (2000), as such a comparison is inappropriate. The guideline values provided in ANZECC (2000) are for receiving water environments (*eg*. creeks and rivers), whereas the soluble element data in this assessment is ‘point source’ obtained from a finely-pulped sample subjected to rigorous and artificial extraction to obtain a concentration approaching ‘near maximum’. Furthermore, as contact water reports to the receiving environments a number of geochemical reactions will take place, including: retardation, adsorption and precipitation – and also likely dilution, which will attenuate the concentration as seepage/contact water migrates from the source. These processes are not accounted for in a laboratory setting.

The environmental significance of identified soluble metal/metalloid concentrations in mineral waste material in terms of risk is discussed in **Section 5**.

3.6 Cation Exchange Capacity, Sodicity and Dispersion

To evaluate the potential ‘soil quality’ of spoil material, exchangeable cation concentrations were measured on (and data is available for) 78 potential spoil samples from the EIS program and more recently. Results are available for Gp2, Gp4 and Gp5 sample types (plus one Gp1 sample). The results are presented in **Appendix B**.

The cation exchange capacity (CEC) ranges from 1 to 50 milliequivalents per 100 grams (meq/100g), with a relatively modest median CEC value of 15 meq/100g. The exchangeable sodium percentage (ESP) results range from 8 % to 44 %, with a median ESP of 24 %. There was no significant difference between the CEC and ESP results for each of the three material groups (Gp2, Gp4 and Gp5).

To put these results into context, an ESP value of 6 % or greater generally indicates that soil material is regarded as sodic and may be prone to dispersion (Isbell, 2002) and soil with an ESP value greater than 14 % is regarded as strongly sodic (Northcote and Skene, 1972). However, other important factors such as clay mineralogy, soil sodium concentration, soil salinity and irrigation water (rainwater) chemistry may enhance or limit that potential for soil to be sodic or become sodic over time. Therefore, sodicity ratings (based on the above general interpretation) are a general guide only and should not be taken as definitive.

Seventeen (17) samples had ESP values greater than 6 % and are regarded as being 'sodic'. The remaining 61 samples have ESP values greater than 14 % and, therefore, are regarded as being 'strongly sodic'. As all samples are sodic to varying degrees, mineral waste represented by these samples – which is essentially all mineral waste at CVM – may have *some* potential for dispersion.

Twenty-nine (29) samples from BHP (2020) sampling also underwent Emerson Aggregate Class tests to determine whether these samples were dispersive. Emerson Aggregate Class tests are a direct measure of soil dispersion, whereas ESP values are used as an indirect measure of the *potential* for a sample to have structural stability problems and hence *may be* dispersive.

The results (**Appendix B**) show 22 of the samples were non-dispersive [non-slaking and non-swelling] (Class 8). Of the remaining samples, two were non-dispersive [no slaking, but some swelling] (Class 7) and the remaining five samples (all fresh, Gp4) had some dispersion [slaking] (Class 2). That is, of the 29 samples, only five showed some dispersion (and all 5 were regarded as being strongly sodic) – thus showing that using CEC and ESP alone to determine dispersion is problematic.

Despite the incongruity between the Emerson Aggregate Class results and the expected dispersion of these same samples based on CEC and ESP, the results suggest that a significant proportion of spoil associated with the current Horse Pit and the Project is expected to be sodic to strongly sodic, and dispersive to varying degrees – with no distinction between lithology or degree of weathering.

These exchangeable cation (and Emerson Aggregate Class) results are common (if not typical) for Bowen Basin Permian and Tertiary material based on Terrenus' significant experience in the region – and highlight that spoil is likely to have mixed sodicity and dispersion potential.

Ideally, highly sodic and dispersive material should be identified, selectively handled and placed within the core of spoil emplacements away from final surfaces or used to progressively backfill the voids during mining. However, in practice, spoil comprises such a large amount of waste that selective handling and disposal of potentially sodic spoil is impractical, if not impossible. As such, the management of spoil dumps would need to focus on maintaining relatively low (shallow) slopes and undertaking progressive rehabilitation of spoil dumps to minimise the potential for erosion and landform degradation.

The environmental significance of exchangeable cation values and sodicity levels in spoil material in terms of risk and potential revegetation management is outlined in **Section 5**, however readers should consult the separate soils assessment undertaken as part of the environmental approvals for the Project for a detailed assessment of soil properties with regard to rehabilitation.

4 Geochemical Test Results – Coal Reject Samples

The static geochemical results for 31 coal reject samples are tabulated in **Appendix C**. The laboratory reports can be provided on request. Coal reject samples assessed comprise tailings samples (collected as slurry from the thickener underflow at the CHPP, and dried), fine reject (dewatered tailings collected from the belt press filter at the CHPP), coarse reject collected from the CHPP and mixed plant reject (fine and coarse reject combined) collected from the CHPP and from in-place disposal locations. The results are discussed with reference to these four types of coal reject. At CVM, the actual coal reject that leaves the CHPP for disposal is predominantly fine reject and mixed plant reject.

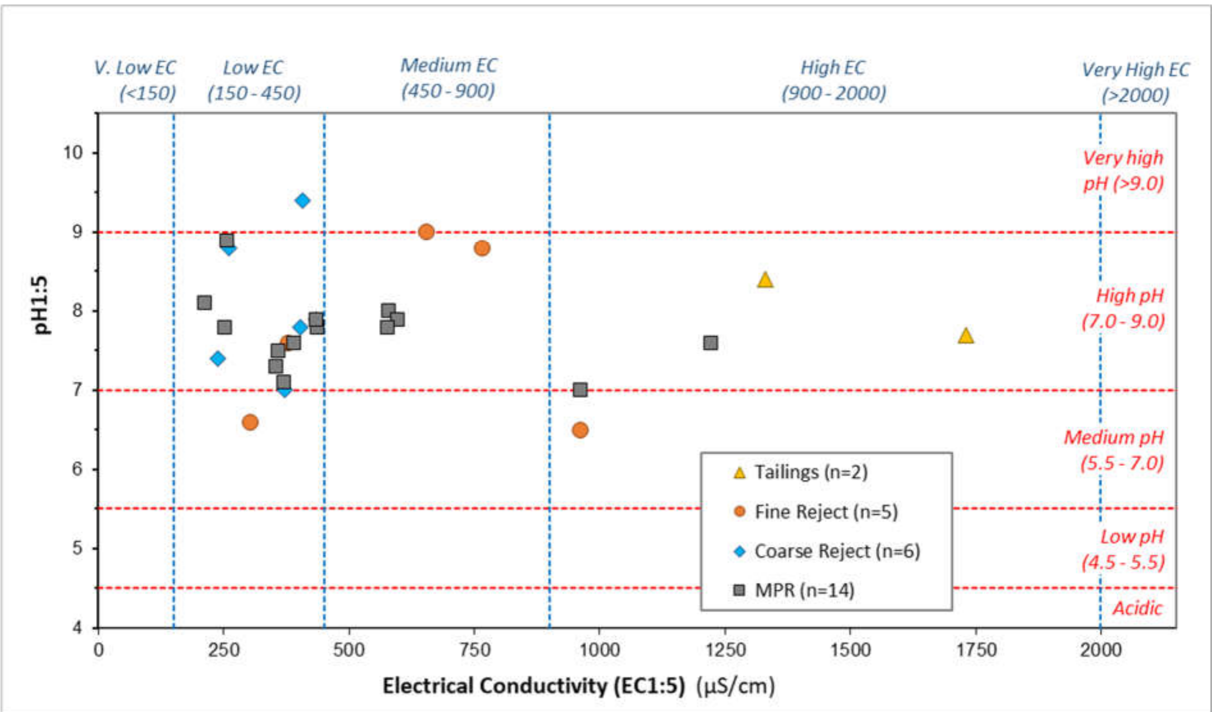
At the time of the CVM EIS no coal reject geochemical data was available, therefore no direct comparison can be made between coal reject data from the current mine (Horse Pit) compared with the Project. However, it is reasonable to assume that coal reject data presented herein is representative (generally) of current and short-to-medium-term (within 5-10 years) future coal reject materials.

4.1 Salinity and pH

EC and pH results were measured on 27 sample pulps – enabling a high level of reaction and dissolution.

The $EC_{1:5}$ of the samples ranged from 213 to 1,730 µS/cm, with median and 90th percentile $EC_{1:5}$ values of 407 and 1,065 µS/cm, respectively. The tailings and fine reject samples appear to span a greater range of EC compared to the coarse reject and MPR samples. As evident in **Figure 4-1**, the samples span a range from 'low' to 'high' EC, however the majority of the samples have 'low' to 'medium' EC.

Figure 4-1. Electrical Conductivity (EC) and pH of Coal Reject



The samples are all pH-neutral to alkaline, with $pH_{1:5}$ values ranging from pH 6.5 to 9.4, with a median $pH_{1:5}$ of 7.8 (and 10th percentile of pH 7) – indicating a general lack of readily soluble acidity. These results place them, generally, in the 'high' soil pH range (**Figure 4-1**), however a small number of samples plot lower and higher in the 'medium' and 'very high' soil pH ranges, respectively.

The $pH_{1:5}$ and $EC_{1:5}$ values of all samples tested are generally typical for coal reject materials from Permian coal measures in Queensland – and the results are as expected.

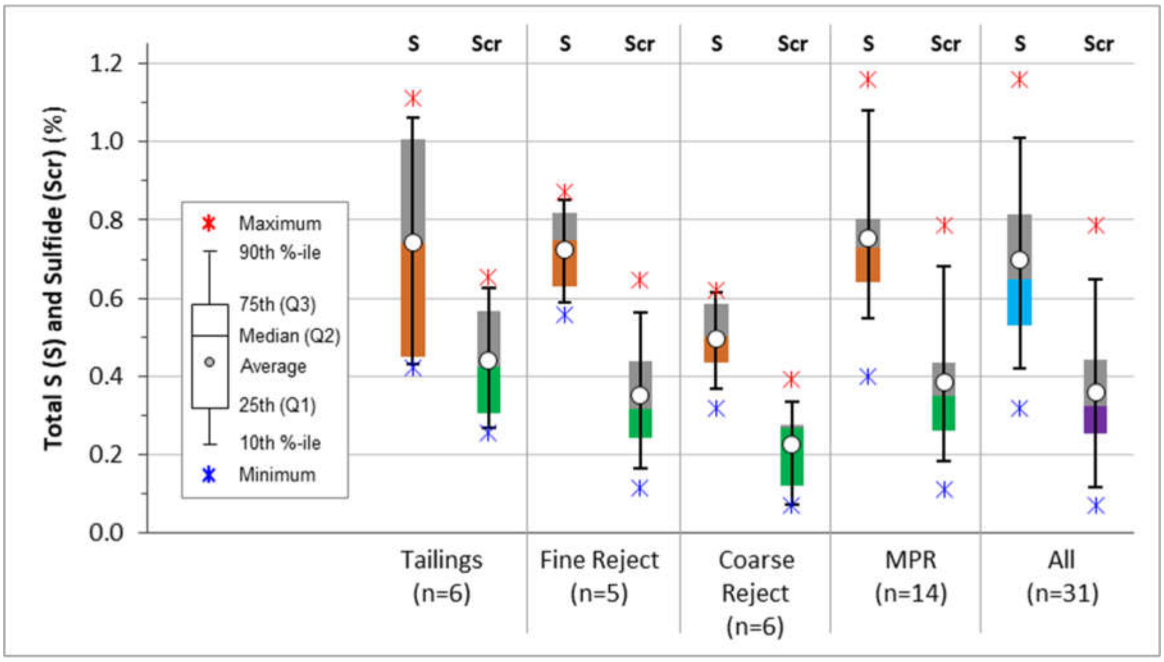
Two of the tailings samples also underwent a modified ASLP, which is a 1:20 soil:water bottle leach over 18 hours. The results (not plotted in Figure 4-1) show that the samples produced less salt (lower EC) compared to the $EC_{1:5}$ results of these same samples due to the diluted leaching method. The pH results were comparable for the two methods – as expected.

4.2 Acid-Base Accounting (Potential for Acid Generation)

Sulfur and Sulfide

The total S concentration values of all samples (n=31) ranged from 0.32 % to 1.16 %, with median and 90th percentile values of 0.65 % and 1.01 %, respectively. Scr (*ie*. sulfur as sulfide) was measured on all samples. The Scr values ranged from 0.07 % to 0.79 %, with median and 90th percentile Scr values of 0.32 % and 0.65 %. The distribution of total S and sulfide is shown in **Figure 4-2**, which illustrates the differences in total S and Scr distribution for the different coal reject materials – with the finer materials (tailings and fine reject) generally having greater total S and Scr concentrations compared to the coarse reject materials. The broad distribution of total S and Scr also illustrates the varying geochemical characteristics of coal reject samples depending upon what seams/plys are being processed at the time of sample collection.

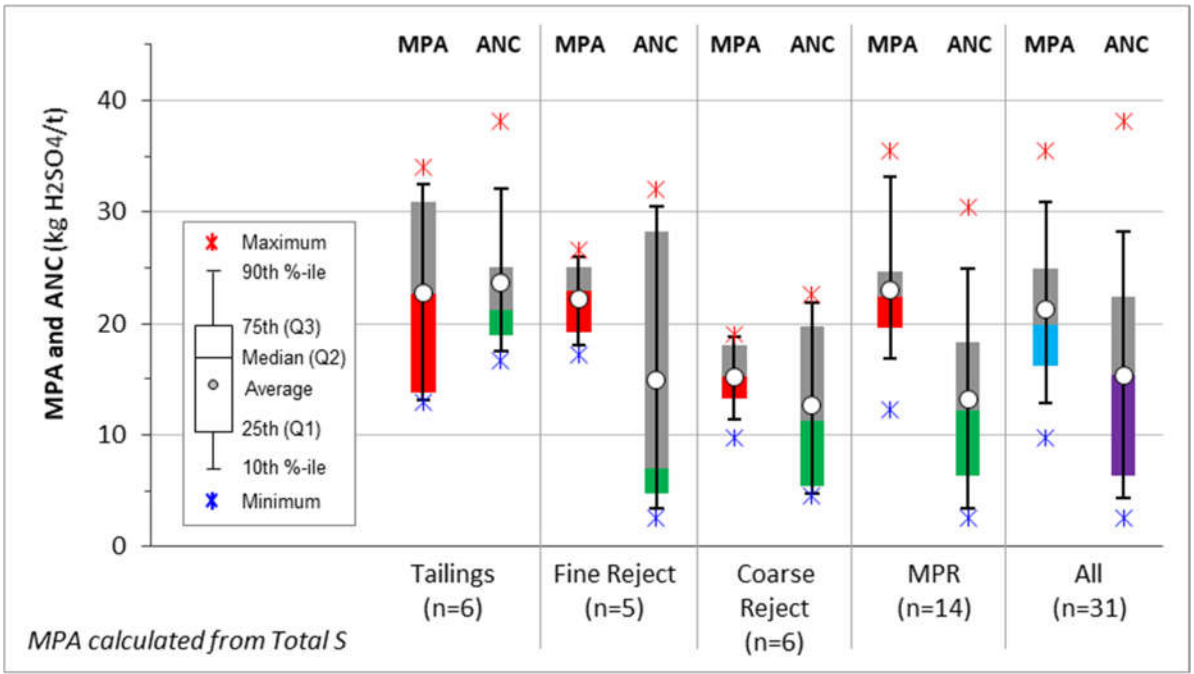
Figure 4-2. Distribution of Total Sulfur (S) and Sulfide (Scr) of Coal Reject



Maximum Potential Acidity and Acid Neutralising Capacity

The distribution of MPA and ANC (**Figure 4-3**) shows that with the exception of MPR, which has higher overall MPA compared to ANC (suggesting net acidity), coal reject materials appear to have MPA and ANC values occupying the same general range – such that when discussing MPA and ANC distribution for fine- and coarse reject materials (by group) the distribution of ANC is similar to or greater than the MPA distribution (and eclipses the range of MPA values). For tailings samples the opposite is true – where the MPA distribution eclipses (generally) the ANC distribution. These results suggest that within each reject group the individual samples have a wide range of MPA and ANC values that are not consistent with the other samples within the same group.

Figure 4-3. Distribution of Maximum Potential Acidity (MPA) and Acid Neutralising Capacity (ANC) for Coal Reject



Available Neutralising Capacity

Three (3) tailings samples collected by BHP in 2020 underwent an ABCC test to assess the proportion of ANC that may be 'readily available' (*ie*. short-acting) in these materials and provide some indication of what carbonate minerals are providing the ANC. 'Ready availability' is regarded as the proportion of ANC that is available for buffering reaction at pH 4.5.

For the three samples, the results showed that the proportion of ANC likely available under field conditions was 16 %, 50 % and 55 % of the Total ANC. The shape of the ABCC curves (the reaction rate) can also be used to infer likely carbonate mineralogy based on standard curves/data for different carbonate minerals at varying ANC values. ABCC reaction rate curves are provided in **Appendix D**. For each sample, iron dolomite (Fe-dolomite) appears to be the dominant carbonate mineral – and this is typical for most of the Bowen Basin. One sample (UF 3/12/19) appears to also have some influence from siderite (based on the shape of the ABCC curve), and this sample has the lowest 'readily available' ANC (16%), which is consistent with the presence of siderite.

ANC/MPA Ratios

Generally, those samples with an ANC/MPA mass ratio greater than two are considered to have a negligible/low risk of acid generation (DIIS, 2016; INAP, 2009[6]). The results, illustrated in **Figure 4-4**, show that only one sample has an ANC/MPA ratio greater than two, and only 11 samples have an ANC/MPA ratio greater than one, indicating that more than half of the samples have greater MPA compared to ANC – as also shown in **Figure 4-3**. The lowest MPA/ANC ratios were found in the MPR, as evident in **Figures 4-3 and 4-4**.

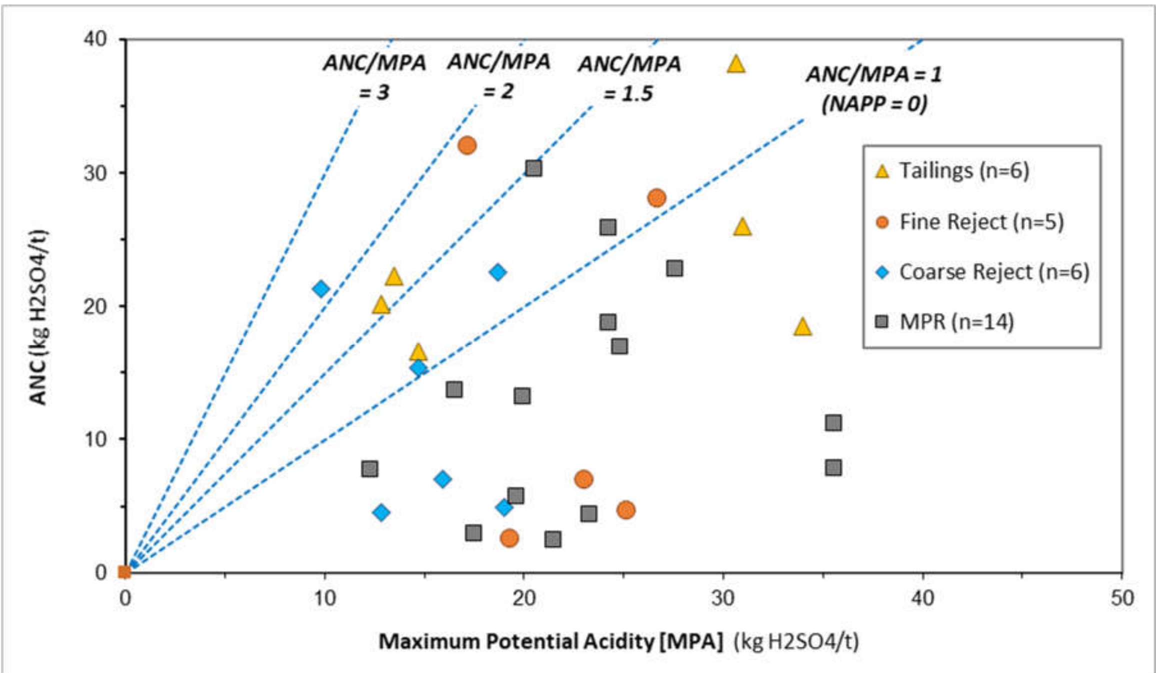
The ANC versus MPA plot (**Figure 4-4** *top*) uses MPA calculated from total S and standard ANC data. When all of the available data, such as Scr, ABCC and NAG is used to classify the samples (as NAF, PAF or Uncertain), and the samples are coded by acid classification, it is evident that coal reject samples with an ANC/MPA ratio greater than 1.5 are NAF (**Figure 4-4** *bottom*), and some materials with an ANC/MPA ratio of between one and 1.5 are also NAF.

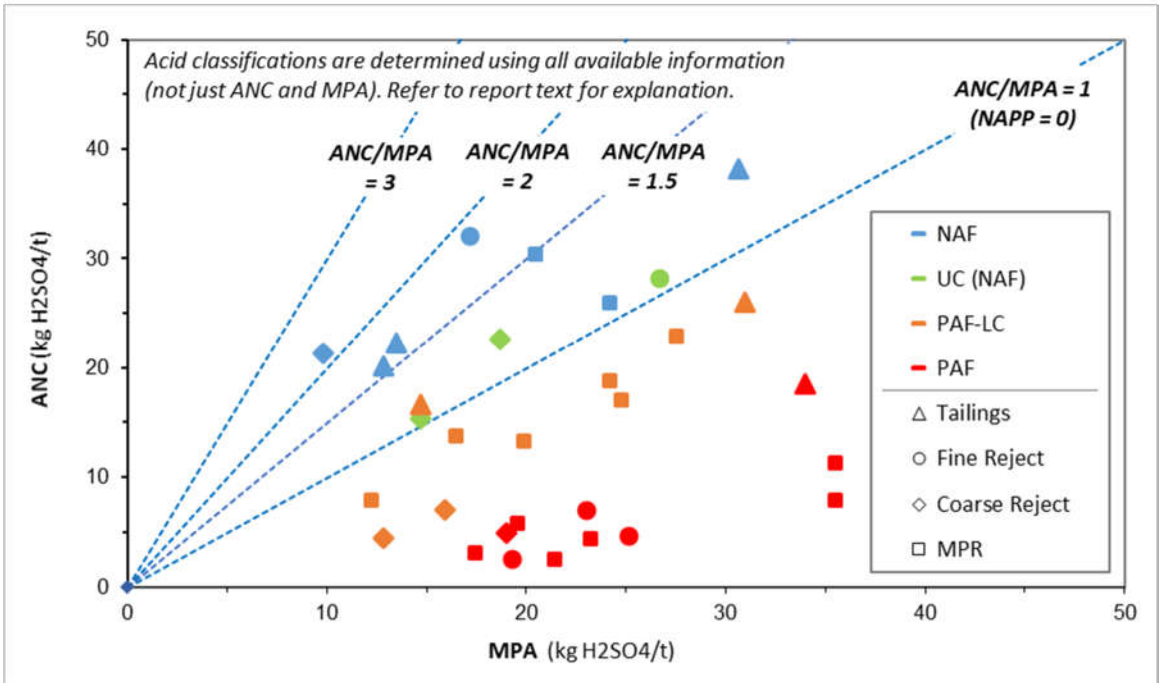
The ABCC results for the three tailings samples indicate that about half of the ANC is in a readily available form, which is consistent with the carbonaceous and coaly potential spoil samples (Gp5 and Gp6). All coal reject samples have Scr data, which shows that Scr accounts for about 50 % of the total S value. Therefore, it is reasonable to assume that about 50 % of the ANC for coal reject materials is in a readily available form and about 50 % of the total S (ie. the MPA) is present as sulfide.

Therefore, for coal reject materials, applying an ANC/MPA ratio of two to broadly (and conservatively) distinguish between NAF and PAF materials is valid using total S and ANC data.

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

Figure 4-4. Acid Neutralising Capacity (ANC) versus Maximum Potential Acidity (MPA) of Coal Reject

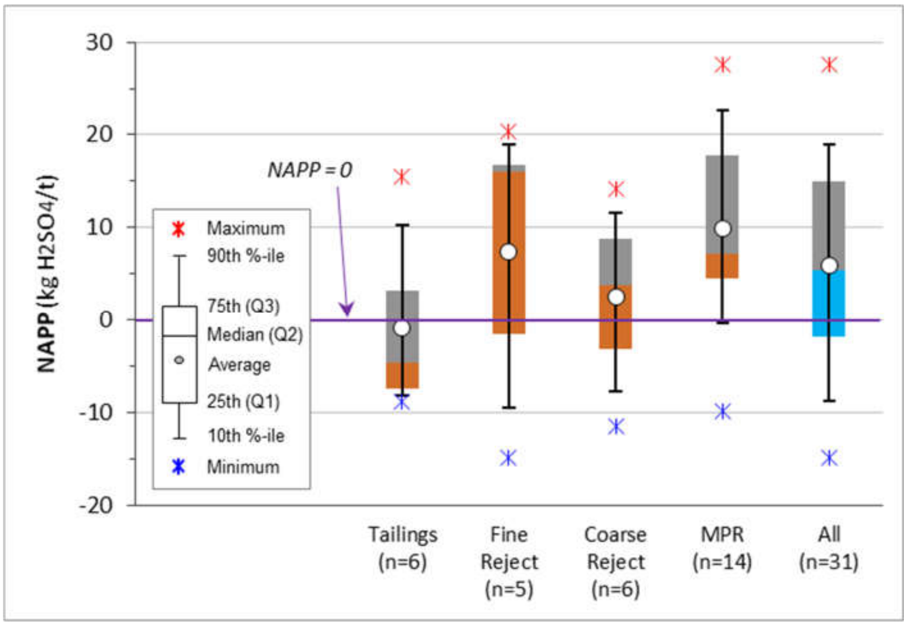




Net Acid Producing Potential and Net Acid Generation Capacity

Based on the mixed MPA and ANC values, the NAPP values (calculated from total S) span a relatively small range from -15 to 28 kg H_2SO_4/t. The NAPP distribution (**Figure 4-5**) reveals that tailings have slightly lower NAPP values (generally) compared with other reject materials, although the differences between the different reject types are not significant. As a bulk material, MPR (comprising co-disposed fine and coarse reject) represents the majority of coal reject 'type' disposed at CVM, followed by minor mono-disposal of fine reject (dewatered tailings).

Figure 4-5. Net Acid Producing Potential (NAPP) Distribution of Coal Reject

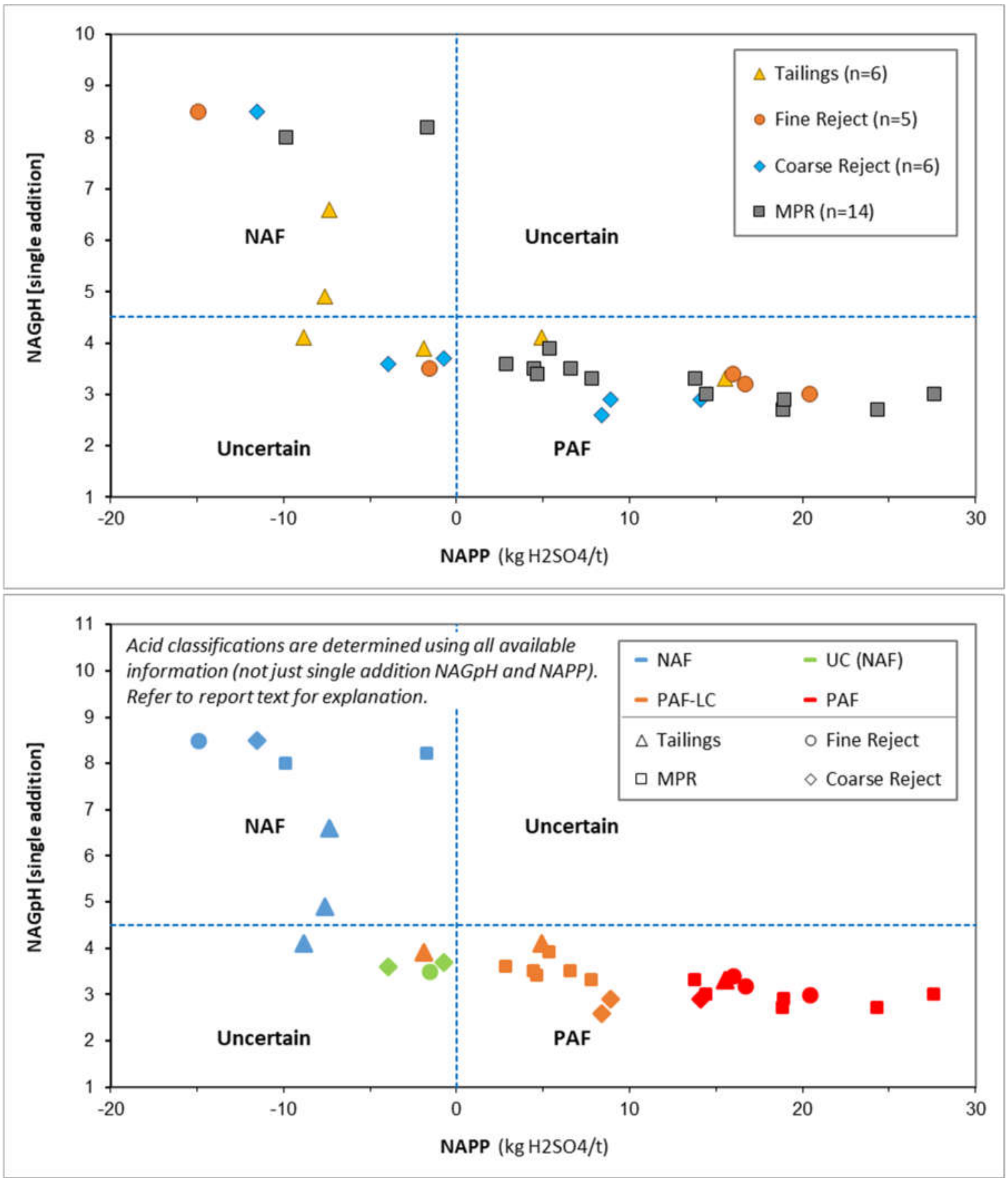


NAG tests were undertaken on all 31 coal reject samples, of which only six of the samples had NAGpH values greater than pH 4.5 (and had NAG capacities <0.1 kg H_2SO_4/t). The plot of NAGpH versus NAPP results (**Figure 4-6** *top*) shows that all six samples with NAGpH values greater than 4.5 also have negative NAPP values, and so plot in the NAF domain. The remaining samples with NAGpH values less than pH 4.5 plot in the 'Uncertain' and PAF domains. Of the samples with NAGpH values less than 4.5, five samples plot in the 'Uncertain' domain.

To attempt to resolve some of this uncertainty with the 'single addition' NAG test (due to potential organic acid interference), 'Uncertain' samples may undergo an Extended Boil NAG method (NAG Extended). NAG Extended data is available for two of the 'Uncertain' samples (both tailings samples), which were re-classified on the basis of the NAG-Extended result. One of the tailings samples had organic acid interference and the final NAGpH after the extended boiling step was pH 6.5 (and therefore NAF). The NAGpH value of the other tailing sample remained below pH 4.5 after the extended boiling step, thus confirming its PAF classification. The second tailing sample also produced very low NAG capacity after boiling, thus refining the classification further to PAF-LC.

Figure 4-6 *bottom* shows a plot of the NAGpH versus NAPP data colour-coded by final acid classification (*ie*. taking into account Scr, ABCC and NAG-Extended data), showing the re-classification of the two 'uncertain' tailings samples. The three remaining 'Uncertain' samples (shown as green markers) have insufficient data to resolve their 'Uncertain' classification.

Figure 4-6. Net Acid Producing Potential (NAPP) and Net Acid Generation pH (NAGpH) of Coal Reject



Kinetic Net Acid Generation (K-NAG)

Two of the tailings samples underwent Kinetic NAG (K-NAG) testing (by BHP) to estimate the rate of potential acid generation (if at all) and to assess how reactive the sample may be should it generate acid.

Kinetic net acid generation (K-NAG) tests provide an indication of the kinetics of sulfide oxidation and potential acid generation for a sample. The K-NAG test is the same as the standard NAG test except that the temperature and pH of the liquor are recorded over the duration of the test (up to six hours). The time until the pH of the liquor reaches pH 4 can be used to broadly estimate the potential lag period before acid conditions may develop in a sample under atmospheric oxidation conditions. The temperature profile can also provide an indication of how vigorous the reaction is (and relative sulfide concentration). A sharp 'spike' in temperature correlates to the rapid reaction of a 'high' (notable) sulfide concentration compared with a slow subtle change in temperature that correlates to a much slower reaction.

The results found that both samples had very weak reaction kinetics, with insignificant changes in temperature even for one of the samples (CVM UF 3/12/19) confirmed as being PAF. For this PAF sample, it took 15 minutes (of peroxide oxidation) to reach pH 4. During this time the temperature increased only 3.6ºC, which suggests that although expected to be PAF, the reactivity (rate of reaction) is low, which infers that acidification may be expected to be over a long time-frame (indicative lag time of several months).

The second sample (CVM UF 15/11/19) was confirmed as NAF and maintained pH-neutral conditions and ambient room temperature throughout the K-NAG test.

Geochemical Classification of Coal Reject Samples

The ABA results presented in this section have been used to classify the acid forming nature of the coal reject samples as shown in **Appendix C**, following the classification criteria outlined in **Section 2.4** and taking into account all additional relevant data, such as Scr, NAG-Extended and ABCC test results. The acid forming nature of these samples is summarised in **Table 4-1**.

The results in **Table 4-1** show that two-thirds of samples were classified as either PAF-LC or PAF, with the remaining third classified as NAF (7 samples: about 23% of samples) or 'Uncertain' (3 samples: about 10 % of samples). Three samples (One fine reject and two coarse reject samples) had an 'uncertain' classification, however the available data suggests that all of these 'uncertain' samples are expected to be NAF [classified as UC (NAF)].

Table 4-1. Geochemical Classification of Coal Reject

Waste Group	NAF	NAF-S	UC (NAF)	UC	UC (PAF)	PAF-LC	PAF
	No. and (%) of samples						
Tailings (n=6)	3	-	-	-	-	2	1
Fine Reject (n=5)	-	-	1	1	-	-	3
Coarse Reject (n=6)	1	-	2	-	-	2	1
MPR (n=14)	2	-	-	-	-	6	6
All samples (n=31)	7 (23%)	-	3	-	-	10 (32%)	11 (35%)

The results suggest that a significant proportion of coal reject at CVM is PAF-LC and PAF and, based on the seams predicted to be mined at the Project, the geochemical characteristics of future coal reject would be expected to be comparable to present. This has implications for soluble metals/metalloids transport, as acidic materials (should they be allowed to generate acid) would increase the release of soluble metals/metalloids. However, the relatively low sulfur concentrations in coal reject indicate that the sulfate concentration that could be generated in these materials from sulfide oxidation (in addition to any salinity unrelated to sulfide oxidation) would likely be relatively low. Coal reject at CVM is currently managed (and proposed to be managed into the future) by prompt burial within low-wall mine spoil to minimise oxidation. This management measure is appropriate for these materials given these acid classifications. Management measures are discussed in **Section 6**.

4.3 Metals and Metalloids

Multi-element (metal and metalloid) data is available for 22 coal reject samples (all from post-EIS sampling by BHP). The test results are presented in **Appendix C**.

The results are compared to background concentrations for each element, based on average elemental abundance in soil in the earth's crust. The comparison is determined by the GAI, as outlined in **Section 2.4**. GAI values of two are regarded as 'slightly to moderately' enriched (with respect to average elemental abundance), GAI values of three or more are regarded as 'significantly' enriched.

The tailings samples were analysed by a higher resolution method compared to the other coal reject samples (fine reject, coarse reject and MPR). As such, the fine reject, coarse reject and MPR samples have laboratory LORs that are typically greater or similar to the median soil abundance concentration used to calculate the GAI. Therefore, these non-tailings coal reject samples have very low GAI values for all elements.

For the tailings samples the GAI values are presented in **Appendix C** alongside the multi-element data, and show that no samples were significantly enriched with respect to any of the elements tested.

4.4 Initial Solubility

Water extract (leaching) data is available for 18 coal reject samples collected between 2014 and 2019 by BHP (data from the BHP database). Leaching was undertaken on two tailings samples, four fine reject samples, six coarse reject samples and five MPR samples. All samples underwent a 1:5 w:v (solid:water) water extract procedure on pulps. The two tailings samples also underwent a modified ASLP, which is a 1:20 soil:water bottle leach over 18 hours.

The tailings samples were analysed by a higher resolution method compared to the other coal reject samples. As such, the non-tailings coal reject samples have laboratory LOR values that are generally greater than the laboratory LOR for the tailings samples.

The results from these tests are provided in **Appendix C** and found that the soluble metals and metalloid concentrations were very low (for both sampling programs), and within the range typical for Permian sedimentary materials in Queensland. For most samples, the soluble metals and metalloids are at concentrations below or marginally above the laboratory limit of reporting (LOR).

The pH was generally pH-neutral to alkaline (as discussed earlier) and, with the exception of the tailings samples, coal reject samples generally had 'low' to 'medium' EC (as discussed earlier). The tailings samples had slightly higher EC (regarded as 'high'). As expected, the EC and major ion concentrations are lower from the ASLP leach due to this test method being undertaken at a 1:20 (solid:water) ratio compared to the water extract procedure undertaken on a 1:5 (solid:water) ratio. The soluble metal/metalloid concentrations were also generally lower in the ASLP leach (compared to the 1:5 water extract) with the notable exception of soluble Al and Fe. The ASLP method uses a 0.6-0.8 µm glass fibre filter membrane, whereas the 1:5 water extract test uses a 0.45 µm cellulose filter membrane. The coarser membrane used by the ASLP method and the different membrane materials likely explains the marginally higher concentrations in the more dilute ASLP solution compared to the 1:5 water extract solution.

It is important to note that the soluble metal/metalloid results presented in this report represent an ‘assumed worst case’ scenario. For both methods the leaching was undertaken on a pulped sample (85 % passing 75 µm) – therefore these samples have a very high surface area compared to similar material in the field.

No comparison has been made between bottle leachate results and water quality guideline values, such as ANZECC (2000), as such a comparison is inappropriate. The guideline values provided in ANZECC (2000) are for receiving water environments (*eg*. creeks and rivers), whereas the soluble element data in this assessment is ‘point source’ obtained from a finely-pulped sample subjected to rigorous and artificial extraction to obtain a concentration approaching ‘near maximum’. Furthermore, as contact water reports to the receiving environments a number of geochemical reactions will take place, including: retardation, adsorption and precipitation – and also likely dilution, which will attenuate the concentration as seepage/contact water migrates from the source. These processes are not accounted for in a laboratory setting.

The environmental significance of identified soluble metal/metalloid concentrations in mineral waste material in terms of risk is discussed in **Section 5**.

5 Geochemical Characteristics and Hazards of Mineral Waste Materials

The geochemical characteristics of potential spoil (overburden & interburden) and coal reject from the Project have been assessed – as have the characteristics of coal samples that may report as ROM coal or as waste. The assessment was undertaken to understand the environmental geochemical characteristics of these samples, as being representative of their respective mineral waste types, such that appropriate management measures can be implemented (for the Project) during operations and post-closure.

Spoil currently comprises the significant majority (approximately 95 %) of mineral waste at CVM and will continue to do so for the Project. The spoil is comprised of about 90 % non-carbonaceous material (of which about 15% is weathered) and about 5 % mostly fresh carbonaceous material. Coal reject will comprise the remaining 5 % (approximately) of all mineral waste over the life of the operation.

The environmental geochemical characteristics of the materials are summarised in the following sub-sections and relate to the characteristics of mineral waste materials likely to be mined/ produced by the Project.

5.1 AMD Potential

Potential Spoil – non-carbonaceous

Non-carbonaceous overburden and interburden [spoil] (types Gp1, Gp2 and Gp4) represents about 87 % of all lithological material at CVM and, excluding coal (*ie*. coal is not a waste), non-carbonaceous overburden and interburden represents about 95 % of all mineral waste.

Non-carbonaceous overburden/interburden, as a bulk material, is expected to generate pH-neutral to alkaline contact water (run-off and seepage).

The total S concentration of this material is very low, with a maximum total S concentration of 0.46 % (90th percentile = 0.09 %). As such, and combined with moderate ANC values (median 38 kg H_2SO_4/t), which is significantly higher than the median MPA (median 1.5 kg H_2SO_4/t), almost all samples (98 %) of this type were classified as NAF. Less than 1.5 % of samples were classified as PAF. The remainder had an Uncertain classification.

The test-work undertaken by BHP Minerals Australia in 2020 has demonstrated (albeit from a small number of samples) that the ANC for the non-carbonaceous overburden and interburden is expected to be only partially available, however the availability will vary depending upon the mineralogy of the materials. As a general guide, ANC is expected to be about 50-60 % available (as a bulk material), however ANC availability is expected to range from 15-25 % for siderite-dominated carbonate materials through to about 50-60 % availability for iron dolomite carbonate materials through to greater than 80 % availability for calcite and dolomite carbonate materials – and variations thereof for mixed mineralogy. Generally, most overburden and interburden (of all types – *ie*. carbonaceous and non-carbonaceous) is expected to have iron dolomite as the main neutralising mineral, with an ANC availability of in the order of 50-60 % of the standard ANC.

Total metal and metalloid concentrations are generally very low compared to average element abundance in soil in the earth's crust. Some samples were enriched in Te with respect to average crustal abundance in soil, which is not a cause for concern.

Soluble multi-element results indicate that leachate from non-carbonaceous material is expected to contain low concentrations of soluble metals and metalloids.

Based on the results, non-carbonaceous overburden has a negligible potential to generate acid/acidic drainage (AD) and/or NMD. Due to the very low total S (and negligible sulfide) concentrations, the potential for Saline Drainage (SD) (sulfate-derived salinity from sulfide oxidation) is also negligible. Salinity is discussed in **Section 5.2**.

Potential Spoil – carbonaceous

Carbonaceous overburden and interburden (Gp3 and Gp5) represents about 4 % of all lithological material at CVM and, excluding coal (*ie*. coal is not a waste), carbonaceous overburden and interburden represents about 5 % of all mineral waste. Of this 5 %, about 80 % is fresh Permian material (Gp5). Weathered carbonaceous material comprises about 1 % of all mineral waste.

Carbonaceous material is expected to generate pH-neutral to alkaline contact water (run-off and seepage).

The total S concentration of this material is generally low, with a maximum total S concentration of 1.05 %, however a low 90th percentile = 0.38 %). Combined with ANC values (median 16 kg H_2SO_4/t) that are generally significantly higher than the MPA values (median 3.5 kg H_2SO_4/t), 80 % of carbonaceous samples were classified as NAF. Five percent (5 %) of samples were classified as PAF and the remaining samples had an 'uncertain' classification [of which most were assigned as UC (NAF)]. ANC is expected to be about 50-60 % available for most carbonaceous overburden and interburden materials.

Note, it is expected that most of the total S in weathered carbonaceous overburden materials (Gp3) materials will be oxidised and therefore total S in this material is likely to be present predominantly as sulfate (*ie*. oxidised sulfur).

Total metal and metalloid concentrations are very low compared to average element abundance in soil in the earth's crust. Some samples were enriched with respect to S and Te, however this is not cause for concern.

Soluble multi-element results indicate that leachate from carbonaceous material is expected to contain low concentrations of soluble metals and metalloids – similar to non-carbonaceous materials.

Based on the results, a small proportion of carbonaceous material has a low potential to generate AMD in an uncontrolled and unmitigated environment. Although total S concentrations are higher (generally) than non-carbonaceous materials, the total S concentration of carbonaceous materials is still very low (90^{th} percentile = 0.38 %). Due to the low total S concentrations, the potential for Saline Drainage (sulfate-derived salinity from sulfide oxidation) is also low.

Carbonaceous overburden and interburden is assessed as having a low potential to generate AMD.

Coal Reject (tailings, fine reject, coarse reject and MPR)

Coal reject material is expected to generate pH-neutral to alkaline contact water (run-off and seepage).

The total S concentration of this material spans a much wider range compared to non-carbonaceous materials, but is generally low to moderate, with a maximum total S concentration of 1.16 % and 90th percentile value of 1.0 %. Similar to the total S (and sulfide) concentrations, the ANC of samples spanned a wide range, from 2.5 to 38 kg H_2SO_4/t. As such, coal reject materials had a wide range of acid classifications, with 23 % of samples classified as NAF and 67 % of samples classified as PAF or PAF-LC. The remaining 10% of samples (3 samples) had an Uncertain classification, however the available data suggests that all of these 'uncertain' samples are expected to be NAF [classified as UC (NAF)].

The recent test-work has demonstrated (albeit from a small number of samples) that the ANC for the coal reject is expected to be only partially available (approximately 50 % availability) and that iron dolomite (+/- siderite) is the dominant acid neutralising mineral.

Total metal and metalloid concentrations are very low compared to average element abundance in soil in the earth's crust.

Soluble multi-element results indicate that leachate from coal reject material is expected to contain low concentrations of soluble metals and metalloids – similar to carbonaceous materials (as expected).

Based on the results, about two-thirds of coal reject material is classified as PAF or PAF-LC and, therefore, has a moderate to high potential to generate AMD in an uncontrolled and unmitigated environment. Due to the moderate total S concentrations (90th percentile = 1 %), the potential for Saline Drainage (sulfate-derived salinity from sulfide oxidation) is also moderate to high.

Coal reject is assessed as having a moderate to high potential to generate AMD in an uncontrolled and unmitigated environment. When managed as per the current coal reject management strategy the potential for disposed coal reject to generate AMD is low. The management of this material is discussed in **Section 6.2**.

Coal

Coal is not regarded as waste and ROM coal would remain on-site for a relatively short period of time. However, some minor coal seams/plys will report directly as waste. Additionally, the environmental geochemical characteristics of ROM coal (temporarily stored on a ROM pad) should still be assessed for environmental management purposes.

Coal (Gp6) represents about 9-10 % of all lithological material at CVM and, assuming almost all of this will report as ROM coal, we can conservatively assume that coal will represent less than 2 % of mineral waste.

ROM coal is expected to generate pH-neutral to alkaline contact water (run-off and seepage).

The total S concentration of this material is generally low, with similar total S distribution to carbonaceous spoil material (Gp5). Coal samples have a maximum total S concentration of 0.46 % and a low to moderate 90th percentile = 0.40 %). Combined with ANC values (median 17 kg H_2SO_4/t) that are generally significantly higher than the MPA values (median 4.7 kg H_2SO_4/t), 84 % of coal samples were classified as NAF. Ten percent (10 %) of samples were classified as PAF and the remaining 6 % of coal samples had an 'uncertain' classification (the uncertainty is primarily due to incomplete test-work).

Total metal and metalloid concentrations from two samples tested are very low compared to average element abundance in soil in the earth's crust.

Soluble multi-element results from two samples tested indicate that leachate from coal is expected to contain low concentrations of soluble metals and metalloids – similar to carbonaceous and non-carbonaceous spoil materials.

Based on the results, a small proportion of coal has a low potential to generate AMD in an uncontrolled and unmitigated environment. Although total S concentrations are higher (generally) than non-carbonaceous materials, the total S concentration of coal materials is still very low (90th percentile = 0.40 %). Due to the low total S concentrations, the potential for Saline Drainage (sulfate-derived salinity from sulfide oxidation) is also low.

As a bulk material, ROM coal is assessed as having a low potential to generate AMD, however some coal seams (*eg*. P seam) are expected to pose a higher AMD potential.

The environmental management of coal (ROM coal and/or product coal) will be focused on surface water run-off and seepage collection and dust control, which are 'standard' management practices for ROM and product coal stockpiles, and are outlined in **Section 6** below. Surface water run-off from ROM coal and product coal stockpiles would be managed as part of the mine water management system.

5.2 Salinity, Sodicity and Dispersion Potential

Potential Spoil – non-carbonaceous

Non-carbonaceous overburden and interburden (Gp1, Gp2 and Gp4) has EC values ranging from 113 to 3,720 µS/cm, with median and 90th percentile values of 546 and 839 µS/cm. On this basis, non-carbonaceous overburden/interburden is expected to generate low- to medium-salinity contact water (run-off and seepage). Due to the very low total S concentrations, the potential for sulfate-derived salinity (from sulfide oxidation) is negligible.

Non-carbonaceous overburden/interburden samples (n=66) had relatively high CEC values and moderate-to-high ESP values, resulting in 75 % of samples being classified as 'strongly sodic' and the remaining samples being classified as 'sodic'. As such, non-carbonaceous overburden/interburden is expected to be sodic with some potential for dispersion (based on the high sodicity values). A small subset of samples (n=20) underwent Emerson Aggregate Class testing to directly measure dispersion, which found that only five samples were dispersive. The management of this material is discussed in **Section 6**.

Potential Spoil – carbonaceous

Carbonaceous overburden and interburden (Gp3 and Gp5) has similar EC values to non-carbonaceous materials – ranging from 177 to 918 µS/cm, with median and 90th percentile values of 319 and 759 µS/cm. On this basis, and consistent with non-carbonaceous overburden/interburden, carbonaceous materials are expected to generate low- to medium-salinity contact water (run-off and seepage). Due to the low total S concentrations, the potential for sulfate-derived salinity (from sulfide oxidation) is low.

Carbonaceous overburden/interburden samples (n=11) had CEC and ESP values comparable to non-carbonaceous samples, resulting in all 11 samples being classified as 'strongly sodic'. As such, carbonaceous overburden/interburden is expected to be sodic to strongly sodic with some potential for dispersion (based on the high sodicity values). A subset of samples (n=9) underwent Emerson Aggregate Class testing to directly measure dispersion, which found that no samples were dispersive. The management of this material is discussed in **Section 6**.

Coal Reject (tailings, fine reject, coarse reject and MPR)

Coal reject has EC values similar to potential spoil materials – ranging from 213 to 1,730 µS/cm, with median and 90th percentile EC values of 407 and 1,065 µS/cm, respectively. The tailings and fine reject samples appear to span a greater range of EC compared to the coarse reject and MPR samples. On this basis, coal reject is expected to generate low- to medium-salinity contact water (run-off and seepage). Due to the moderate to high total S concentrations, the potential for sulfate-derived salinity (from sulfide oxidation in an unmitigated environment) is moderate to high.

Coal reject samples have not undergone assessment for sodicity and dispersion as these materials do not report to (or near) final landforms and, therefore, are not subject to erosion and dispersion – nor are coal reject materials expected to have suitable soil properties for use as a growth medium in rehabilitation activities.

Coal

Coal has EC values similar to carbonaceous spoil and coal reject materials – up to 895 µS/cm, with median and 90th percentile EC values of 457 and 836 µS/cm, respectively.

On a ROM pad, coal is expected to generate low- to medium-salinity contact water (run-off and seepage). Due to the relatively low total S concentrations and the short exposure (temporary storage) of ROM coal, the potential for sulfate-derived salinity (from sulfide oxidation) is low.

Coal samples have not undergone assessment for sodicity and dispersion as these materials are (generally) not waste and will not report to (or near) final landforms and, therefore, are not subject to erosion and dispersion – nor are coal materials expected to have suitable soil properties for use as a growth medium in rehabilitation activities.

6 Management and Mitigation Measures

6.1 Spoil Management Strategy

The management of overburden and interburden (spoil) materials generated by the Project will be consistent with the current approved mine waste management strategy – comprising the disposal of overburden and interburden as low-wall spoil, then progressively rehabilitated – with run-off and seepage captured by the mine water management system.

Spoil is overwhelmingly NAF with excess ANC and has a negligible risk of developing acid conditions. Furthermore, spoil is expected to generate relatively low to moderate salinity surface water run-off and seepage with relatively low soluble metal/metalloid concentrations. However, spoil is expected to be sodic with some potential for dispersion and erosion (to varying degrees).

Where highly sodic and/or dispersive spoil is identified it should, wherever practicable, not report to final landform surfaces and should not be used in construction activities. Tertiary spoil has generally been found to be unsuitable for construction use or on final landform surfaces (Australian Coal Association Research Program [ACARP], 2004 and 2019).

It may not be practical to selectively handle and preferentially emplace highly sodic and dispersive spoil during operation of the Project. Therefore, in the absence of such selective handling, spoil landforms would need to be constructed with short and low (shallow) slopes and progressively rehabilitated to minimise erosion. Where practical, and where competent rock is available, armouring of slopes should be considered.

Where rock is used for construction activities, this should be limited (as much as practical) to unweathered Permian sandstone, as this material has been found (generally) to be more suitable for construction and for use as embankment covering on final landform surfaces. Regardless of the rock type, especially where engineering or geotechnical stability is required, laboratory testing and rehabilitation field trials should be undertaken to determine the propensity for dispersion and erosion of spoil landforms.

Surface water run-off and seepage from waste rock emplacements, including any rehabilitated areas, should be monitored for 'standard' water quality parameters including, but not limited to, pH, EC, major anions (sulfate, chloride and alkalinity), major cations (sodium, calcium, magnesium and potassium), total dissolved solids (TDS) and a broad suite of soluble metals/metalloids.

With the implementation of the proposed management and mitigation measures, the waste rock is regarded as posing a low risk of environmental harm.

6.2 Coal Reject Management Strategy

The management of coal reject materials generated by the Project will be consistent with the current approved coal reject management strategy – comprising the disposal (burial) of dewatered tailings and MPR within low-wall spoil at designated disposal areas. Coal reject areas will also undergo monitoring for AMD and related environmental aspects.

Based on the current assessment, coal reject material is regarded as posing a moderate to high AMD hazard (unmitigated) with respect to generation of acidity and/or sulfate. As such, the burial and management of coal reject materials (as per the current approved CVM coal reject disposal practices) will continue, so as to minimise sulfide oxidation and potential generation of AMD.

Seepage would be confined within the footprint of the open-cut pit and would drain into/towards open-cut pit areas (and therefore be captured by the mine water system). Surface water run-off would drain into mine dams/drains and also be captured by the mine water system. Therefore, when buried deeply amongst alkaline NAF spoil the overall risk of environmental harm and health-risk that emplaced coal reject poses is low.

The management measures for coal reject are addressed in the CVM Mining Waste Management Plan that is certified by an appropriately qualified person in accordance with condition E12 of the CVM EA.

6.3 Validation of Coal Reject Characteristics

BMA will undertake validation test-work of coal reject during development of the Project (*ie*. as the Horse Pit transitions into the Project area), particularly whenever new seams/plys or ROM coal blends are being processed. Test-work would, at minimum, comprise a broad suite of environmental geochemical parameters, such as pH, EC (salinity), acid-base account parameters and total and soluble metals/metalloids.

6.4 ROM Stockpiles and CHPP

ROM coal is not mining waste, and surface water run-off and seepage from ROM stockpiles would not report off-site and would be managed as part of the mine water management system. The available information suggests that ROM coal generated by the Project is expected to have a low degree of risk associated with potential acid, salt and soluble metals generation. Surface water run-off from ROM coal and product coal stockpiles is captured in the mine water management system.

ROM coal would be stored on-site for a relatively short period of time (days to weeks) compared to mineral waste materials, which would be stored at the site in perpetuity. Management practices are therefore different for ROM coal (compared to spoil) and would largely be based around the operational (day-to-day) management of surface water run-off from ROM coal stockpiles, as is currently accepted practice at coal mines in Australia.

The mine water management system is monitored for ‘standard’ water quality parameters including, but not limited to, pH, EC, major anions (sulfate, chloride and alkalinity), major cations (sodium, calcium, magnesium and potassium), TDS, acidity and a broad suite of soluble metals/metalloids.

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Appendix A

Summary Information for Drill-holes Utilised
in the Geochemistry Assessment

Table A1. Drill-hole Summary Information

Drill-hole ID	**Easting** (m) AGD84, zone 55	**Northing** (m) AGD84, zone 55	Sample Types	Sampling Program	Data Source
48627	609121	7559765	Core	Pre-mining (EIS)	URS 2007 & Terrenus 2009
48626	608851	7559496	Core	Pre-mining (EIS)	URS 2007 & Terrenus 2009
48619	610062	7557467	Core	Pre-mining (EIS)	URS 2007 & Terrenus 2009
48618	609032	7555691	Core	Pre-mining (EIS)	URS 2007 & Terrenus 2009
48617	609384	7555271	Core	Pre-mining (EIS)	URS 2007 & Terrenus 2009
48616	609872	7553762	Core	Pre-mining (EIS)	URS 2007 & Terrenus 2009
127481	608607	7558227	Chips	Start of mining (2013)	PW Baker 2013
127480	608491	7555416	Chips	Start of mining (2013)	PW Baker 2013
127479	608194	7553663	Chips	Start of mining (2013)	PW Baker 2013
127478	608646	7552497	Chips	Start of mining (2013)	PW Baker 2013
201847	609546	7558426	Core & Chips	Recent (2020)	BHP geochemical database
201455	609341	7554847	Chips	Recent (2020)	BHP geochemical database
201537	610367	7553030	Core & Chips	Recent (2020)	BHP geochemical database

* All drill-holes are vertical (dip = 90 degrees).

Appendix B

Static Geochemical Results Tables – Potential Spoil and Coal

- Table B1 – Acid-Base Characteristics of Potential Spoil and Coal
- Table B2 – Total Element Concentrations and Geochemical Abundance Indices for Potential Spoil and Coal
- Table B3 Quantitative X-Ray Diffraction Results for Potential Spoil
- Table B4 – Soluble Major Ions, pH, Electrical Conductivity and Multi-Element Concentrations in Water Extracts from Potential Spoil and Coal
- Table B5 – Exchangeable Cations and Emerson Aggregate Class Test Results for Potential Spoil
- Table B6 Composite Sample Make-up from URS 2007 Geochemical Assessment

Table B1. Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5	S	SCR	MPA	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5	NAG@ pH7.0	Acid Classification
									µS/cm	%		kg H_2SO_4/t					kg H_2SO_4/t		
BHP d'base	201455_WC002	201455	1-2	Weathered	Not Logged	-	Gp1	-	-	0.09	-	2.8	30	-27.2	10.9	-	-	-	NAF
BHP d'base	201455_WC003	201455	2-3	Weathered	Not Logged	-	Gp1	-	-	0.04	-	1.2	14.9	-13.7	12.2	-	-	-	NAF
BHP d'base	201455_WC004	201455	3-4	Weathered	Not Logged	-	Gp1	-	-	0.02	-	0.6	9.6	-9.0	15.7	-	-	-	NAF
BHP d'base	201455_WC005	201455	4-5	Weathered	Not Logged	-	Gp1	-	-	0.02	-	0.6	9.4	-8.8	15.3	-	-	-	NAF
BHP d'base	201455_WC006	201455	5-6	Weathered	Sandstone, fine to v. fine	-	Gp2	-	-	0.03	-	0.9	16.3	-15.4	17.7	-	-	-	NAF
BHP d'base	201455_WC007	201455	6-7	Weathered	Sandstone, very fine	-	Gp2	-	-	0.03	-	0.9	9.2	-8.3	10.0	-	-	-	NAF
BHP d'base	201455_WC008	201455	7-8	Weathered	Sandstone, very fine	-	Gp2	-	-	0.04	-	1.2	15.8	-14.6	12.9	-	-	-	NAF
BHP d'base	201455_WC009	201455	8-9	Weathered	Sandstone, very fine	-	Gp2	-	-	0.03	-	0.9	8.8	-7.9	9.6	-	-	-	NAF
BHP d'base	201455_WC0010	201455	9-10	Weathered	Sandstone, very fine	-	Gp2	-	-	0.03	-	0.9	9.1	-8.2	9.9	-	-	-	NAF
BHP d'base	201455_WC0011	201455	10-11	Weathered	Sandstone, very fine	-	Gp2	-	-	0.04	-	1.2	16.1	-14.9	13.1	-	-	-	NAF
BHP d'base	201455_WC0012	201455	11-12	Weathered	Sandstone, very fine	-	Gp2	-	-	0.06	-	1.8	14.5	-12.7	7.9	-	-	-	NAF
BHP d'base	201455_WC0013	201455	12-13	Weathered	Sandst., v. fine; & Carb. Siltst.	-	Gp3	-	-	0.05	-	1.5	10.2	-8.7	6.7	-	-	-	NAF
BHP d'base	201455_WC0014	201455	13-14	Weathered	Sandst., v. fine to fine; coaly	- / P	Gp2	-	-	0.04	-	1.2	11.4	-10.2	9.3	-	-	-	NAF
BHP d'base	201455_WC0015	201455	14-15	Weathered	Coal (inferior) & Sandst., fine	P	Gp3	-	-	0.09	-	2.8	15.9	-13.1	5.8	-	-	-	NAF
BHP d'base	201455_WC0016	201455	15-16	Weathered	Coal, part inferior	P	Gp3	-	-	0.13	0.02	4.0	28.1	-24.1	7.1	-	-	-	NAF
BHP d'base	201455_WC0017	201455	16-17	Weathered	Coal (inferior) & Sandst., fine	P	Gp3	-	-	0.05	-	1.5	16.8	-15.3	11.0	-	-	-	NAF
BHP d'base	201455_WC0018	201455	17-18	Weathered	Coal; Tuff & Carb. Siltstone	P / P Tuff	Gp3	-	-	0.15	0.02	4.6	8.1	-3.5	1.8	7.5	<0.1	<0.1	NAF
BHP d'base	201455_WC0019	201455	18-19	Weathered	Tuff & Sandst.	P Tuff	Gp2	-	-	0.07	-	2.1	19.3	-17.2	9.0	-	-	-	NAF
BHP d'base	201455_WC0020	201455	19-20	Weathered	Sandstone, very fine	-	Gp2	-	-	0.04	-	1.2	7.3	-6.1	6.0	-	-	-	NAF
BHP d'base	201455_WC0021	201455	20-21	Weathered	Sandstone, very fine	-	Gp2	-	-	0.04	-	1.2	6.5	-5.3	5.3	-	-	-	NAF
BHP d'base	201455_WC0022	201455	21-22	Weathered	Sandstone, very fine; carb.	-	Gp2	-	-	0.10	-	3.1	6.3	-3.2	2.1	-	-	-	NAF
BHP d'base	201455_WC0023	201455	22-23	Weathered	Sandstone, very fine	-	Gp2	-	-	0.06	-	1.8	14.4	-12.6	7.8	-	-	-	NAF
BHP d'base	201455_WC0024	201455	23-24	Weathered	Sandstone, v. fine to fine	-	Gp2	-	-	0.06	-	1.8	16.8	-15.0	9.1	-	-	-	NAF
BHP d'base	201455_WC0025	201455	24-25	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	15.5	-13.7	8.4	-	-	-	NAF
BHP d'base	201455_WC0026	201455	25-26	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	25.6	-24.1	16.7	-	-	-	NAF
BHP d'base	201455_WC0027	201455	26-27	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	37.9	-36.4	24.8	-	-	-	NAF
BHP d'base	201455_WC0028	201455	27-28	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	39	-37.5	25.5	-	-	-	NAF
BHP d'base	201455_WC0029	201455	28-29	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	56.6	-54.8	30.8	-	-	-	NAF
BHP d'base	201455_WC0030	201455	29-30	Fresh	Sandstone, fine	-	Gp4	-	-	0.04	-	1.2	134	-132.8	109.4	-	-	-	NAF
BHP d'base	201455_WC0031	201455	30-31	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	123	-121.5	80.3	-	-	-	NAF
BHP d'base	201455_WC0032	201455	31-32	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	188	-186.2	102.3	-	-	-	NAF
BHP d'base	201455_WC0033	201455	32-33	Fresh	Sandstone, fine	-	Gp4	-	-	0.04	-	1.2	167	-165.8	136.3	-	-	-	NAF
BHP d'base	201455_WC0034	201455	33-34	Fresh	Sandstone, fine	-	Gp4	-	-	0.04	-	1.2	100	-98.8	81.6	-	-	-	NAF
BHP d'base	201455_WC0035	201455	34-35	Fresh	Sandstone, fine	-	Gp4	-	-	0.15	0.13	4.6	84.3	-79.7	18.4	-	-	-	NAF
BHP d'base	201455_WC0036	201455	35-36	Fresh	Sandstone, fine-medium	-	Gp4	-	-	0.05	-	1.5	78.8	-77.3	51.5	-	-	-	NAF
BHP d'base	201455_WC0037	201455	36-37	Fresh	Sandstone, fine-medium	-	Gp4	-	-	0.06	-	1.8	125	-123.2	68.0	-	-	-	NAF
BHP d'base	201455_WC0038	201455	37-38	Fresh	Sandstone, fine-medium	-	Gp4	-	-	0.04	-	1.2	184	-182.8	150.2	-	-	-	NAF
BHP d'base	201455_WC0039	201455	38-39	Fresh	Sandstone, fine	-	Gp4	-	-	0.04	-	1.2	153	-151.8	124.9	-	-	-	NAF

Grey rows are seam samples. pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity; ANC = Acid neutralising capacity; NAPP = Net acid producing potential; NAG = Net acid generation.
MPA is calculated from Total S; NAPP is calculated from MPA and ANC. Refer to main body of the report for explanation of test results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5	S	Scr	MPA	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5	NAG@ pH7.0	Acid Classification
									µS/cm	%		kg H_2SO_4/t					kg H_2SO_4/t		
BHP d'base	201455_WC0040	201455	39-40	Fresh	Sandstone, fine	-	Gp4	-	-	0.04	-	1.2	120	-118.8	98.0	-	-	-	NAF
BHP d'base	201455_WC0041	201455	40-41	Fresh	Sandstone, fine	-	Gp4	-	-	0.03	-	0.9	116	-115.1	126.3	-	-	-	NAF
BHP d'base	201455_WC0042	201455	41-42	Fresh	Sandstone, fine	-	Gp4	-	-	0.04	-	1.2	113	-111.8	92.2	-	-	-	NAF
BHP d'base	201455_WC0043	201455	42-43	Fresh	Sandstone, fine	-	Gp4	-	-	0.04	-	1.2	111	-109.8	90.6	-	-	-	NAF
BHP d'base	201455_WC0044	201455	43-44	Fresh	Sandstone, fine; coaly	Unknown	Gp6	-	-	0.04	-	1.2	116	-114.8	94.7	-	-	-	NAF
BHP d'base	201455_WC0045	201455	44-45	Fresh	Sandstone, fine; coaly	Unknown	Gp6	-	-	0.04	-	1.2	102	-100.8	83.3	-	-	-	NAF
BHP d'base	201455_WC0046	201455	45-46	Fresh	Sandstone, fine	-	Gp4	-	-	0.04	-	1.2	114	-112.8	93.1	-	-	-	NAF
BHP d'base	201455_WC0047	201455	46-47	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	75.8	-74.3	49.5	-	-	-	NAF
BHP d'base	201455_WC0048	201455	47-48	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	78.1	-76.6	51.0	-	-	-	NAF
BHP d'base	201455_WC0049	201455	48-49	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	83.3	-81.8	54.4	-	-	-	NAF
BHP d'base	201455_WC0050	201455	49-50	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	102	-100.5	66.6	-	-	-	NAF
BHP d'base	201455_WC0051	201455	50-51	Fresh	Sandstone, fine; coaly	-	Gp5	-	-	0.06	-	1.8	56.9	-55.1	31.0	-	-	-	NAF
BHP d'base	201455_WC0052	201455	51-52	Fresh	Coal with Sandstone, fine	HC Upper	Gp6	-	-	0.08	-	2.5	37.5	-35.1	15.3	-	-	-	NAF
BHP d'base	201455_WC0053	201455	52-53	Fresh	Coal; some Sandst., fine	HC Upper	Gp6	-	-	0.20	0.07	6.1	31	-24.9	5.1	-	-	-	NAF
BHP d'base	201455_WC0054	201455	53-54	Fresh	Coal with Sandstone, fine	HC Upper	Gp6	-	-	0.35	0.08	10.7	16.2	-5.5	1.5	-	-	-	NAF
BHP d'base	201455_WC0055	201455	54-55	Fresh	Coal	HC Upper	Gp6	-	-	0.32	0.06	9.8	16.8	-7.0	1.7	-	-	-	NAF
BHP d'base	201455_WC0056	201455	55-56	Fresh	Coal; part inferior	HC Upper	Gp6	-	-	0.40	0.080	12.3	12.1	0.2	1.0	-	-	-	NAF
BHP d'base	201455_WC0058	201455	57-58	Fresh	Carb. Sandst., fine-medium	-	Gp5	-	-	0.38	0.08	11.6	13.2	-1.6	1.1	-	-	-	NAF
BHP d'base	201455_WC0059	201455	58-59	Fresh	Sandst., v. fine to fine; carb.	-	Gp5	-	-	0.16	0.05	4.9	23.6	-18.7	4.8	-	-	-	NAF
BHP d'base	201455_WC0060	201455	59-60	Fresh	Sandstone, very fine	-	Gp4	-	-	0.13	0.04	4.0	30	-26.0	7.5	-	-	-	NAF
BHP d'base	201455_WC0062	201455	61-62	Fresh	Sandstone, very fine to fine	-	Gp4	-	-	0.10	-	3.1	30.2	-27.1	9.9	-	-	-	NAF
BHP d'base	201455_WC0063	201455	62-63	Fresh	Sandstone, fine	-	Gp4	-	-	0.12	0.05	3.7	27.7	-24.0	7.5	-	-	-	NAF
BHP d'base	201455_WC0064	201455	63-64	Fresh	Sandstone, fine	-	Gp4	-	-	0.14	0.09	4.3	26.7	-22.4	6.2	-	-	-	NAF
BHP d'base	201455_WC0065	201455	64-65	Fresh	Sandstone, fine to very fine	-	Gp4	-	-	0.12	0.06	3.7	24.8	-21.1	6.7	-	-	-	NAF
BHP d'base	201455_WC0066	201455	65-66	Fresh	Sandstone, very fine	-	Gp4	-	-	0.06	-	1.8	55.4	-53.6	30.1	-	-	-	NAF
BHP d'base	201455_WC0067	201455	66-67	Fresh	Sandstone, very fine	-	Gp4	-	-	0.06	-	1.8	43.8	-42.0	23.8	-	-	-	NAF
BHP d'base	201455_WC0068	201455	67-68	Fresh	Sandstone, very fine	-	Gp4	-	-	0.06	-	1.8	38.5	-36.7	21.0	-	-	-	NAF
BHP d'base	201455_WC0069	201455	68-69	Fresh	Sandstone, very fine to fine	-	Gp4	-	-	0.05	-	1.5	57.8	-56.3	37.7	-	-	-	NAF
BHP d'base	201455_WC0070	201455	69-70	Fresh	Sandstone, fine to very fine	-	Gp4	-	-	0.05	-	1.5	38.1	-36.6	24.9	-	-	-	NAF
BHP d'base	201455_WC0071	201455	70-71	Fresh	Sandstone, very fine	-	Gp4	-	-	0.04	-	1.2	34.2	-33.0	27.9	-	-	-	NAF
BHP d'base	201455_WC0072	201455	71-72	Fresh	Sandstone, very fine	-	Gp4	-	-	0.06	-	1.8	37	-35.2	20.1	-	-	-	NAF
BHP d'base	201455_WC0073	201455	72-73	Fresh	Sandstone, fine to very fine	-	Gp4	-	-	0.05	-	1.5	32.7	-31.2	21.4	-	-	-	NAF
BHP d'base	201455_WC0074	201455	73-74	Fresh	Sandstone, very fine	-	Gp4	-	-	0.05	-	1.5	72.4	-70.9	47.3	-	-	-	NAF
BHP d'base	201455_WC0075	201455	74-75	Fresh	Sandstone, very fine	-	Gp4	-	-	0.04	-	1.2	53	-51.8	43.3	-	-	-	NAF
BHP d'base	201455_WC0076	201455	75-76	Fresh	Sandstone, very fine	-	Gp4	-	-	0.06	-	1.8	39.4	-37.6	21.4	-	-	-	NAF
BHP d'base	201455_WC0077	201455	76-77	Fresh	Sandstone, fine to very fine	-	Gp4	-	-	0.05	-	1.5	40	-38.5	26.1	-	-	-	NAF
BHP d'base	201455_WC0078	201455	77-78	Fresh	Sandstone, very fine	-	Gp4	-	-	0.06	-	1.8	44	-42.2	23.9	-	-	-	NAF
BHP d'base	201455_WC0079	201455	78-79	Fresh	Sandstone, very fine	-	Gp4	-	-	0.05	-	1.5	80.1	-78.6	52.3	-	-	-	NAF

Grey rows are seam samples. pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity; ANC = Acid neutralising capacity; NAPP = Net acid producing potential; NAG = Net acid generation.
MPA is calculated from Total S; NAPP is calculated from MPA and ANC. Refer to main body of the report for explanation of test results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5	S	SCR	MPA	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5	NAG@ pH7.0	Acid Classification
									µS/cm	%		kg H_2SO_4/t					kg H_2SO_4/t		
BHP d'base	201455_WC0080	201455	79-80	Fresh	Sandstone, very fine	-	Gp4	-	-	0.05	-	1.5	54.6	-53.1	35.7	-	-	-	NAF
BHP d'base	201455_WC0081	201455	80-81	Fresh	Sandstone, very fine	-	Gp4	-	-	0.05	-	1.5	53.7	-52.2	35.1	-	-	-	NAF
BHP d'base	201455_WC0082	201455	81-82	Fresh	Sandst., v. fine; some Coal	-	Gp4	-	-	0.05	-	1.5	53.6	-52.1	35.0	-	-	-	NAF
BHP d'base	201455_WC0083	201455	82-83	Fresh	Coal	HC Lower	Gp6	-	-	0.07	-	2.1	44.4	-42.3	20.7	-	-	-	NAF
BHP d'base	201455_WC0085	201455	84-85	Fresh	Coal, inferior	HC Lower	Gp6	-	-	0.13	0.06	4.0	39.8	-35.8	10.0	-	-	-	NAF
BHP d'base	201455_WC0086	201455	85-86	Fresh	Sandst., very fine; coaly	-	Gp5	-	-	0.24	0.1	7.4	23.7	-16.4	3.2	-	-	-	NAF
BHP d'base	201455_WC0087	201455	86-87	Fresh	Sandstone, very fine	-	Gp4	-	-	0.29	0.1	8.9	21.3	-12.4	2.4	-	-	-	NAF
BHP d'base	201455_WC0088	201455	87-88	Fresh	Sandst., very fine; minor carb.	-	Gp5	-	-	0.17	0.07	5.2	22.4	-17.2	4.3	-	-	-	NAF
BHP d'base	201455_WC0089	201455	88-89	Fresh	Sandst., very fine; minor carb.	-	Gp4	-	-	0.12	0.06	3.7	29.8	-26.1	8.1	-	-	-	NAF
BHP d'base	201455_WC0091	201455	90-91	Fresh	Sandstone, very fine	-	Gp4	-	-	0.09	-	2.8	28.7	-25.9	10.4	-	-	-	NAF
BHP d'base	201455_WC0092	201455	91-92	Fresh	Sandstone, very fine	-	Gp4	-	-	0.08	-	2.5	36.5	-34.1	14.9	-	-	-	NAF
BHP d'base	201455_WC0093	201455	92-93	Fresh	Sandstone, very fine	-	Gp4	-	-	0.07	-	2.1	32.3	-30.2	15.1	-	-	-	NAF
BHP d'base	201455_WC0094	201455	93-94	Fresh	Sandstone, very fine	-	Gp4	-	-	0.09	-	2.8	24.9	-22.1	9.0	-	-	-	NAF
BHP d'base	201455_WC0095	201455	94-95	Fresh	Sandstone, v. fine to fine	-	Gp4	-	-	0.06	-	1.8	25.4	-23.6	13.8	-	-	-	NAF
BHP d'base	201455_WC0096	201455	95-96	Fresh	Sandstone, fine-medium	-	Gp4	-	-	0.07	-	2.1	25	-22.9	11.7	-	-	-	NAF
BHP d'base	201455_WC0097	201455	96-97	Fresh	Sandstone, fine-medium	-	Gp4	-	-	0.05	-	1.5	76.1	-74.6	49.7	-	-	-	NAF
BHP d'base	201455_WC0098	201455	97-98	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	144	-142.5	94.0	-	-	-	NAF
BHP d'base	201455_WC0099	201455	98-99	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	116	-114.5	75.8	-	-	-	NAF
BHP d'base	201455_WC00100	201455	99-100	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	121	-119.5	79.0	-	-	-	NAF
BHP d'base	201455_WC00101	201455	100-101	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	113	-111.2	61.5	-	-	-	NAF
BHP d'base	201455_WC00102	201455	101-102	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	107	-105.5	69.9	-	-	-	NAF
BHP d'base	201455_WC00103	201455	102-103	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	89.5	-87.7	48.7	-	-	-	NAF
BHP d'base	201455_WC00104	201455	103-104	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	76	-74.2	41.4	-	-	-	NAF
BHP d'base	201455_WC00105	201455	104-105	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	76.5	-74.7	41.6	-	-	-	NAF
BHP d'base	201455_WC00106	201455	105-106	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	142	-140.2	77.3	-	-	-	NAF
BHP d'base	201455_WC00107	201455	106-107	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	155	-153.2	84.4	-	-	-	NAF
BHP d'base	201455_WC00108	201455	107-108	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	150	-148.5	98.0	-	-	-	NAF
BHP d'base	201455_WC00109	201455	108-109	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	148	-146.2	80.5	-	-	-	NAF
BHP d'base	201455_WC00110	201455	109-110	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	86.1	-84.3	46.9	-	-	-	NAF
BHP d'base	201455_WC00111	201455	110-111	Fresh	Sandstone, fine	-	Gp4	-	-	0.02	-	0.6	83	-82.4	135.5	-	-	-	NAF
BHP d'base	201455_WC00112	201455	111-112	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	133	-131.5	86.9	-	-	-	NAF
BHP d'base	201455_WC00113	201455	112-113	Fresh	Sandst., vf to f.; minor carb.	-	Gp4	-	-	0.05	-	1.5	128	-126.5	83.6	-	-	-	NAF
BHP d'base	201455_WC00114	201455	113-114	Fresh	Sandst., v.fine; some coal	DY Upper	Gp5	-	-	0.05	-	1.5	134	-132.5	87.5	-	-	-	NAF
BHP d'base	201455_WC00115	201455	114-115	Fresh	Coal; with Sandstone, fine	DY Upper	Gp6	-	-	0.05	-	1.5	89.7	-88.2	58.6	-	-	-	NAF
BHP d'base	201455_WC00116	201455	115-116	Fresh	Sandstone, fine	-	Gp4	-	-	0.10	-	3.1	62.5	-59.4	20.4	-	-	-	NAF
BHP d'base	201455_WC00117	201455	116-117	Fresh	Sandstone, fine	-	Gp4	-	-	0.11	0.03	3.4	55.3	-51.9	16.4	-	-	-	NAF
BHP d'base	201455_WC00118	201455	117-118	Fresh	Sandstone, fine	-	Gp4	-	-	0.11	0.04	3.4	30.3	-26.9	9.0	-	-	-	NAF
BHP d'base	201455_WC00119	201455	118-119	Fresh	Sandstone, fine	-	Gp4	-	-	0.08	-	2.5	29.6	-27.2	12.1	-	-	-	NAF

Grey rows are seam samples. pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity; ANC = Acid neutralising capacity; NAPP = Net acid producing potential; NAG = Net acid generation.
MPA is calculated from Total S; NAPP is calculated from MPA and ANC. Refer to main body of the report for explanation of test results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5	S	SCR	MPA	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5	NAG@ pH7.0	Acid Classification
									µS/cm	%		kg H_2SO_4/t					kg H_2SO_4/t		
BHP d'base	201455_WC00120	201455	119-120	Fresh	Sandstone, v. fine to fine	-	Gp4	-	-	0.10	-	3.1	30.9	-27.8	10.1	-	-	-	NAF
BHP d'base	201455_WC00121	201455	120-121	Fresh	Sandstone, very fine	-	Gp4	-	-	0.09	-	2.8	21.9	-19.1	7.9	-	-	-	NAF
BHP d'base	201455_WC00122	201455	121-122	Fresh	Sandstone, very fine	-	Gp4	-	-	0.09	-	2.8	22.5	-19.7	8.2	-	-	-	NAF
BHP d'base	201455_WC00123	201455	122-123	Fresh	Sandstone, very fine	-	Gp4	-	-	0.08	-	2.5	21.5	-19.1	8.8	-	-	-	NAF
BHP d'base	201455_WC00124	201455	123-124	Fresh	Sandstone, fine	-	Gp4	-	-	0.07	-	2.1	22.1	-20.0	10.3	-	-	-	NAF
BHP d'base	201455_WC00125	201455	124-125	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	83.4	-81.9	54.5	-	-	-	NAF
BHP d'base	201455_WC00126	201455	125-126	Fresh	Sandstone, fine	-	Gp4	-	-	0.07	-	2.1	110	-107.9	51.3	-	-	-	NAF
BHP d'base	201455_WC00127	201455	126-127	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	57.4	-55.6	31.2	-	-	-	NAF
BHP d'base	201455_WC00128	201455	127-128	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	48.7	-47.2	31.8	-	-	-	NAF
BHP d'base	201455_WC00129	201455	128-129	Fresh	Sandstone, v. fine to fine	-	Gp4	-	-	0.06	-	1.8	63.1	-61.3	34.3	-	-	-	NAF
BHP d'base	201455_WC00130	201455	129-130	Fresh	Sandstone, very fine	-	Gp4	-	-	0.07	-	2.1	74.4	-72.3	34.7	-	-	-	NAF
BHP d'base	201455_WC00131	201455	130-131	Fresh	Sandstone, very fine	-	Gp4	-	-	0.05	-	1.5	51	-49.5	33.3	-	-	-	NAF
BHP d'base	201455_WC00132	201455	131-132	Fresh	Sandstone, v. fine; carb.	-	Gp5	-	-	0.05	-	1.5	49.6	-48.1	32.4	-	-	-	NAF
BHP d'base	201455_WC00133	201455	132-133	Fresh	Sandstone, very fine	-	Gp4	-	-	0.07	-	2.1	30.9	-28.8	14.4	-	-	-	NAF
BHP d'base	201455_WC00134	201455	133-134	Fresh	Sandstone, v. fine to fine	-	Gp4	-	-	0.07	-	2.1	29.4	-27.3	13.7	-	-	-	NAF
BHP d'base	201455_WC00135	201455	134-135	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	38.5	-36.7	21.0	-	-	-	NAF
BHP d'base	201455_WC00136	201455	135-136	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	23.8	-22.0	13.0	-	-	-	NAF
BHP d'base	201455_WC00137	201455	136-137	Fresh	Sandstone, fine	-	Gp4	-	-	0.07	-	2.1	32.7	-30.6	15.3	-	-	-	NAF
BHP d'base	201455_WC00138	201455	137-138	Fresh	Sandstone, fine	-	Gp4	-	-	0.07	-	2.1	105	-102.9	49.0	-	-	-	NAF
BHP d'base	201455_WC00139	201455	138-139	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	39.3	-37.8	25.7	-	-	-	NAF
BHP d'base	201455_WC00140	201455	139-140	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	49.7	-48.2	32.5	-	-	-	NAF
BHP d'base	201455_WC00141	201455	140-141	Fresh	Sandstone, fine	-	Gp4	-	-	0.04	-	1.2	42.4	-41.2	34.6	-	-	-	NAF
BHP d'base	201455_WC00142	201455	141-142	Fresh	Sandstone, fine	-	Gp4	-	-	0.07	-	2.1	42.4	-40.3	19.8	-	-	-	NAF
BHP d'base	201455_WC00143	201455	142-143	Fresh	Sandstone, fine	-	Gp4	-	-	0.06	-	1.8	45.4	-43.6	24.7	-	-	-	NAF
BHP d'base	201455_WC00144	201455	143-144	Fresh	Sandstone, v. fine to fine	-	Gp4	-	-	0.05	-	1.5	112	-110.5	73.1	-	-	-	NAF
BHP d'base	201455_WC00145	201455	144-145	Fresh	Sandstone, very fine	-	Gp4	-	-	0.04	-	1.2	56	-54.8	45.7	-	-	-	NAF
BHP d'base	201455_WC00146	201455	145-146	Fresh	Sandstone, very fine	-	Gp4	-	-	0.04	-	1.2	57	-55.8	46.5	-	-	-	NAF
BHP d'base	201455_WC00147	201455	146-147	Fresh	Sandstone, very fine	-	Gp4	-	-	0.05	-	1.5	55.9	-54.4	36.5	-	-	-	NAF
BHP d'base	201455_WC00148	201455	147-148	Fresh	Sandstone, very fine	-	Gp4	-	-	0.05	-	1.5	104	-102.5	67.9	-	-	-	NAF
BHP d'base	201455_WC00149	201455	148-149	Fresh	Sandstone, very fine	-	Gp4	-	-	0.05	-	1.5	101	-99.5	66.0	-	-	-	NAF
BHP d'base	201455_WC00150	201455	149-150	Fresh	Sandstone, very fine	-	Gp4	-	-	0.06	-	1.8	50.3	-48.5	27.4	-	-	-	NAF
BHP d'base	201455_WC00151	201455	150-151	Fresh	Sandstone, v. fine to fine	-	Gp4	-	-	0.06	-	1.8	59.4	-57.6	32.3	-	-	-	NAF
BHP d'base	201455_WC00152	201455	151-152	Fresh	Sandstone, v. fine to fine	-	Gp4	-	-	0.19	0.03	5.8	17.8	-12.0	3.1	-	-	-	NAF
BHP d'base	201455_WC00153	201455	152-153	Fresh	Sandstone, v. fine; with Coal	DY Upper	Gp6	-	-	0.20	0.04	6.1	15.6	-9.5	2.5	-	-	-	NAF
BHP d'base	201455_WC00154	201455	153-154	Fresh	Coal; with Sandstone, v. fine	DY Upper	Gp6	-	-	<0.01	0.03	0.2	53.5	-53.3	349.4	-	-	-	NAF
BHP d'base	201455_WC00156	201455	155-156	Fresh	Sandstone, very fine	-	Gp4	-	-	0.08	-	2.5	39.3	-36.9	16.0	-	-	-	NAF
BHP d'base	201455_WC00157	201455	156-157	Fresh	Sandst., v. fine to fine; coaly	DY Upper	Gp5	-	-	0.08	-	2.5	52.4	-50.0	21.4	-	-	-	NAF
BHP d'base	201455_WC00158	201455	157-158	Fresh	Sandstone, very fine	-	Gp4	-	-	0.09	-	2.8	43	-40.2	15.6	-	-	-	NAF

Grey rows are seam samples. pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity; ANC = Acid neutralising capacity; NAPP = Net acid producing potential; NAG = Net acid generation.
MPA is calculated from Total S; NAPP is calculated from MPA and ANC. Refer to main body of the report for explanation of test results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5	S	SCR	MPA	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5	NAG@ pH7.0	Acid Classification
									µS/cm	%		kg H_2SO_4/t					kg H_2SO_4/t		
BHP d'base	201455_WC00159	201455	158-159	Fresh	Sandstone, v. fine to medium	-	Gp4	-	-	0.06	-	1.8	56.8	-55.0	30.9	-	-	-	NAF
BHP d'base	201455_WC00160	201455	159-160	Fresh	Sandstone, v. fine; with Siltst.	-	Gp4	-	-	0.07	-	2.1	53.7	-51.6	25.0	-	-	-	NAF
BHP d'base	201455_WC00161	201455	160-161	Fresh	Sandstone, v. fine to fine	-	Gp4	-	-	0.08	-	2.5	43.7	-41.3	17.8	-	-	-	NAF
BHP d'base	201455_WC00162	201455	161-162	Fresh	Sandstone, fine	-	Gp4	-	-	0.08	-	2.5	42.9	-40.5	17.5	-	-	-	NAF
BHP d'base	201455_WC00163	201455	162-163	Fresh	Sandstone, fine	-	Gp4	-	-	0.07	-	2.1	75.6	-73.5	35.3	-	-	-	NAF
BHP d'base	201455_WC00164	201455	163-164	Fresh	Sandstone, v. fine; with Siltst.	-	Gp4	-	-	0.07	-	2.1	68.7	-66.6	32.0	-	-	-	NAF
BHP d'base	201455_WC00165	201455	164-165	Fresh	Siltstone; & Tuff	-	Gp4	-	-	0.08	-	2.5	33.3	-30.9	13.6	-	-	-	NAF
BHP d'base	201455_WC00166	201455	165-166	Fresh	Tuff; & Coal	DY Lower	Gp5	-	-	0.08	-	2.5	72.5	-70.1	29.6	-	-	-	NAF
BHP d'base	201455_WC00167	201455	166-167	Fresh	Coal	DY Lower	Gp6	-	-	0.05	-	1.5	114	-112.5	74.4	-	-	-	NAF
BHP d'base	201455_WC00168	201455	167-168	Fresh	Coal; & Tuff	DY Lower	Gp6	-	-	0.42	0.21	12.9	16.8	-3.9	1.3	-	-	-	NAF
BHP d'base	201455_WC00169	201455	168-169	Fresh	Tuff; & Coal & Sandst., v. fine	DY Lower	Gp5	-	-	0.17	0.03	5.2	26.6	-21.4	5.1	-	-	-	NAF
BHP d'base	201455_WC00170	201455	169-170	Fresh	Sandstone, very fine	-	Gp4	-	-	0.22	0.04	6.7	25.2	-18.5	3.7	-	-	-	NAF
BHP d'base	201455_WC00171	201455	170-171	Fresh	Sandstone, very fine	-	Gp4	-	-	0.10	-	3.1	24.2	-21.1	7.9	-	-	-	NAF
BHP d'base	201455_WC00172	201455	171-172	Fresh	Sandstone, very fine	-	Gp4	-	-	0.10	-	3.1	22.9	-19.8	7.5	-	-	-	NAF
BHP d'base	201455_WC00173	201455	172-173	Fresh	Siltstone & Sandst., v. fine	-	Gp4	-	-	0.08	-	2.5	75.3	-72.9	30.7	-	-	-	NAF
BHP d'base	201455_WC00174	201455	173-174	Fresh	Sandstone, very fine	-	Gp4	-	-	0.09	-	2.8	73.4	-70.6	26.6	-	-	-	NAF
BHP d'base	201455_WC00175	201455	174-175	Fresh	Sandstone, v. fine to fine	-	Gp4	-	-	0.07	-	2.1	73.2	-71.1	34.1	-	-	-	NAF
BHP d'base	201455_WC00176	201455	175-176	Fresh	Siltstone & Sandst., v. fine	-	Gp4	-	-	0.08	-	2.5	72.3	-69.9	29.5	-	-	-	NAF
BHP d'base	201455_WC00177	201455	176-177	Fresh	Sandstone, v. fine; & Siltst.	-	Gp4	-	-	0.07	-	2.1	68.1	-66.0	31.8	-	-	-	NAF
BHP d'base	201455_WC00178	201455	177-178	Fresh	Sandstone, v. fine to fine	-	Gp4	-	-	0.14	0.08	4.3	30	-25.7	7.0	-	-	-	NAF
BHP d'base	201455_WC00179	201455	178-179	Fresh	Sandstone, very fine	-	Gp4	-	-	0.09	-	2.8	36.3	-33.5	13.2	-	-	-	NAF
BHP d'base	201455_WC00180	201455	179-180	Fresh	Sandst., v.fine to fine & Coal	DY Lower	Gp5	-	-	0.39	0.2	11.9	17.1	-5.2	1.4	-	-	-	NAF
BHP d'base	201455_WC00181	201455	180-181	Fresh	Coal; & Sandstone, v. fine	DY Lower	Gp6	-	-	0.44	-	13.5	17.1	-3.6	1.3	-	-	-	Uncertain
BHP d'base	201455_WC00182	201455	181-182	Fresh	Coal	DY Lower	Gp6	-	-	0.46	0.22	14.1	20.4	-6.3	1.4	-	-	-	NAF
BHP d'base	201455_WC00183	201455	182-183	Fresh	Coal; & Tuff	DY Lower	Gp5	-	-	0.11	0.05	3.4	44.9	-41.5	13.3	-	-	-	NAF
BHP d'base	201455_WC00184	201455	183-184	Fresh	Coal; & Sandstone, v. fine	DY Lower	Gp6	-	-	0.16	0.03	4.9	29.5	-24.6	6.0	-	-	-	NAF
BHP d'base	201455_WC00185	201455	184-185	Fresh	Coal; & Sandstone, v. fine	DY Lower	Gp6	-	-	0.11	0.05	3.4	46.4	-43.0	13.8	-	-	-	NAF
BHP d'base	201455_WC00186	201455	185-186	Fresh	Siltstone & Coal (inferior)	DY Lower	Gp6	-	-	0.10	-	3.1	45.3	-42.2	14.8	-	-	-	NAF
BHP d'base	201455_WC00187	201455	186-187	Fresh	Coal; & Sandst., fine	DY Lower	Gp6	-	-	0.10	-	3.1	39.8	-36.7	13.0	-	-	-	NAF
BHP d'base	201455_WC00188	201455	187-188	Fresh	Sandstone, fine	-	Gp4	-	-	0.10	-	3.1	42.5	-39.4	13.9	-	-	-	NAF
BHP d'base	201455_WC00189	201455	188-189	Fresh	Sandstone, fine	-	Gp4	-	-	0.11	0.05	3.4	41.7	-38.3	12.4	-	-	-	NAF
BHP d'base	201455_WC00190	201455	189-190	Fresh	Sandstone, fine	-	Gp4	-	-	0.10	-	3.1	49.9	-46.8	16.3	-	-	-	NAF
BHP d'base	201455_WC00191	201455	190-191	Fresh	Sandstone, fine	-	Gp4	-	-	0.08	-	2.5	75.7	-73.3	30.9	-	-	-	NAF
BHP d'base	201455_WC00192	201455	191-192	Fresh	Sandstone, fine	-	Gp4	-	-	0.10	-	3.1	31.8	-28.7	10.4	-	-	-	NAF
BHP d'base	201455_WC00193	201455	192-193	Fresh	Sandstone, fine	-	Gp4	-	-	0.07	-	2.1	34.5	-32.4	16.1	-	-	-	NAF
BHP d'base	201455_WC00194	201455	193-194	Fresh	Sandstone, fine	-	Gp4	-	-	0.11	0.07	3.4	34.2	-30.8	10.2	-	-	-	NAF
BHP d'base	201455_WC00195	201455	194-195	Fresh	Sandstone, fine	-	Gp4	-	-	0.05	-	1.5	96.6	-95.1	63.1	-	-	-	NAF
BHP d'base	201455_WC00196	201455	195-196	Fresh	Sandstone, fine	-	Gp4	-	-	0.37	0.19	11.3	11.2	0.1	1.0	-	-	-	Uncertain

Grey rows are seam samples. pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity; ANC = Acid neutralising capacity; NAPP = Net acid producing potential; NAG = Net acid generation.
MPA is calculated from Total S; NAPP is calculated from MPA and ANC. Refer to main body of the report for explanation of test results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5	S	SCR	MPA	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5	NAG@ pH7.0	Acid Classification
									µS/cm	%		kg H_2SO_4/t					kg H_2SO_4/t		
BHP d'base	201537_WCC_52	201537	0-1	Extremely	Gravelly Sand	-	Gp1	8.0	814	0.01	-	0.3	31	-30.9	101.9	-	-	-	NAF
BHP d'base	201537_WCC_53	201537	2-3	Extremely	Gravelly Sand	-	Gp1	8.1	699	0.01	-	0.3	30	-30.0	98.9	-	-	-	NAF
BHP d'base	201537_WCC_54	201537	4-5	Extremely	Sandstone, very fine	-	Gp2	8.0	516	<0.01	-	0.2	41	-40.3	264.5	-	-	-	NAF
BHP d'base	201537_WCC_55	201537	6-7	Distinctly	Sandstone, very fine	-	Gp2	8.3	1020	<0.01	-	0.2	39	-39.0	256.0	-	-	-	NAF
BHP d'base	201537_WCC_56	201537	8-9	Distinctly	Sandstone, very fine	-	Gp2	8.6	778	<0.01	-	0.2	39	-38.6	253.4	-	-	-	NAF
BHP d'base	201537_WCC_57	201537	10-11	Distinctly	Sandstone, fine	-	Gp2	8.4	635	<0.01	-	0.2	121	-120.8	790.2	-	-	-	NAF
BHP d'base	201537_WCC_58	201537	12-13	Weathered	Sandstone, fine	-	Gp2	8.7	421	<0.01	-	0.2	47	-46.3	303.7	-	-	-	NAF
BHP d'base	201537_WCC_59	201537	14-15	Weathered	Sandstone, fine	-	Gp2	8.6	544	<0.01	-	0.2	144	-143.8	940.4	-	-	-	NAF
BHP d'base	201537_WCC_60	201537	16-17	Weathered	Sandstone, fine	-	Gp2	8.7	670	<0.01	-	0.2	186	-185.8	1214.7	-	-	-	NAF
BHP d'base	201537_WCC_61	201537	18-19	Weathered	Sandstone, fine	-	Gp2	8.5	849	<0.01	-	0.2	34	-34.1	224.0	-	-	-	NAF
BHP d'base	201537_WCC_62	201537	20-21	Slightly	Sandstone, fine	-	Gp2	8.5	814	<0.01	-	0.2	52	-52.2	342.2	-	-	-	NAF
BHP d'base	201537_WCC_63	201537	22-23	Slightly	Sandstone, fine	-	Gp2	8.6	825	<0.01	-	0.2	91	-91.2	596.9	-	-	-	NAF
BHP d'base	201537_WCC_64	201537	24-25	Slightly	Sandstone, fine	-	Gp2	8.6	839	0.01	-	0.3	53	-52.6	172.7	-	-	-	NAF
BHP d'base	201537_WCC_65	201537	26-27	Fresh	Sandstone, fine	-	Gp4	8.6	812	0.02	-	0.6	44	-43.7	72.3	-	-	-	NAF
BHP d'base	201537_WCC_66	201537	28-29	Fresh	Sandstone, fine	-	Gp4	8.6	832	0.04	-	1.2	52	-51.0	42.6	-	-	-	NAF
BHP d'base	201537_WCC_67	201537	30-31	Fresh	Sandstone, fine	-	Gp4	8.7	818	0.02	-	0.6	41	-40.7	67.4	-	-	-	NAF
BHP d'base	201537_WCC_68	201537	32-33	Fresh	Sandstone, fine	-	Gp4	8.5	3720	0.04	-	1.2	81	-79.8	66.1	-	-	-	NAF
BHP d'base	201537_WCC_69	201537	34-35	Fresh	Sandstone, very fine	-	Gp4	8.7	754	0.04	-	1.2	42	-41.2	34.6	-	-	-	NAF
BHP d'base	201537_WCC_70	201537	36-37	Fresh	Sandstone, very fine	-	Gp4	8.5	540	0.03	-	0.9	15	-13.7	15.9	-	-	-	NAF
BHP d'base	201537_WCC_71	201537	38-39	Fresh	Sandstone, very fine	-	Gp4	8.5	783	0.04	-	1.2	22	-20.9	18.0	-	-	-	NAF
BHP d'base	201537_WCC_72	201537	40-41	Fresh	Siltstone	-	Gp4	8.4	857	0.04	-	1.2	<0.5	1.2	0.2	-	-	-	PAF-LC
BHP d'base	201537_WCC_73	201537_R01	42.09-43.17	Fresh	Coal, 40-60% bright	P	Gp6	8.5	836	0.04	-	1.2	<0.5	1.2	0.2	-	-	-	PAF-LC
BHP d'base	201537_WCC_74	201537_R01	43.17-43.98	Fresh	Coal; with minor carb. siltst.	P	Gp6	8.3	500	0.28	0.05	8.6	<0.5	8.6	0.0	-	-	-	NAF
								Extended Boil NAGpH = 6.5; Extended Boil Calculated NAG = -6.4 kg H2SO4/t											
BHP d'base	201537_WCC_75	201537_R01	43.98-45.04	Fresh	Coal and Claystone	P	Gp6	8.3	491	0.28	0.04	8.6	3	5.3	0.4	-	-	-	NAF
								Extended Boil NAGpH = 4.8; Extended Boil Calculated NAG = -3.5 kg H2SO4/t											
BHP d'base	201537_WCC_76	201537_R01	45.04-45.97	Fresh	Coal; some claystone	P	Gp6	8.5	457	0.29	0.04	8.9	5	3.5	0.6	-	-	-	NAF
								Extended Boil NAGpH = 5.2; Extended Boil Calculated NAG = -4.5 kg H2SO4/t											
BHP d'base	201537_WCC_77	201537_R01	45.97-46.79	Fresh	Coal; minor tuff, carb.	P	Gp6	8.5	895	0.15	0.08	4.6	6	-1.0	1.2	-	-	-	NAF
								Extended Boil NAGpH = 5.7; Extended Boil Calculated NAG = -5.8 kg H2SO4/t											
BHP d'base	201537-R01_WC_52	201537_R01	47.3-47.4	Fresh	Tuff	P Tuff	Gp4	8.5	174	0.06	-	1.8	7	-5.2	3.8	-	-	-	NAF
BHP d'base	201537-R01_WC_53	201537_R01	48.32-48.49	Fresh	Coal, inferior	Unknown	Gp6	9.0	65	0.15	0.02	4.6	1	3.6	0.2	-	-	-	PAF
								Extended Boil NAGpH = 2.7; Extended Boil Calculated NAG = -1.3 kg H2SO4/t											
BHP d'base	201537-R01_WC_54	201537_R01	48.49-48.6	Fresh	Carbonaceous Siltstone	-	Gp5	9.2	187	0.3	0.13	9.2	8	1.0	0.9	4.1	1.8	13.6	Uncertain (NAF)
BHP d'base	201537_WCC_78	201537_R01	48.6-49	Fresh	Carb. Siltst.; & Sandst., vf.	-	Gp5	8.2	405	0.84	0.55	25.7	3	22.3	0.1	2.5	22	34.8	PAF
BHP d'base	201537_WCC_79	201537	50-51	Fresh	Sandstone, fine	-	Gp4	8.5	486	0.19	0.10	5.8	6	0.2	1.0	3.8	2.7	16.5	Uncertain (NAF)
BHP d'base	201537_WCC_80	201537	52-53	Fresh	Sandstone, fine	-	Gp4	8.7	779	0.07	-	2.1	52	-49.9	24.3	-	-	-	NAF
BHP d'base	201537_WCC_81	201537	54-55	Fresh	Sandstone, fine	-	Gp4	8.5	894	0.03	-	0.9	25	-23.8	26.9	-	-	-	NAF
BHP d'base	201537_WC_01	201537	56-56.05	Fresh	Sandstone, fine	-	Gp4	9.1	367	0.03	-	0.9	30	-29.3	32.9	-	-	-	NAF
BHP d'base	201537_WC_02	201537	57-57.05	Fresh	Sandstone, fine-medium	-	Gp4	9.2	361	0.01	-	0.3	125	-124.7	408.2	-	-	-	NAF

Grey rows are seam samples. pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity [calculated from Total S]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential [calculated from MPA and ANC]; NAG = Net acid generation. Selected samples from the BHP (2020) program underwent Extended Boil NAG test or Acid Buffering Characterision Curve (ABCC) test to refine the acid classification. Refer to report body for explanation of results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5	S	SCR	MPA	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5	NAG@ pH7.0	Acid Classification
									µS/cm	%		kg H_2SO_4/t					kg H_2SO_4/t		
BHP d'base	201537_WC_03	201537	58.2-58.25	Fresh	Sandstone, fine-medium	-	Gp4	9.2	436	0.01	-	0.3	102	-101.7	333.1	-	-	-	NAF
								ABCC ANC = 136 kg H2SO4/t; % of ANC @ pH4.5 = >100%; Carb. neut. mineral = Calcite											
BHP d'base	201537_WC_04	201537	59-59.05	Fresh	Sandstone, very fine	-	Gp4	9.0	284	0.03	-	0.9	23	-22.1	25.0	-	-	-	NAF
								ABCC ANC = 9 kg H2SO4/t; % of ANC @ pH4.5 = 40%; Carb. neut. mineral = Fe-Dolomite.											
BHP d'base	201537_WC_05	201537	60-60.05	Fresh	Sandstone, very fine	-	Gp4	9.3	350	0.03	-	0.9	85	-84.2	92.6	-	-	-	NAF
BHP d'base	201537_WCC_82	201537	61-62	Fresh	Sandstone, fine	-	Gp4	8.7	717	0.05	-	1.5	56	-54.1	36.3	-	-	-	NAF
BHP d'base	201537_WCC_83	201537	63-64	Fresh	Sandstone, fine-medium	-	Gp4	8.7	669	0.02	-	0.6	65	-64.8	106.8	-	-	-	NAF
BHP d'base	201537_WCC_84	201537	65-66	Fresh	Sandstone, fine-medium	-	Gp4	8.7	695	0.02	-	0.6	81	-80.4	132.2	-	-	-	NAF
BHP d'base	201537_WCC_85	201537	67-68	Fresh	Sandstone, fine-medium	-	Gp4	8.8	668	0.02	-	0.6	55	-54.8	90.4	-	-	-	NAF
BHP d'base	201537_WCC_86	201537	69-70	Fresh	Sandstone, medium	-	Gp4	9.0	594	0.01	-	0.3	220	-219.7	718.4	-	-	-	NAF
BHP d'base	201537_WCC_87	201537	71-72	Fresh	Sandstone, fine-medium	-	Gp4	8.7	619	0.02	-	0.6	321	-320.4	524.1	-	-	-	NAF
BHP d'base	201537_WCC_88	201537	73-74	Fresh	Sandstone, fine	-	Gp4	8.8	567	0.02	-	0.6	40	-38.9	64.5	-	-	-	NAF
BHP d'base	201537_WCC_89	201537	75-76	Fresh	Sandstone, fine	-	Gp4	8.9	597	0.02	-	0.6	70	-69.0	113.6	-	-	-	NAF
BHP d'base	201537_WCC_90	201537	77-78	Fresh	Sandstone, fine	-	Gp4	8.9	447	0.01	-	0.3	48	-47.7	156.7	-	-	-	NAF
BHP d'base	201537_WCC_91	201537	79-80	Fresh	Sandstone, fine	-	Gp4	9.0	615	0.02	-	0.6	56	-55.8	92.1	-	-	-	NAF
BHP d'base	201537_WCC_92	201537	81-82	Fresh	Sandstone, fine	-	Gp4	8.9	546	0.03	-	0.9	54	-53.5	59.2	-	-	-	NAF
BHP d'base	201537_WCC_93	201537	83-84	Fresh	Sandstone, fine	-	Gp4	9.0	611	0.02	-	0.6	45	-44.6	73.8	-	-	-	NAF
BHP d'base	201537_WCC_94	201537	85-86	Fresh	Sandstone, fine	-	Gp4	8.6	815	0.05	-	1.5	53	-51.9	34.9	-	-	-	NAF
BHP d'base	201537_WC_06	201537	87.68-87.72	Fresh	Siltstone	-	Gp4	8.8	316	0.03	-	0.9	10	-8.7	10.4	-	-	-	NAF
BHP d'base	201537_WC_07	201537	88.95-89	Fresh	Siltstone	-	Gp4	8.9	224	0.03	-	0.9	11	-9.9	11.8	-	-	-	NAF
								ABCC ANC = 3 kg H2SO4/t; % of ANC @ pH4.5 = 29%; Carb. neut. mineral = Fe-Dol. + Sid.											
BHP d'base	201537_WC_08	201537	91.04-91.1	Fresh	Carbonaceous Siltstone	-	Gp5	9.0	177	0.04	-	1.2	8	-6.4	6.2	-	-	-	NAF
BHP d'base	201537_WC_09	201537	95.44-95.5	Fresh	Siltstone	-	Gp4	9.1	234	0.03	-	0.9	10	-8.6	10.3	-	-	-	NAF
								ABCC ANC = 3 kg H2SO4/t; % of ANC @ pH4.5 = 35%; Carb. neut. mineral = Fe-Dol. + Sid.											
BHP d'base	201537_WCC_96	201537	98-99	Fresh	Sandstone, fine	-	Gp4	8.2	632	0.04	-	1.2	6	-4.5	4.7	-	-	-	NAF
BHP d'base	201537_WCC_97	201537	100-101	Fresh	Sandstone, very fine	-	Gp4	8.3	675	<0.01	-	0.2	9	-8.8	58.8	-	-	-	NAF
BHP d'base	201537_WCC_98	201537	102-103	Fresh	Sandstone, very fine	-	Gp4	8.5	693	0.04	-	1.2	21	-19.5	16.9	-	-	-	NAF
BHP d'base	201537_WCC_99	201537	104-105	Fresh	Sandstone, very fine	-	Gp4	8.8	570	0.03	-	0.9	257	-256.1	279.7	-	-	-	NAF
BHP d'base	201537_WCC_101	201537	108-109	Fresh	Sandstone, very fine	-	Gp4	8.8	598	0.03	-	0.9	19	-18.4	21.0	-	-	-	NAF
BHP d'base	201537_WCC_102	201537	110-111	Fresh	Sandstone, very fine	-	Gp4	8.7	530	0.02	-	0.6	11	-10.3	17.8	-	-	-	NAF
BHP d'base	201537_WC_10	201537	112.25-112.3	Fresh	Sandst., f.-med.; minor calcite	-	Gp4	9.5	391	0.02	-	0.6	194	-193.4	316.7	-	-	-	NAF
BHP d'base	201537_WC_11	201537	114-114.05	Fresh	Siltstone; minor calcite	-	Gp4	9.2	256	0.02	-	0.6	35	-34.8	57.8	-	-	-	NAF
BHP d'base	201537_WC_12	201537	115.93-116.03	Fresh	Carb. Siltstone; minor coal	-	Gp5	9.3	243	0.11	0.06	3.4	14	-10.3	4.1	7	<0.1	<0.1	NAF
BHP d'base	201537_WC_13	201537	116.37-116.44	Fresh	Siltstone; minor carb.	-	Gp5	8.8	198	0.69	0.58	21.1	103	-81.9	4.9	7.8	<0.1	<0.1	NAF
								ABCC ANC = 12 kg H2SO4/t; % of ANC @ pH4.5 = 12%; Carb. neut. mineral = Sid. / Mag.											
BHP d'base	201537_WC_14	201537	118.49-118.55	Fresh	Carbonaceous Siltstone	-	Gp5	9.3	317	0.09	-	2.8	13	-10.3	4.8	-	-	-	NAF
BHP d'base	201537_WC_15	201537	119.32-119.37	Fresh	Siltstone	-	Gp4	9.1	186	0.06	-	1.8	13	-11.0	7.0	-	-	-	NAF
BHP d'base	201537_WC_16	201537	119.82-119.87	Fresh	Siltstone	-	Gp4	9.0	190	0.03	-	0.9	15	-13.6	15.8	-	-	-	NAF
BHP d'base	201537_WC_17	201537	120.3-120.35	Fresh	Siltstone	-	Gp4	9.0	233	0.06	-	1.8	17	-15.0	9.1	-	-	-	NAF

pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity [calculated from Total S]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential [calculated from MPA and ANC]; NAG = Net acid generation.
Selected samples from the BHP (2020) program underwent Extended Boil NAG test or Acid Buffering Characterision Curve (ABCC) test to refine the acid classification. Refer to report body for explanation of results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5 µS/cm	S %	S_{CR} %	MPA kg H_2SO_4/t	ANC kg H_2SO_4/t	NAPP kg H_2SO_4/t	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5 kg H_2SO_4/t	NAG@ pH7.0 kg H_2SO_4/t	Acid Classification
BHP d'base	201537_WC_18	201537	120.79-120.83	Fresh	Siltstone; minor coal	-	Gp4	9.2	186	0.26	0.21	8.0	13	-5.0	1.6	5.5	<0.1	1.8	NAF
								ABCC ANC = 4 kg H2SO4/t; % of ANC @ pH4.5 = 31%; Carb. neut. mineral = Fe-Dolomite.											
BHP d'base	201537_WC_19	201537	121.8-121.85	Fresh	Sandstone, fine	-	Gp4	8.9	187	0.05	-	1.5	12	-10.1	7.6	-	-	-	NAF
BHP d'base	201537_WC_20	201537	122.7-122.76	Fresh	Siltstone	-	Gp4	9.2	221	0.04	-	1.2	14	-12.6	11.3	-	-	-	NAF
BHP d'base	201537_WC_21	201537	123.4-123.46	Fresh	Sandstone, fine-medium	-	Gp4	9.1	210	0.1	0.08	3.1	23	-19.6	7.4	8.2	<0.1	<0.1	NAF
								ABCC ANC = 18 kg H2SO4/t; % of ANC @ pH4.5 = 80%; Carb. neut. mineral = Dol. & Fe-Dol.											
BHP d'base	201537_WC_22	201537	124.35-124.4	Fresh	Siltstone	-	Gp4	8.9	221	0.04	-	1.2	19	-17.8	15.5	-	-	-	NAF
BHP d'base	201537_WC_23	201537	124.7-124.75	Fresh	Carbonaceous Siltstone	-	Gp5	9.5	321	0.04	-	1.2	18	-17.1	14.9	-	-	-	NAF
BHP d'base	201537_WC_24	201537	125.23-125.29	Fresh	Siltstone	-	Gp4	9.3	133	0.08	-	2.5	13	-10.6	5.3	-	-	-	NAF
BHP d'base	201537_WC_25	201537	126.37-126.42	Fresh	Siltstone	-	Gp4	9.2	176	0.06	-	1.8	11	-9.4	6.1	-	-	-	NAF
BHP d'base	201537_WC_26	201537	126.59-126.67	Fresh	Carb. Siltstone; coaly	-	Gp5	9.4	201	0.33	0.03	10.1	7	3.1	0.7	3.6	5.4	24.2	Uncertain (NAF)
BHP d'base	201537_WC_27	201537	127.13-127.24	Fresh	Carbonaceous Siltstone	-	Gp5	9.3	184	0.07	-	2.1	11	-8.7	5.0	-	-	-	NAF
								ABCC ANC = 3 kg H2SO4/t; % of ANC @ pH4.5 = 27%; Carb. neut. mineral = Fe-Dol. & Sid.											
BHP d'base	201537_WC_28	201537	128.03-128.08	Fresh	Sandstone, fine	-	Gp4	9.4	233	0.05	-	1.5	15	-13.9	10.1	-	-	-	NAF
BHP d'base	201537_WC_29	201537	128.46-128.51	Fresh	Sandstone, fine	-	Gp4	9.3	178	0.05	-	1.5	14	-12.0	8.8	-	-	-	NAF
BHP d'base	201537_WC_30	201537	130.05-130.09	Fresh	Siltstone	-	Gp4	9.6	271	0.07	-	2.1	86	-83.9	40.1	-	-	-	NAF
								ABCC ANC = 87 kg H2SO4/t; % of ANC @ pH4.5 = 100%; Carb. neut. mineral = Dol. & Fe-Dol.											
BHP d'base	201537_WC_31	201537	131.88-131.92	Fresh	Siltstone	-	Gp4	9.5	174	0.04	-	1.2	23	-22.2	19.1	-	-	-	NAF
								ABCC ANC = 6 kg H2SO4/t; % of ANC @ pH4.5 = 24%; Carb. neut. mineral = Fe-Dolomite.											
BHP d'base	201537_WC_32	201537	133.1-133.15	Fresh	Sandstone, fine-medium	-	Gp4	9.3	177	0.02	-	0.6	2	-1.8	3.9	-	-	-	NAF
BHP d'base	201537_WC_33	201537	135.7-135.77	Fresh	Sandstone, fine-medium	-	Gp4	9.3	319	0.03	-	0.9	11	-9.6	11.4	-	-	-	NAF
BHP d'base	201537_WCC_103	201537	136-137	Fresh	Sandstone, fine	-	Gp4	8.8	521	0.02	-	0.6	7	-6.7	11.9	-	-	-	NAF
BHP d'base	201537_WCC_104	201537	138-139	Fresh	Sandstone, fine	-	Gp4	9.0	598	0.03	-	0.9	8	-6.9	8.5	-	-	-	NAF
BHP d'base	201537_WCC_105	201537	140-141	Fresh	Sandstone, fine	-	Gp4	8.7	453	0.03	-	0.9	7	-6.3	7.8	-	-	-	NAF
BHP d'base	201537_WCC_106	201537	142-143	Fresh	Sandstone, fine	-	Gp4	9.0	444	0.01	-	0.3	8	-8.0	27.1	-	-	-	NAF
BHP d'base	201537_WCC_107	201537	144-145	Fresh	Sandstone, fine	-	Gp4	9.0	555	0.03	-	0.9	14	-13.1	15.2	-	-	-	NAF
BHP d'base	201537_WCC_108	201537	146-147	Fresh	Sandstone, fine	-	Gp4	9.1	487	0.02	-	0.6	252	-251.4	411.4	-	-	-	NAF
BHP d'base	201537_WCC_109	201537	148-149	Fresh	Sandstone, fine	-	Gp4	8.9	486	0.02	-	0.6	65	-64.7	106.6	-	-	-	NAF
BHP d'base	201537_WCC_110	201537	150-151	Fresh	Sandstone, fine	-	Gp4	8.8	492	0.01	-	0.3	37	-36.4	119.8	-	-	-	NAF
BHP d'base	201537_WCC_111	201537	152-153	Fresh	Sandstone, fine	-	Gp4	9.1	358	0.02	-	0.6	24	-23.1	38.7	-	-	-	NAF
BHP d'base	201537_WCC_112	201537	154-155	Fresh	Sandstone, fine	-	Gp4	9.0	423	0.03	-	0.9	53	-52.5	58.1	-	-	-	NAF
BHP d'base	201537_WCC_113	201537	156-157	Fresh	Sandstone, fine	-	Gp4	9.0	473	0.03	-	0.9	56	-55.2	61.1	-	-	-	NAF
BHP d'base	201537_WCC_114	201537	158-159	Fresh	Sandstone, fine	-	Gp4	8.6	529	0.02	-	0.6	61	-60.2	99.3	-	-	-	NAF
BHP d'base	201537_WCC_115	201537	160-161	Fresh	Sandstone, very fine	-	Gp4	9.0	470	0.01	-	0.3	33	-32.8	108.1	-	-	-	NAF
BHP d'base	201537_WCC_116	201537	162-163	Fresh	Sandstone, fine	-	Gp4	9.1	389	<0.01	-	0.2	23	-23.0	151.5	-	-	-	NAF
BHP d'base	201537_WCC_117	201537	164-165	Fresh	Sandstone, fine	-	Gp4	9.0	488	<0.01	-	0.2	26	-25.3	166.5	-	-	-	NAF
BHP d'base	201537_WCC_118	201537	166-167	Fresh	Sandstone, very fine	-	Gp4	9.1	438	<0.01	-	0.2	29	-29.1	191.3	-	-	-	NAF
BHP d'base	201537_WCC_119	201537	168-169	Fresh	Sandstone, fine	-	Gp4	9.1	663	<0.01	-	0.2	298	-297.8	1946.1	-	-	-	NAF
BHP d'base	201537_WCC_120	201537	170-171	Fresh	Sandstone, fine	-	Gp4	9.0	627	0.01	-	0.3	160	-159.7	522.4	-	-	-	NAF
BHP d'base	201537_WCC_121	201537	172-173	Fresh	Sandstone, fine	-	Gp4	8.9	579	0.02	-	0.6	63	-62.7	103.3	-	-	-	NAF

pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity [calculated from Total S]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential [calculated from MPA and ANC]; NAG = Net acid generation.
Selected samples from the BHP (2020) program underwent Extended Boil NAG test or Acid Buffering Characterisation Curve (ABCC) test to refine the acid classification. Refer to report body for explanation of results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5	S	ScR	MPA	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5	NAG@ pH7.0	Acid Classification
									µS/cm	%		kg H_2SO_4/t					kg H_2SO_4/t		
BHP d'base	201537_WC_34	201537	174-174.05	Fresh	Sandstone, fine-medium	-	Gp4	9.4	294	0.01	-	0.3	27	-26.3	86.9	-	-	-	NAF
BHP d'base	201537_WC_35	201537	174.95-175	Fresh	Sandstone, fine-medium	-	Gp4	9.2	256	0.05	-	1.5	20	-18.4	13.0	-	-	-	NAF
								ABCC ANC = 11 kg H2SO4/t; % of ANC @ pH4.5 = 57%; Carb. neut. mineral = Fe-Dol. & Dol.											
BHP d'base	201537_WC_36	201537	176-176.05	Fresh	Carbonaceous Siltstone	-	Gp5	9.5	219	0.12	0.07	3.7	15	-11.1	4.0	5.9	<0.1	2.2	NAF
BHP d'base	201537_WC_37	201537	177.7-177.75	Fresh	Siltstone	-	Gp4	9.5	172	0.02	-	0.6	17	-15.9	26.9	-	-	-	NAF
BHP d'base	201537_WC_38	201537	178.5-178.55	Fresh	Siltstone	-	Gp4	9.6	179	0.02	-	0.6	14	-13.8	23.5	-	-	-	NAF
BHP d'base	201537_WCC_122	201537	178.55-179	Fresh	Coal and Siltstone	DY Upper	Gp5	8.8	739	0.08	-	2.5	10	-7.4	4.0	-	-	-	NAF
BHP d'base	201537_WCC_123	201537	181-182	Fresh	Sandstone, fine	-	Gp4	9.1	558	0.04	-	1.2	21	-19.6	17.0	-	-	-	NAF
BHP d'base	201537_WCC_124	201537	183-184	Fresh	Sandstone, very fine	-	Gp4	9.1	580	0.06	-	1.8	10	-8.0	5.3	-	-	-	NAF
BHP d'base	201537_WCC_125	201537	185-186	Fresh	Sandstone, very fine	-	Gp4	9.2	555	0.02	-	0.6	12	-11.4	19.6	-	-	-	NAF
BHP d'base	201537_WCC_126	201537	187-188	Fresh	Sandstone, very fine	-	Gp4	9.0	469	0.04	-	1.2	18	-16.9	14.8	-	-	-	NAF
BHP d'base	201537_WCC_127	201537	189-190	Fresh	Sandstone, very fine	-	Gp4	9.0	553	0.05	-	1.5	11	-9.0	6.9	-	-	-	NAF
BHP d'base	201537_WC_39	201537	191.95-192	Fresh	Siltstone	-	Gp4	9.2	213	0.01	-	0.3	10	-9.8	33.0	-	-	-	NAF
BHP d'base	201537_WC_40	201537	192.85-192.9	Fresh	Siltstone; minor calcite	-	Gp4	9.3	327	0.02	-	0.6	9	-7.9	13.9	-	-	-	NAF
BHP d'base	201537_WC_41	201537	195.95-196	Fresh	Siltstone	-	Gp4	9.2	163	0.06	-	1.8	12	-10.3	6.6	-	-	-	NAF
BHP d'base	201537_WC_42	201537	196.03-196.2	Fresh	Coal, 40-60% bright	DY Lower	Gp6	9.2	54	0.34	0.01	10.4	1	9.4	0.1	-	-	-	PAF
								Extended Boil NAGpH = 2.1; Extended Boil Calculated NAG = -0.5 kg H2SO4/t											
BHP d'base	201537_WC_43	201537	196.47-196.74	Fresh	Carbonaceous Mudstone	-	Gp5	8.6	766	0.11	0.08	3.4	56	-52.5	16.6	8.3	<0.1	<0.1	NAF
								ABCC ANC = 6 kg H2SO4/t; % of ANC @ pH4.5 = 10%; Carb. neut. mineral = Sid. / Mag.											
BHP d'base	201537_WC_44	201537	198.21-198.26	Fresh	Siltstone	-	Gp4	9.4	247	0.06	-	1.8	10	-8.5	5.6	-	-	-	NAF
BHP d'base	201537_WC_45	201537	198.63-198.95	Fresh	Sandstone, fine	-	Gp4	9.3	209	0.05	-	1.5	9	-7.7	6.0	-	-	-	NAF
BHP d'base	201537_WC_46	201537	199.25-199.3	Fresh	Sandstone, very fine	-	Gp4	9.6	364	0.04	-	1.2	223	-221.8	182.0	-	-	-	NAF
BHP d'base	201537_WC_47	201537	199.95-200	Fresh	Siltstone	-	Gp4	9.3	163	0.06	-	1.8	13	-11.2	7.1	-	-	-	NAF
BHP d'base	201537_WC_48	201537	203.1-203.15	Fresh	Siltstone	-	Gp4	9.1	159	0.06	-	1.8	9	-7.3	5.0	-	-	-	NAF
BHP d'base	201537_WC_49	201537	204.5-204.55	Fresh	Siltstone	-	Gp4	9.0	158	0.07	-	2.1	7	-5.3	3.5	-	-	-	NAF
BHP d'base	201537_WC_50	201537	205.15-205.2	Fresh	Siltstone	-	Gp4	9.2	113	0.16	0.13	4.9	11	-5.6	2.1	5.7	<0.1	1.7	NAF
BHP d'base	201537_WC_51	201537	206.1-206.24	Fresh	Siltstone; minor coal	-	Gp4	9.4	248	0.05	-	1.5	7	-5.7	4.7	-	-	-	NAF
BHP d'base	201847_WCC_25	201847	0-1	Extremely	Soil; gravelly	-	Gp1	7.7	392	0.01	-	0.3	51.3	-51.0	167.5	-	-	-	NAF
BHP d'base	201847_WCC_26	201847	2-3	Distinctly	Clayey Sand	-	Gp1	8.7	616	<0.01	-	0.2	135	-134.8	881.6	-	-	-	NAF
BHP d'base	201847_WCC_27	201847	4-5	Distinctly	Sandstone, fine; clayey	-	Gp2	8.6	674	<0.01	-	0.2	61.1	-60.9	399.0	-	-	-	NAF
BHP d'base	201847_WCC_28	201847	6-7	Distinctly	Sandstone, fine; clayey	-	Gp2	8.7	668	<0.01	-	0.2	58.9	-58.7	384.7	-	-	-	NAF
BHP d'base	201847_WCC_29	201847	8-9	Distinctly	Sandstone, fine; clayey	-	Gp2	8.8	606	<0.01	-	0.2	72.5	-72.3	473.5	-	-	-	NAF
BHP d'base	201847_WCC_30	201847	10-11	Distinctly	Sandstone, fine; silty	-	Gp2	7.8	827	0.02	-	0.6	11.9	-11.3	19.4	-	-	-	NAF
BHP d'base	201847_WCC_31	201847	12-13	Distinctly	Sandstone, very fine	-	Gp2	8.1	968	0.03	-	0.9	13.3	-12.4	14.5	-	-	-	NAF
BHP d'base	201847_WCC_32	201847	14-15	Distinctly	Sandstone, very fine	-	Gp2	8.0	598	0.02	-	0.6	7.8	-7.2	12.7	-	-	-	NAF
BHP d'base	201847_WCC_33	201847	16-17	Weathered	Sandstone, fine	-	Gp2	7.6	483	0.09	-	2.8	10.4	-7.6	3.8	-	-	-	NAF
								ABCC ANC = 5.9 kg H2SO4/t; % of ANC @ pH4.5 = 56%; Carb. neut. mineral = Fe-Dol. & Sid.											
BHP d'base	201847_WCC_34	201847	18-19	Slightly	Sandstone, very fine	-	Gp2	8.7	352	0.05	-	1.5	16.5	-15.0	10.8	-	-	-	NAF
BHP d'base	201847_WCC_35	201847	20-21	Slightly	Sandstone, very fine	-	Gp2	8.9	344	0.03	-	0.9	13.9	-13.0	15.1	-	-	-	NAF

Grey rows are seam samples. pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity [calculated from Total S]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential [calculated from MPA and ANC];
NAG = Net acid generation. Selected samples from the BHP (2020) program underwent Extended Boil NAG test or Acid Buffering Characterision Curve (ABCC) test to refine the acid classification. Refer to report body for explanation of results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5 µS/cm	S %	SCR %	MPA kg H_2SO_4/t	ANC kg H_2SO_4/t	NAPP kg H_2SO_4/t	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5 kg H_2SO_4/t	NAG@ pH7.0 kg H_2SO_4/t	Acid Classification
BHP d'base	201847_WCC_36	201847	22-23	Fresh	Sandstone, fine	-	Gp4	8.8	490	0.02	-	0.6	102	-101.4	166.5	-	-	-	NAF
								ABCC ANC = 102 kg H2SO4/t; % of ANC @ pH4.5 = 100%; Carb. neut. mineral = Fe-Dolomite											
BHP d'base	201847_WCC_37	201847	24-25	Fresh	Sandstone, fine	-	Gp4	9.0	356	0.03	-	0.9	59.2	-58.3	64.4	-	-	-	NAF
								ABCC ANC = 62 kg H2SO4/t; % of ANC @ pH4.5 = 104%; Carb. neut. min. = Calcite & Fe-Dol.											
BHP d'base	201847_WCC_38	201847	26-27	Fresh	Sandstone, fine	-	Gp4	8.7	432	0.02	-	0.6	285	-284.4	465.3	-	-	-	NAF
BHP d'base	201847_WCC_39	201847	28-29	Fresh	Sandstone, fine	-	Gp4	8.9	408	0.02	-	0.6	80.7	-80.1	131.8	-	-	-	NAF
BHP d'base	201847_WCC_40	201847	30-31	Fresh	Sandstone, fine	-	Gp4	9.0	391	0.03	-	0.9	71.9	-71.0	78.3	-	-	-	NAF
BHP d'base	201847_WCC_41	201847	32-33	Fresh	Sandstone, fine	-	Gp4	8.9	385	0.02	-	0.6	75.7	-75.1	123.6	-	-	-	NAF
BHP d'base	201847_WCC_42	201847	34-35	Fresh	Sandstone, fine	-	Gp4	9.0	430	0.02	-	0.6	83.1	-82.5	135.7	-	-	-	NAF
BHP d'base	201847_WCC_43	201847	36-37	Fresh	Sandstone, very fine	-	Gp4	9.1	403	0.02	-	0.6	113	-112.4	184.5	-	-	-	NAF
BHP d'base	201847_WCC_44	201847	38-39	Fresh	Sandstone, very fine	-	Gp4	9.2	354	0.04	-	1.2	40.2	-39.0	32.8	-	-	-	NAF
BHP d'base	201847_WCC_45	201847	40-41	Fresh	Sandstone, very fine	-	Gp4	8.5	445	0.04	-	1.2	17.9	-16.7	14.6	-	-	-	NAF
BHP d'base	201847_WC_01	201847	42.25-42.3	Fresh	Siltstone	-	Gp4	8.4	165	0.03	-	0.9	16.1	-15.2	17.5	-	-	-	NAF
BHP d'base	201847_WC_02	201847	43.06-43.13	Fresh	Siltstone	-	Gp4	8.3	243	0.07	-	2.1	7.4	-5.3	3.5	-	-	-	NAF
BHP d'base	201847_WC_03	201847	43.77-43.89	Fresh	Carb. Siltstone; & Coal	HC Lower	Gp5	5.9	278	0.19	0.07	5.8	4.2	1.6	0.7	3.2	11.5	27.3	Uncertain (PAF)
BHP d'base	201847_WC_04	201847	45.47-45.53	Fresh	Siltstone; minor pyrite	-	Gp4	8.0	289	0.46	0.46	14.1	7.8	6.3	0.6	3	5.5	10.6	PAF
BHP d'base	201847_WC_05	201847	46.05-46.1	Fresh	Carbonaceous Siltstone	-	Gp5	7.5	337	0.19	0.19	5.8	8.8	-3.0	1.5	4.4	0.1	4.6	Uncertain (NAF)
BHP d'base	201847_WCC_46	201847	46.43-47	Fresh	Coal, inferior	Unknown	Gp6	9.3	383	0.39	0.23	11.9	11.4	0.5	1.0	4.4	0.5	21.6	NAF
								Extended Boil NAGpH = 5.0; Extended Boil Calculated NAG = -2.7 kg H2SO4/t											
BHP d'base	201847_WCC_47	201847	48-49	Fresh	Sandstone, very fine	-	Gp4	8.8	455	0.05	-	1.5	36.2	-34.7	23.6	-	-	-	NAF
BHP d'base	201847_WCC_48	201847	50-51	Fresh	Sandstone, very fine	-	Gp4	9.1	384	0.04	-	1.2	23.8	-22.6	19.4	-	-	-	NAF
BHP d'base	201847_WCC_49	201847	52-53	Fresh	Sandstone, very fine	-	Gp4	9.2	388	0.04	-	1.2	20	-18.8	16.3	-	-	-	NAF
BHP d'base	201847_WC_06	201847	53.93-53.99	Fresh	Sandstone, fine	-	Gp4	8.8	165	0.05	-	1.5	10.4	-8.9	6.8	-	-	-	NAF
BHP d'base	201847_WC_07	201847	54.14-54.19	Fresh	Coal, 10-40% bright	Unknown	Gp6	9.5	268	0.2	0.02	6.1	13.2	-7.1	2.2	7.3	<0.1	<0.1	NAF
BHP d'base	201847_WC_08	201847	54.31-54.4	Fresh	Carb. Siltstone; coaly	-	Gp5	9.4	305	0.14	0.03	4.3	10.2	-5.9	2.4	5.9	<0.1	2.8	NAF
BHP d'base	201847_WC_09	201847	54.5-54.55	Fresh	Carb. Siltstone; coaly	-	Gp5	9.3	255	0.1	0.04	3.1	10.7	-7.6	3.5	7.2	<0.1	<0.1	NAF
BHP d'base	201847_WC_10	201847	54.75-54.81	Fresh	Siltstone	-	Gp4	9.0	181	0.11	0.05	3.4	11	-7.6	3.3	6.8	<0.1	0.2	NAF
								ABCC ANC = 2.6 kg H2SO4/t; % of ANC @ pH4.5 = 24%; Carb. neut. mineral = Fe-Dol. & Sid.											
BHP d'base	201847_WC_11	201847	55.43-55.49	Fresh	Siltstone	-	Gp4	8.4	237	0.14	0.11	4.3	10.9	-6.6	2.5	6.6	<0.1	0.1	NAF
BHP d'base	201847_WCC_50	201847	56-57	Fresh	Sandstone, very fine	-	Gp4	8.9	448	0.06	-	1.8	16.9	-15.1	9.2	-	-	-	NAF
BHP d'base	201847_WCC_51	201847	58-59	Fresh	Sandstone, very fine	-	Gp4	9.1	539	0.06	-	1.8	63.3	-61.5	34.4	-	-	-	NAF
								ABCC ANC = 66 kg H2SO4/t; % of ANC @ pH4.5 = 105%; Carb. neut. mineral = Calcite & Dol.											
BHP d'base	201847_WCC_52	201847	60-61	Fresh	Sandstone, very fine	-	Gp4	9.0	835	0.07	-	2.1	31.6	-29.5	14.7	-	-	-	NAF
BHP d'base	201847_WCC_53	201847	62-63	Fresh	Sandstone, very fine	-	Gp4	9.1	541	0.08	-	2.5	22.9	-20.5	9.3	-	-	-	NAF
BHP d'base	201847_WC_12	201847	63.12-63.2	Fresh	Siltstone	-	Gp4	8.8	332	0.08	-	2.5	30.3	-27.9	12.4	-	-	-	NAF
BHP d'base	201847_WC_13	201847	64.05-64.1	Fresh	Siltstone	-	Gp4	9.0	207	0.05	-	1.5	20	-18.5	13.1	-	-	-	NAF
								ABCC ANC = 3.5 kg H2SO4/t; % of ANC @ pH4.5 = 18%; Carb. neut. mineral = Fe-Dol. & Sid.											
BHP d'base	201847_WC_14	201847	64.8-64.87	Fresh	Siltstone	-	Gp4	8.6	181	0.03	-	0.9	11.4	-10.5	12.4	-	-	-	NAF
BHP d'base	201847_WC_15	201847	65.35-65.42	Fresh	Carb. Siltstone; minor pyrite	-	Gp5	7.6	520	0.13	0.05	4.0	9.1	-5.1	2.3	3.7	4.2	16.8	Uncertain (NAF)

Grey rows are seam samples. pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity [calculated from Total S]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential [calculated from MPA and ANC];
NAG = Net acid generation. Selected samples from the BHP (2020) program underwent Extended Boil NAG test or Acid Buffering Characterision Curve (ABCC) test to refine the acid classification. Refer to report body for explanation of results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5 (µS/cm)	S (%)	SCR (%)	MPA (kg H_2SO_4/t)	ANC (kg H_2SO_4/t)	NAPP (kg H_2SO_4/t)	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5 (kg H_2SO_4/t)	NAG@ pH7.0 (kg H_2SO_4/t)	Acid Classification
BHP d'base	201847_WC_16	201847	66.64-66.7	Fresh	Siltstone	-	Gp4	8.8	239	0.05	-	1.5	12.8	-11.3	8.4	-	-	-	NAF
BHP d'base	201847_WCC_54	201847	68-69	Fresh	Sandstone, very fine	-	Gp4	9.1	571	0.05	-	1.5	22	-20.5	14.4	-	-	-	NAF
								ABCC ANC = 9.1 kg H2SO4/t; % of ANC @ pH4.5 = 42%; Carb. neut. mineral = Fe-Dolomite											
BHP d'base	201847_WCC_55	201847	70-71	Fresh	Sandstone, very fine	-	Gp4	9.1	480	0.04	-	1.2	19.8	-18.6	16.2	-	-	-	NAF
BHP d'base	201847_WCC_56	201847	72-73	Fresh	Sandstone, fine	-	Gp4	9.2	529	0.03	-	0.9	298	-297.1	324.4	-	-	-	NAF
BHP d'base	201847_WCC_57	201847	74-75	Fresh	Sandstone, fine	-	Gp4	9.4	700	0.04	-	1.2	52.2	-51.0	42.6	-	-	-	NAF
								ABCC ANC = 40 kg H2SO4/t; % of ANC @ pH4.5 = 77%; Carb. neut. mineral = Fe-Dol. & Dol.											
BHP d'base	201847_WC_17	201847	76.75-76.81	Fresh	Siltstone	-	Gp4	8.8	267	0.05	-	1.5	20.4	-18.9	13.3	-	-	-	NAF
								ABCC ANC = 3.8 kg H2SO4/t; % of ANC @ pH4.5 = 19%; Carb. neut. mineral = Fe-Dol. & Sid.											
BHP d'base	201847_WC_18	201847	77.25-77.3	Fresh	Siltstone	-	Gp4	8.9	343	0.06	-	1.8	14.3	-12.5	7.8	-	-	-	NAF
BHP d'base	201847_WC_19	201847	78.03-78.09	Fresh	Siltstone	-	Gp4	8.9	272	0.02	-	0.6	15.1	-14.5	24.7	-	-	-	NAF
BHP d'base	201847_WC_20	201847	82.26-82.34	Fresh	Siltstone	-	Gp4	9.2	322	0.04	-	1.2	9.2	-8.0	7.5	-	-	-	NAF
BHP d'base	201847_WCC_58	201847	84-85	Fresh	Siltstone	-	Gp4	9.2	451	0.04	-	1.2	15.9	-14.7	13.0	-	-	-	NAF
BHP d'base	201847_WCC_59	201847	86-87	Fresh	Sandstone, very fine	-	Gp4	9.2	626	0.03	-	0.9	114	-113.1	124.1	-	-	-	NAF
BHP d'base	201847_WCC_60	201847	88-89	Fresh	Sandstone, fine	-	Gp4	9.4	510	0.02	-	0.6	106	-105.4	173.1	-	-	-	NAF
								ABCC ANC = 97 kg H2SO4/t; % of ANC @ pH4.5 = 92%; Carb. neut. mineral = Fe-Dol. / Dol.											
BHP d'base	201847_WCC_61	201847	90-91	Fresh	Sandstone, fine	-	Gp4	9.2	611	0.06	-	1.8	148	-146.2	80.5	-	-	-	NAF
BHP d'base	201847_WCC_62	201847	92-93	Fresh	Sandstone, very fine	-	Gp4	9.1	569	0.05	-	1.5	70.1	-68.6	45.8	-	-	-	NAF
BHP d'base	201847_WC_21	201847	94.16-94.22	Fresh	Siltstone	-	Gp4	9.2	365	0.06	-	1.8	24	-22.2	13.1	-	-	-	NAF
BHP d'base	201847_WC_22	201847	95-95.07	Fresh	Siltstone	-	Gp4	8.6	340	0.26	0.26	8.0	24.4	-16.4	3.1	7.9	<0.1	<0.1	NAF
BHP d'base	201847_WC_23	201847	95.89-95.94	Fresh	Siltstone	-	Gp4	9.0	341	0.1	0.03	3.1	8.2	-5.1	2.7	7.3	<0.1	<0.1	NAF
BHP d'base	201847_WC_24	201847	99.5-99.56	Fresh	Carbonaceous Siltstone	-	Gp5	8.5	295	0.08	-	2.5	12	-9.6	4.9	-	-	-	NAF
								ABCC ANC = 3.4 kg H2SO4/t; % of ANC @ pH4.5 = 28%; Carb. neut. mineral = Fe-Dol. & Sid.											

pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity [calculated from Total S]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential [calculated from MPA and ANC]; NAG = Net acid generation.
Selected samples from the BHP (2020) program underwent Extended Boil NAG test or Acid Buffering Characterisation Curve (ABCC) test to refine the acid classification. Refer to report body for explanation of results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5	S	Scr	MPA	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG@ pH4.5	NAG@ pH7.0	Acid Classification
									µS/cm	%		kg H_2SO_4/t					kg H_2SO_4/t		
Baker, 2013	GT478_01	127478	4.58-4.87	Weathered	Siltstone	-	Gp2	7.9	1,100	-	-	-	4.9	-	-	8.9	<0.5	<0.5	NAF
Baker, 2013	GT478_02	127478	5.22-5.5	Weathered	Siltstone	-	Gp2	8.0	940	-	-	-	4.9	-	-	4.6	<0.5	<0.5	Uncertain
Baker, 2013	GT478_03	127478	6.13-6.33	Weathered	Siltstone	-	Gp2	8.0	860	-	-	-	4.3	-	-	5.4	<0.5	0.7	NAF
Baker, 2013	GT478_05	127478	7.59-7.88	Distinctly	Siltstone	-	Gp2	7.6	890	-	-	-	4.3	-	-	6.3	<0.5	<0.5	NAF
Baker, 2013	GT478_06	127478	8.62-8.99	Distinctly	Sandst., v. fine; carb. wisps	-	Gp2	8.1	630	-	-	-	5.5	-	-	5.3	<0.5	<0.5	NAF
Baker, 2013	GT478_07	127478	9.8-10.16	Distinctly	Sandstone, fine-medium	-	Gp2	9.4	610	-	-	-	18	-	-	9.4	<0.5	<0.5	NAF
Baker, 2013	GT478_08	127478	10.16-10.49	Distinctly	Sandstone, fine-medium	-	Gp2	9.4	650	-	-	-	57	-	-	9.4	<0.5	<0.5	NAF
Baker, 2013	GT478_11	127478	12.77-13.09	Fresh	Carbonaceous Siltstone	-	Gp5	8.9	780	-	-	-	21	-	-	8.2	<0.5	<0.5	NAF
Baker, 2013	GT478_12	127478	13.29-13.69	Fresh	Siltstone; trace carb.	-	Gp4	8.5	920	-	-	-	67	-	-	8.7	<0.5	<0.5	NAF
Baker, 2013	GT478_15	127478	16.42-16.62	Fresh	Siltstone	-	Gp4	8.4	660	-	-	-	24	-	-	8.3	<0.5	<0.5	NAF
Baker, 2013	GT478_16	127478	17.7-17.97	Fresh	Sandst., f.-m.; minor Siltst.	-	Gp4	8.8	750	-	-	-	6.7	-	-	8.3	<0.5	<0.5	NAF
Baker, 2013	GT478_17	127478	18.17-18.52	Fresh	Sandstone, fine-medium	-	Gp4	9.1	760	-	-	-	94	-	-	8.5	<0.5	<0.5	NAF
Baker, 2013	GT478_19	127478	21.19-21.56	Fresh	Siltstone; minor carb.	-	Gp4	9.0	590	-	-	-	1.8	-	-	6.6	<0.5	<0.5	NAF
Baker, 2013	GT478_24	127478	27.06-27.41	Fresh	Siltstone; with Sandstone	-	Gp4	8.6	600	-	-	-	6.1	-	-	7.4	<0.5	<0.5	NAF
Baker, 2013	GT479_002	127479	4.907-5.167	Distinctly	Sandstone, fine-medium	-	Gp2	5.7	750	-	-	-	3.1	-	-	5.5	<0.5	0.7	NAF
Baker, 2013	GT479_004	127479	6.947-7.217	Weathered	Sandst., med.; minor carb.	-	Gp2	9.4	760	-	-	-	8.6	-	-	9.1	<0.5	<0.5	NAF
Baker, 2013	GT479_006	127479	11.027-11.747	Slightly	Sandstone, v. fine	-	Gp2	8.1	600	-	-	-	5.5	-	-	5.8	<0.5	<0.5	NAF
Baker, 2013	GT479_008	127479	14.407-14.677	Slightly	Sandst., v. fine; minor Siltst.	-	Gp2	8.1	420	-	-	-	6.7	-	-	7.3	<0.5	<0.5	NAF
Baker, 2013	GT479_010	127479	17.247-17.567	Fresh	Sandst., fine; minor Siltst.	-	Gp4	9.2	660	-	-	-	4.3	-	-	4.2	<0.5	<0.5	PAF
Baker, 2013	GT479_014	127479	23.318-23.698	Fresh	Sandstone, f.-med.; clayey	-	Gp4	8.2	890	-	-	-	15	-	-	8.1	<0.5	<0.5	NAF
Baker, 2013	GT479_015	127479	26.178-26.538	Fresh	Sandstone, fine	-	Gp4	8.9	670	-	-	-	17	-	-	9.1	<0.5	<0.5	NAF
Baker, 2013	GT479_017	127479	31.81-32.08	Fresh	Sandst., fine; minor Siltst.	-	Gp4	9.1	520	-	-	-	100	-	-	8.6	<0.5	<0.5	NAF
Baker, 2013	GT480_003	127480	13.95-14.32	Slightly	Sandst., v. fine; minor Siltst.	-	Gp2	6.6	380	-	-	-	1.8	-	-	3.5	<0.5	5.7	PAF
Baker, 2013	GT480_004	127480	17.42-17.71	Fresh	Coal, 40-60% bright	DY Lower	Gp6	6.5	56	-	-	-	5.5	-	-	2.2	26.0	45.0	Uncertain
Baker, 2013	GT480_008	127480	22.25-22.56	Fresh	Sandst., fine; part Siltst.	-	Gp4	9.1	360	-	-	-	8.6	-	-	5.2	<0.5	<0.5	NAF
Baker, 2013	GT480_010	127480	26.31-26.65	Fresh	Sandstone, med.-coarse	-	Gp4	9.4	390	-	-	-	68	-	-	8.0	<0.5	<0.5	NAF
Baker, 2013	GT481_001	127481	4.7-5.12	Distinctly	Sandstone, med.-coarse	-	Gp2	7.9	680	-	-	-	3.7	-	-	3.9	<0.5	2.2	PAF
Baker, 2013	GT481_005	127481	28.134-28.484	Fresh	Sandstone, medium	-	Gp4	9.3	270	-	-	-	47	-	-	7.2	<0.5	<0.5	NAF
Baker, 2013	GT481_013	127481	38.857-39.137	Fresh	Sandstone, very fine;	-	Gp4	9.2	310	-	-	-	12	-	-	6.6	<0.5	<0.5	NAF
Baker, 2013	GT481_014	127481	39.137-39.477	Fresh	Sandstone, fine	-	Gp4	9.3	330	-	-	-	12	-	-	6.9	<0.5	<0.5	NAF
Baker, 2013	GT481_016	127481	42.76-43.05	Fresh	Sandstone, fine	-	Gp4	9.5	400	-	-	-	37	-	-	7.5	<0.5	<0.5	NAF
Baker, 2013	GT481_017	127481	43.72-44.02	Fresh	Sandstone, fine	-	Gp4	9.3	400	-	-	-	15	-	-	7.0	<0.5	<0.5	NAF
Baker, 2013	GT481_018	127481	47.57-47.81	Fresh	Sandstone, fine	-	Gp4	9.5	440	-	-	-	36	-	-	7.7	<0.5	<0.5	NAF

Grey rows are seam samples. pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity [calculated from Total S]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential [calculated from MPA and ANC]; NAG = Net acid generation. Refer to report body for explanation of results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5	S	ScR	MPA	ANC	NAPP	ANC/MPA ratio	Acid Classification
									µS/cm	%		kg H_2SO_4/t				
URS, 2007	97951	48616	0-4	Extremely	Clay	-	Gp1	7.0	1860	0.02	-	0.6	10.5	-9.9	17.1	NAF
URS, 2007	97956	48616	20.5-23	Fresh	Sandstone, fine-medium	-	Gp4	8.5	571	0.02	-	0.6	210	-209.4	342.9	NAF
URS, 2007	97959	48616	38.5-42	Fresh	Siltstone; minor mudstone	-	Gp4	8.2	532	0.07	-	2.1	37.4	-35.3	17.4	NAF
URS, 2007	97960	48616	42-43.49	Fresh	Carbonaceous Siltstone	-	Gp5	8.0	441	1.05	-	32.2	9.3	22.9	0.3	PAF
URS, 2007	97963	48616	48.68-50	Fresh	Claystone	-	Gp4	7.7	466	0.05	-	1.5	41	-39.5	26.8	NAF
URS, 2007	97964	48616	50-50.5	Fresh	Carbonaceous Siltstone	-	Gp5	7.9	388	0.19	-	5.8	10.2	-4.4	1.8	Uncertain
URS, 2007	97967	48616	61-79	Fresh	Sandst., f.-m.; minor siderite	-	Gp4	8.7	494	0.02	-	0.6	132	-131.4	215.5	NAF
URS, 2007	97968	48616	79-93.11	Fresh	Sandst., fine; minor siderite	-	Gp4	7.9	923	0.04	-	1.2	112	-110.8	91.4	NAF
URS, 2007	97973	48616	122.31-130.32	Fresh	Sandst.; minor siltst. & coal	-	Gp4	8.4	833	0.07	-	2.1	46	-43.9	21.5	NAF
URS, 2007	97975	48616	131.1-133	Fresh	Siltstone; trace carb.	-	Gp4	8.2	768	0.07	-	2.1	39.1	-37.0	18.2	NAF
URS, 2007	97976	48616	137.9-138.1	Fresh	Coal	DY Upper	Gp6	8.2	594	0.06	-	1.8	41.4	-39.6	22.5	NAF
URS, 2007	97977	48616	138.1-144.7	Fresh	Sandstone, fine	-	Gp4	8.3	700	0.03	-	0.9	34.7	-33.8	37.8	NAF
URS, 2007	97978	48616	144.7-149	Fresh	Siltstone	-	Gp4	8.2	773	0.03	-	0.9	36.3	-35.4	39.5	NAF
URS, 2007	97979	48616	149-157	Fresh	Sandst., f.-m.; minor Siltst.	-	Gp4	8.6	703	0.03	-	0.9	181	-180.1	197.0	NAF
URS, 2007	97981	48616	163-165	Fresh	Mudstone	-	Gp4	8.2	744	0.06	-	1.8	41	-39.2	22.3	NAF
URS, 2007	97982	48616	165-171.25	Fresh	Sandst., f.-m.; minor coal	-	Gp4	8.3	759	0.03	-	0.9	54.4	-53.5	59.2	NAF
URS, 2007	97984	48616	171.75-175.5	Fresh	Siltstone; minor Sandst.	-	Gp4	8.3	709	0.06	-	1.8	46	-44.2	25.0	NAF
URS, 2007	97988	48616	187-189	Fresh	Siltstone	-	Gp4	8.3	748	0.05	-	1.5	64	-62.5	41.8	NAF
URS, 2007	97989	48616	189-196	Fresh	Sandstone, very fine	-	Gp4	8.4	638	0.05	-	1.5	44.8	-43.3	29.3	NAF
URS, 2007	97990	48616	196-200.87	Fresh	Sandstone, very fine	-	Gp4	8.3	673	0.05	-	1.5	43.1	-41.6	28.1	NAF
URS, 2007	97992	48616	205.34-209.99	Fresh	Sandst., v. fine; minor coal	-	Gp4	8.4	738	0.06	-	1.8	71.8	-70.0	39.1	NAF
URS, 2007	97993	48616	209.99-211.5	Fresh	Carbonaceous Siltstone	-	Gp5	8.2	702	0.07	-	2.1	39.3	-37.2	18.3	NAF
URS, 2007	97995	48617	0-3	Extremely	Clay	-	Gp1	7.8	1500	0.03	-	0.9	56.3	-55.4	61.3	NAF
URS, 2007	97998	48617	12-21	Weathered	Siltst.; lignitic & ferruginous	-	Gp2	7.7	1370	0.07	-	2.1	35.8	-33.7	16.7	NAF
URS, 2007	98000	48617	27-30	Fresh	Sandstone, v. fine; clayey	-	Gp4	8.4	721	0.03	-	0.9	91.4	-90.5	99.5	NAF
URS, 2007	113177	48617	30-40.64	Fresh	Siltstone; sandy laminae	-	Gp4	8.4	725	0.03	-	0.9	88.8	-87.9	96.7	NAF
URS, 2007	113179	48617	46.02-51	Fresh	Sandst., v. fine; & Siltst.	-	Gp4	8.1	798	0.08	-	2.5	60.1	-57.7	24.5	NAF
URS, 2007	113180	48617	51-55	Fresh	Sandstone, fine	-	Gp4	8.3	625	0.03	-	0.9	66	-65.1	71.8	NAF
URS, 2007	113181	48617	55-73.14	Fresh	Sandst., v. fine; sandy lam.	-	Gp4	8.6	576	0.03	-	0.9	110	-109.1	119.7	NAF
URS, 2007	113183	48617	76.94-82	Fresh	Sandstone, very fine	-	Gp4	8.4	389	0.06	-	1.8	39.1	-37.3	21.3	NAF
URS, 2007	113184	48617	82-98.8	Fresh	Sandst., f.-m.; part sideritic	-	Gp4	8.3	621	0.04	-	1.2	80.3	-79.1	65.6	NAF
URS, 2007	113192	48617	120.53-141.2	Fresh	Sandstone, fine-medium	-	Gp4	8.5	582	0.05	-	1.5	41.6	-40.1	27.2	NAF
URS, 2007	113196	48617	155.52-168	Fresh	Sandstone, vf.; trace carb.	-	Gp4	8.4	498	0.08	-	2.5	50.8	-48.4	20.7	NAF
URS, 2007	113198	48617	175.17-181	Fresh	Sandstone, very fine	-	Gp4	8.4	490	0.05	-	1.5	82.7	-81.2	54.0	NAF

Grey rows are seam samples. pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity [calculated from Total S]; ANC = Acid neutralising capacity;
NAPP = Net acid producing potential [calculated from MPA and ANC]. Refer to report body for explanation of results and acid classification.

Table B1 (cont.) Acid-Base Characteristics of Potential Spoil and Coal

Data Source	Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Seam Group	Material Group	pH 1:5	EC1:5	S	SCR	MPA	ANC	NAPP	ANC/MPA ratio	Acid Classification
									µS/cm	%		kg H_2SO_4/t				
URS, 2007	113200	48618	3-6	Weathered	Siltstone; clayey	-	Gp2	6.9	1970	0.01	-	0.3	8.7	-8.4	28.4	NAF
URS, 2007	113204	48618	36.11-54	Fresh	Sandst., fine; minor mudst.	-	Gp4	8.3	677	0.05	-	1.5	33.6	-32.1	21.9	NAF
URS, 2007	113205	48618	54-60	Fresh	Siltstone	-	Gp4	8.2	568	0.04	-	1.2	30.2	-29.0	24.7	NAF
URS, 2007	113206	48618	60-67.5	Fresh	Sandstone, vf.; micaceous	-	Gp4	8.3	518	0.04	-	1.2	37.3	-36.1	30.4	NAF
URS, 2007	113209	48618	76.09-81.75	Fresh	Siltst.; & Sandst., micaceous	-	Gp4	7.9	660	0.03	-	0.9	68.8	-67.9	74.9	NAF
URS, 2007	113211	48618	88-99.75	Fresh	Sandstone, vf.; micaceous	-	Gp4	8.2	565	0.05	-	1.5	176	-174.5	114.9	NAF
URS, 2007	113213	48618	103.79-114	Fresh	Sandstone, vf.; micaceous	-	Gp4	8.5	542	0.04	-	1.2	24	-22.8	19.6	NAF
URS, 2007	113218	48619	18-24	Fresh	Siltst.; minor sandst.	-	Gp4	8.5	841	0.03	-	0.9	32.6	-31.7	35.5	NAF
URS, 2007	113221	48619	38.67-54	Fresh	Sandstone, fine; trace coal	-	Gp4	8.4	576	0.03	-	0.9	42	-41.1	45.7	NAF
URS, 2007	113224	48619	62.38-78	Fresh	Sandstone, fine-medium	-	Gp4	8.7	581	0.04	-	1.2	140	-138.8	114.3	NAF
URS, 2007	113278	48619	101-103	Fresh	Sandstone, fine	-	Gp4	8.2	604	0.04	-	1.2	39.7	-38.5	32.4	NAF
URS, 2007	113281	48619	110.4-125.8	Fresh	Sandst., v. fine; micaceous	-	Gp4	8.4	637	0.06	-	1.8	56.3	-54.5	30.6	NAF
URS, 2007	113285	48626	2-4	Weathered	Sandstone, fine-medium	-	Gp2	8.4	1100	0.01	-	0.3	42.9	-42.6	140.1	NAF
URS, 2007	113286	48626	4-12.31	Weathered	Sandst., v. fine; minor carb.	-	Gp2	8.3	1710	0.03	-	0.9	68	-67.1	74.0	NAF
URS, 2007	113288	48626	17.85-24	Fresh	Sandstone, very fine	-	Gp4	8.4	1080	0.16	-	4.9	47.6	-42.7	9.7	NAF
URS, 2007	113291	48626	27.7-44.35	Fresh	Sandst., vf.; some Mudst.	-	Gp4	8.4	814	0.06	-	1.8	30.2	-28.4	16.4	NAF
URS, 2007	113293	48626	48.69-61.45	Fresh	Siltstone; minor Mudst.	-	Gp4	8.5	854	0.09	-	2.8	31.3	-28.5	11.4	NAF
URS, 2007	113295	48626	66.56-71	Fresh	Sandstone, very fine	-	Gp4	8.2	815	0.08	-	2.5	33	-30.6	13.5	NAF
URS, 2007	113296	48626	71-73	Fresh	Sandstone, fine	-	Gp4	8.4	588	0.14	-	4.3	43	-38.7	10.0	NAF
URS, 2007	113297	48626	73-76	Fresh	Mudstone	-	Gp4	8.4	907	0.08	-	2.5	37.2	-34.8	15.2	NAF
URS, 2007	113298	48627	0-2	Extremely	Clay	-	Gp1	8.6	1240	0.01	-	0.3	32.5	-32.2	106.1	NAF
URS, 2007	113299	48627	2-7	Weathered	Carb. Siltst.; clayey coaly	-	Gp3	8.4	918	<0.01	-	0.2	88.2	-88.0	576.0	NAF
URS, 2007	113300	48627	7-24	Fresh	Sandstone, fine-medium	-	Gp4	8.4	601	0.05	-	1.5	100	-98.5	65.3	NAF
URS, 2007	113302	48627	29.37-36.55	Fresh	Sandst., vf.; Siltst. & Mudst.	-	Gp4	8.3	838	0.28	-	8.6	31.9	-23.3	3.7	NAF
URS, 2007	113304	48627	37.35-50.5	Fresh	Mudstone and Siltstone	-	Gp4	8.5	886	0.06	-	1.8	35	-33.2	19.0	NAF
URS, 2007	113307	48627	60.24-73.62	Fresh	Siltst.; minor Sandst.	-	Gp4	8.5	621	0.12	-	3.7	31.3	-27.6	8.5	NAF
URS, 2007	113309	48627	77.15-79	Fresh	Carb. Siltst. & Carb. Mudst.	-	Gp5	8.5	743	0.17	-	5.2	30.2	-25.0	5.8	NAF

pH and EC on 1:5 water extracts [on sample pulp]; MPA = Maximum potential acidity [calculated from Total S]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential [calculated from MPA and ANC];
Refer to report body for explanation of results and acid classification.

Table B2. Total Element Concentrations and Geochemical Abundance Indices for Potential Spoil and Coal

Sample ID:	201537 _WCC_53	201847 _WCC_26	201537 _WCC_56	201537 _WCC_59	201537 _WCC_63	201847 _WCC_28	201847 _WCC_31	201847 _WCC_33		201537 _WCC_53	201847 _WCC_26	201537 _WCC_56	201537 _WCC_59	201537 _WCC_63	201847 _WCC_28	201847 _WCC_31	201847 _WCC_33
Waste Type:	Tertiary (Gp1)		Permian, w eathered, non-carbonaceous (Gp2)							Tertiary (Gp1)		Permian, w eathered, non-carbonaceous (Gp2)					
Lithology:	Gravelly Sand	Clayey Sand	Sandstone, very fine	Sandstone, fine	Sandstone, fine	Sandstone, fine; clayey	Sandstone, very fine	Sandstone, very fine	Median Soil	Gravelly Sand	Clayey Sand	Sandst., v. fine	Sandst., fine	Sandst., fine	Sandst., f.; clayey	Sandst., v. fine	Sandst., v. fine
Element	4acid	4acid	4acid	4acid	4acid	4acid	4acid	2acid	Abundance	Geochemical Abundance Index (GAI)							
Ag	0.062	0.033	0.035	0.049	0.06	0.059	0.102	0.052	0.05	-	-	-	-	-	-	-	-
Al	5.82%	6.84%	6.2%	7.47%	7.34%	7.75%	10.55%	0.77%	7.1%	-	-	-	-	-	-	-	-
As	9.83	5.91	3.78	6.09	9	9.99	13.55	`	6	-	-	-	-	-	-	1	1
Ba	439	231	179	232	198	150	305	83.6	500	-	-	-	-	-	-	-	-
Be	1.56	1.43	1.36	1.34	1.48	1.36	2.12	0.98	0.3	2	2	2	2	2	2	2	1
Bi	0.226	0.137	0.227	0.106	0.214	0.129	0.576	0.457	0.2	-	-	-	-	-	-	1	1
Ca	1.02%	3.86%	1.28%	4.82%	3.11%	1.37%	0.55%	0.27%	1.5%	-	1	-	1	-	-	-	-
Cd	0.052	0.064	0.027	0.101	0.066	0.086	0.094	0.076	0.35	-	-	-	-	-	-	-	-
Co	20.9	17.4	17.25	25.6	22.3	17.85	5.71	8.31	8	1	1	1	1	1	1	-	-
Cr	98	50.9	40.9	83.6	66.3	55.9	33	5.33	70	-	-	-	-	-	-	-	-
Cu	23.6	14.95	42.4	46.3	54.6	14.45	41.9	37.3	30	-	-	-	-	-	-	-	-
Fe	5.83%	4.19%	3.82%	5.44%	4.46%	3.33%	1.25%	2.11%	4%	-	-	-	-	-	-	-	-
Hg	0.016	0.02	0.052	0.012	0.026	0.019	0.151	0.067	0.06	-	-	-	-	-	-	1	-
K	0.64%	1.19%	0.92%	0.98%	1.21%	1.59%	2.6%	0.24%	1.4%	-	-	-	-	-	-	-	-
Li	24	19.3	22.7	33.4	27.7	18.5	38.6	5.8	25	-	-	-	-	-	-	-	-
Mg	0.58%	1.37%	1.38%	2.2%	1.52%	1.07%	0.71%	0.36%	0.5%	-	1	1	2	1	1	-	-
Mn	892	1345	596	1245	873	864	58.7	281	1000	-	-	-	-	-	-	-	-
Mo	0.74	0.45	1.21	1.12	1.88	0.61	1.89	0.88	1.2	-	-	-	-	-	-	-	-
Na	0.239%	1.375%	0.914%	1.735%	1.315%	1.28%	0.208%	0.143%	0.5%	-	1	-	1	1	1	-	-
Ni	49.5	36	31.1	35.5	34.9	35.2	15.25	23.4	50	-	-	-	-	-	-	-	-
P	0.04%	0.077%	0.115%	0.125%	0.126%	0.09%	0.016%	0.017%	0.08%	-	-	-	-	-	-	-	-
Pb	17.65	11.65	10.4	9.24	10.65	13	24.3	20.2	35	-	-	-	-	-	-	-	-
S	0.03%	0.01%	0.01%	0.01%	0.02%	0.01%	0.03%	0.01%	0.07%	-	-	-	-	-	-	-	-
Sb	0.82	0.42	0.44	0.44	0.48	0.51	1.55	0.238	1	-	-	-	-	-	-	-	-
Se	0.417	0.033	0.066	0.024	0.054	0.045	0.49	0.785	0.4	-	-	-	-	-	-	-	-
Sn	1.7	1.74	1.51	1.4	1.55	1.86	3.22	0.51	4	-	-	-	-	-	-	-	-
Sr	159	205	104.5	123.5	128	131.5	170	63.1	250	-	-	-	-	-	-	-	-
Te	0.071	0.018	0.059	0.024	0.064	0.02	0.154	0.091	0.02	2	-	2	1	2	-	3	3
Th	7.94	7.07	6.64	6.28	6.72	7.67	14.35	5.11	9	-	-	-	-	-	-	-	-
Ti	0.404%	0.411%	0.356%	0.553%	0.464%	0.471%	0.425%	0.001%	0.5%	-	-	-	-	-	-	-	-
Tl	0.388	0.44	0.349	0.323	0.399	0.428	0.786	0.052	0.2	-	1	-	-	-	1	1	-
U	2.01	1.77	1.74	1.83	1.84	1.9	3.85	0.429	2	-	-	-	-	-	-	-	-
V	114	104	120.5	198	160	111	101.5	14.3	90	-	-	-	1	-	-	-	-
W	1.39	1.235	1.235	1.165	1.315	1.415	1.995	0.027	1.5	-	-	-	-	-	-	-	-
Zn	64.7	69	58.3	86.3	84.3	81.1	36.9	50.1	90	-	-	-	-	-	-	-	-
Zr	109.5	112.5	108.5	124.5	120.5	119.5	196	4.6	400	-	-	-	-	-	-	-	-

All data from BHP geochemical database from samples collected by BMA or BHP. 4acid/2acid = 4- or 2-acid digest. ICP-MS analysis. All results mg/kg except w here show n.
Results for selected minor elements (Ce, Cs, Ga, Ge, Hf, In, La, Nb, Rb, Re, Sc, Ta, Y) not show n, and all have GAI values of 1 or <1.

Table B2 (cont.) Total Element Concentrations and Geochemical Abundance Indices for Potential Spoil and Coal

Sample ID:	201537 _WCC_66	201537 _WCC_70	201537-R01 _WC_52	201537 _WC_01	201537 _WC_05	201537 _WC_07	201537 _WC_09	201537 _WC_11	
Waste Type:	Permian, fresh, non-carbonaceous (Gp4)								
Lithology:	Sandstone, fine	Sandstone, very fine	Tuff	Sandstone, fine	Sandstone, very fine	Siltstone	Siltstone	Siltstone; trace calcite	*Median Soil*
Element	4acid	4acid	4acid	4acid	4acid	4acid	4acid	4acid	*Abundance*
Ag	0.082	0.083	0.046	0.089	0.052	0.105	0.072	0.078	0.05
Al	8.37%	9.11%	5.7%	8.76%	8.49%	10.3%	8.48%	7.97%	7.1%
As	9.28	3.61	1.45	7.29	16.3	15.1	3.52	1.6	6
Ba	174	132	1190	199	182	222	254	216	500
Be	1.63	1.99	0.9	1.82	1.35	2.09	2.24	2.39	0.3
Bi	0.346	0.474	0.209	0.276	0.143	0.351	0.566	0.416	0.2
Ca	1.76%	0.92%	0.09%	0.86%	2.59%	0.32%	0.23%	1.38%	1.5%
Cd	0.098	0.122	0.024	0.072	0.093	0.148	0.006	0.126	0.35
Co	21.7	15.7	2.22	27.9	18.4	13.4	4.89	12.15	8
Cr	57.4	47.2	1.6	90.1	133.5	82.8	49.4	49.1	70
Cu	78.7	62.8	4.17	44.3	33.1	49.9	33.4	34.7	30
Fe	5.18%	4.8%	0.43%	3.23%	3.13%	1.07%	1.49%	7.19%	4%
Hg	0.048	0.048	0.047	0.043	0.04	0.119	0.097	0.069	0.06
K	1.77%	2.6%	1.3%	2.34%	1.95%	2.2%	2.24%	2.25%	1.4%
Li	28	27.7	14.9	23.4	14.4	31.7	32.7	25.1	25
Mg	1.45%	1.31%	0.47%	1.29%	1.52%	0.58%	0.72%	1.18%	0.5%
Mn	601	553	8.4	422	829	73.3	97.7	1840	1000
Mo	1.75	1.27	1.82	1.43	0.74	1.43	0.49	1.49	1.2
Na	0.923%	0.101%	0.023%	0.174%	1.335%	0.103%	0.105%	0.194%	0.5%
Ni	34	30.4	6.9	105.5	104	58.5	37.8	49.6	50
P	0.142%	0.121%	0.006%	0.087%	0.16%	0.113%	0.078%	0.404%	0.08%
Pb	15.45	18.9	15.5	14.5	10.05	21.2	18.05	19.7	35
S	0.05%	0.05%	0.07%	0.04%	0.05%	0.05%	0.05%	0.04%	0.07%
Sb	0.54	0.52	0.31	0.52	0.61	0.67	0.31	0.53	1
Se	0.495	0.592	0.075	0.255	0.121	0.623	0.323	0.489	0.4
Sn	1.99	2.74	1.56	2.22	1.49	2.89	3.12	2.48	4
Sr	179.5	302	98.5	187.5	304	193	345	208	250
Te	0.138	0.158	0.007	0.046	0.027	0.068	0.12	0.071	0.02
Th	8.54	11	11.75	9.4	5.66	11.95	12	11.55	9
Ti	0.51%	0.47%	0.144%	0.448%	0.417%	0.563%	0.406%	0.312%	0.5%
Tl	0.558	0.779	0.28	0.587	0.419	0.573	0.705	0.686	0.2
U	2.37	2.71	2.75	2.31	1.67	3.28	2.76	3.19	2
V	157	124.5	12.1	110	108.5	131.5	102.5	97.9	90
W	1.475	1.85	1.045	1.63	1.04	2.24	1.96	1.78	1.5
Zn	76.2	87.4	12.1	49.2	72.9	105	20.5	82.3	90
Zr	153	150	72.7	141	111.5	162	145.5	153	400

Sample ID:	201537 _WCC_66	201537 _WCC_70	201537-R01 _WC_52	201537 _WC_01	201537 _WC_05	201537 _WC_07	201537 _WC_09	201537 _WC_11
Waste Type:	Permian, fresh, non-carbonaceous (Gp4)							
Lithology:	Sandstone, fine	Sandstone, very fine	Tuff	Sandstone, fine	Sandstone, very fine	Siltstone	Siltstone	Siltstone; trace calc.
Element	Geochemical Abundance Index (GAI)							
Ag	-	-	-	-	-	-	-	-
Al	-	-	-	-	-	-	-	-
As	-	-	-	-	1	1	-	-
Ba	-	-	1	-	-	-	-	-
Be	2	2	1	2	2	2	2	2
Bi	-	1	-	-	-	-	1	-
Ca	-	-	-	-	-	-	-	-
Cd	-	-	-	-	-	-	-	-
Co	1	-	-	1	1	-	-	-
Cr	-	-	-	-	-	-	-	-
Cu	1	-	-	-	-	-	-	-
Fe	-	-	-	-	-	-	-	-
Hg	-	-	-	-	-	-	-	-
K	-	-	-	-	-	-	-	-
Li	-	-	-	-	-	-	-	-
Mg	1	1	-	1	1	-	-	1
Mn	-	-	-	-	-	-	-	-
Mo	-	-	-	-	-	-	-	-
Na	-	-	-	-	1	-	-	-
Ni	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	2
Pb	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-
Sb	-	-	-	-	-	-	-	-
Se	-	-	-	-	-	-	-	-
Sn	-	-	-	-	-	-	-	-
Sr	-	-	-	-	-	-	-	-
Te	3	3	-	2	1	2	3	2
Th	-	-	-	-	-	-	-	-
Ti	-	-	-	-	-	-	-	-
Tl	1	1	-	1	-	1	1	1
U	-	-	-	-	-	-	-	-
V	-	-	-	-	-	-	-	-
W	-	-	-	-	-	-	-	-
Zn	-	-	-	-	-	-	-	-
Zr	-	-	-	-	-	-	-	-

All data from BHP geochemical database from samples collected by BMA or BHP. 4acid = 4-acid digest. ICP-MS analysis. All results mg/kg except w here show n.
Results for selected minor elements (Ce, Cs, Ga, Ge, Hf, In, La, Nb, Rb, Re, Sc, Ta, Y) not show n, and all have GAI values of 1 or <1.

Table B2 (cont.) Total Element Concentrations and Geochemical Abundance Indices for Potential Spoil and Coal

Sample ID:	201537 _WC_15	201537 _WC_21	201537 _WC_32	201537 _WC_35	201537 _WC_41	201537 _WC_47	201847 _WCC_37	201847 _WCC_40		201537 _WC_15	201537 _WC_21	201537 _WC_32	201537 _WC_35	201537 _WC_41	201537 _WC_47	201847 _WCC_37	201847 _WCC_40
Waste Type:	Permian, fresh, non-carbonaceous (Gp4)									Permian, fresh, non-carbonaceous (Gp4)							
Lithology:	Siltstone	Sandstone, fine-med.	Sandstone, fine-med.	Sandstone, fine-med.	Siltstone	Siltstone	Sandstone, fine	Sandstone, fine	*Median Soil*	Siltstone	Sandstone, fine-med.	Sandstone, fine-med.	Sandstone, fine-med.	Siltstone	Siltstone	Sandstone, fine	Sandstone, fine
Element	4acid	4acid	4acid	4acid	4acid	4acid	4acid	4acid	*Abundance*	Geochemical Abundance Index (GAI)							
Ag	0.126	0.123	0.032	0.047	0.318	0.122	0.073	0.054	0.05	1	1	-	-	2	1	-	-
Al	9.23%	8.59%	5.78%	0.61%	11.4%	9.58%	6.73%	6.2%	7.1%	-	-	-	-	-	-	-	-
As	15.05	15.05	2.89	11.95	13.45	16.55	6.64	7.28	6	1	1	-	-	1	1	-	-
Ba	164	134	172	78.8	195	228	126	128	500	-	-	-	-	-	-	-	-
Be	1.88	1.57	1.29	0.94	1.92	2.26	1.25	1.36	0.3	2	2	2	1	2	2	1	2
Bi	0.527	0.367	0.231	0.192	0.519	0.454	0.147	0.133	0.2	1	-	-	-	1	1	-	-
Ca	0.31%	0.64%	0.11%	0.43%	0.22%	0.26%	1.7%	2.09%	1.5%	-	-	-	-	-	-	-	-
Cd	0.17	0.435	0.031	0.25	0.223	0.199	0.082	0.062	0.35	-	-	-	-	-	-	-	-
Co	19.25	12.35	2.73	14.5	10.45	5.75	16.45	34.3	8	1	-	-	-	-	-	-	2
Cr	49	69.5	38.3	11.5	3.3	45.7	43.4	57.5	70	-	-	-	-	-	-	-	-
Cu	57.3	55.9	17.75	27.6	20.9	33.8	18.45	17.85	30	-	-	-	-	-	-	-	-
Fe	2.26%	1.92%	0.75%	2.64%	1.35%	1.64%	3.08%	5.87%	4%	-	-	-	-	-	-	-	-
Hg	0.073	0.089	0.016	0.042	0.193	0.07	0.04	0.039	0.06	-	-	-	-	1	-	-	-
K	2.31%	1.78%	1.5%	0.21%	2.14%	2.17%	1.36%	1.23%	1.4%	-	-	-	-	-	-	-	-
Li	31.8	32.8	16.2	5.2	25.7	42.1	16.9	15.7	25	-	-	-	-	-	-	-	-
Mg	0.91%	0.71%	0.28%	0.34%	0.61%	0.46%	0.85%	1%	0.5%	-	-	-	-	-	-	-	-
Mn	175	237	52.4	1050	93.8	247	766	1725	1000	-	-	-	-	-	-	-	-
Mo	2.29	0.69	0.35	0.63	7.41	0.89	0.87	1.43	1.2	-	-	-	-	2	-	-	-
Na	0.852%	0.81%	1.425%	0.077%	0.336%	0.534%	2.02%	2.04%	0.5%	-	-	1	-	-	-	1	1
Ni	47.4	36	12.85	23	14.9	18.35	41.5	70.8	50	-	-	-	-	-	-	-	-
P	0.097%	0.073%	0.008%	0.04%	0.017%	0.06%	0.065%	0.076%	0.08%	-	-	-	-	-	-	-	-
Pb	27.8	19.85	17.5	15.9	33	26.4	11.55	11.3	35	-	-	-	-	-	-	-	-
S	0.07%	0.12%	0.03%	0.02%	0.07%	0.08%	0.03%	0.04%	0.07%	-	-	-	-	-	-	-	-
Sb	0.93	1.24	0.34	0.207	3.18	0.75	0.78	0.63	1	-	-	-	-	1	-	-	-
Se	0.717	0.658	0.279	0.189	0.848	0.749	0.071	0.055	0.4	-	-	-	-	-	-	-	-
Sn	2.88	2.73	2.28	0.45	5.41	3.75	1.72	1.6	4	-	-	-	-	-	-	-	-
Sr	231	261	120.5	101	238	202	165.5	175	250	-	-	-	-	-	-	-	-
Te	0.173	0.094	0.032	0.031	0.052	0.067	0.024	0.02	0.02	4	3	1	1	2	2	1	-
Th	12.6	11.85	9.36	2.89	32.7	15.75	7.66	6.75	9	-	-	-	-	1	-	-	-
Ti	0.497%	0.441%	0.365%	0.003%	0.397%	0.457%	0.337%	0.338%	0.5%	-	-	-	-	-	-	-	-
Tl	0.711	0.602	0.414	0.03	0.864	0.68	0.366	0.336	0.2	1	1	-	-	2	1	-	-
U	3.01	3.21	2.11	0.36	9.79	3.83	1.81	1.66	2	-	-	-	-	2	-	-	-
V	138	128.5	41.7	34.2	10.7	98.7	97.5	113.5	90	-	-	-	-	-	-	-	-
W	2.16	1.92	1.43	0.034	2.62	2.89	1.445	1.345	1.5	-	-	-	-	-	-	-	-
Zn	100	80.1	23.2	47.5	135.5	100.5	59.1	59	90	-	-	-	-	-	-	-	-
Zr	158.5	170.5	116.5	3.68	362	166.5	108.5	103	400	-	-	-	-	-	-	-	-

All data from BHP geochemical database from samples collected by BMA or BHP. 4acid = 4-acid digest. ICP-MS analysis. All results mg/kg except where shown.
Results for selected minor elements (Ce, Cs, Ga, Ge, Hf, In, La, Nb, Rb, Re, Sc, Ta, Y) not shown, and all have GAI values of 1 or <1.

Table B2 (cont.) Total Element Concentrations and Geochemical Abundance Indices for Potential Spoil and Coal

Sample ID:	201847 _WCC_43	201847 _WC_02	201847 _WC_04	201847 _WC_11	201847 _WC_13	201847 _WC_16	201847 _WC_18	201847 _WC_20	201847 _WC_22		201847 _WCC_43	201847 _WC_02	201847 _WC_04	201847 _WC_11	201847 _WC_13	201847 _WC_16	201847 _WC_18	201847 _WC_20	201847 _WC_22
Waste Type:	Permian, fresh, non-carbonaceous (Gp4)										Permian, fresh, non-carbonaceous (Gp4)								
Lithology:	Sandstone, fine	Siltstone	Siltstone; minor Py.	Siltstone	Siltstone	Siltstone	Siltstone	Siltstone	Siltstone	*Median Soil*	Sandstone, fine	Siltstone	Siltstone; minor Py.	Siltstone	Siltstone	Siltstone	Siltstone	Siltstone	Siltstone
Element	4acid	4acid	4acid	4acid	4acid	4acid	4acid	4acid	4acid	*Abundance*	Geochemical Abundance Index (GAI)								
Ag	0.059	0.069	0.08	0.134	0.096	0.082	0.106	0.125	0.094	0.05	-	-	-	1	-	-	-	1	-
Al	6.59%	8.48%	9.15%	9.52%	8.55%	9.01%	10.9%	10.7%	0.37%	7.1%	-	-	-	-	-	-	-	-	-
As	7.61	8.8	2.64	6.3	9.97	10.2	2.33	2.09	16.45	6	-	-	-	-	-	-	-	-	1
Ba	116	1510	470	326	205	760	1900	297	393	500	-	1	-	-	-	-	1	-	-
Be	1.06	2.14	2.05	2.38	2.03	2.11	2.45	3.05	2.13	0.3	1	2	2	2	2	2	2	3	2
Bi	0.118	0.357	0.48	0.466	0.411	0.422	0.55	0.608	0.28	0.2	-	-	1	1	-	-	1	1	-
Ca	3.45%	0.25%	0.26%	0.18%	0.37%	0.22%	0.21%	0.11%	0.66%	1.5%	1	-	-	-	-	-	-	-	-
Cd	0.107	0.114	0.122	0.245	0.11	0.167	0.123	0.273	0.097	0.35	-	-	-	-	-	-	-	-	-
Co	15.2	19.3	6.92	5.49	11.55	6.2	7.51	11.25	12.05	8	-	1	-	-	-	-	-	-	-
Cr	64.5	59.5	44.7	43.2	45.4	47.3	37.2	31.6	6.79	70	-	-	-	-	-	-	-	-	-
Cu	19.45	38.3	40.2	33.9	31.2	33.3	39.7	34.1	20.5	30	-	-	-	-	-	-	-	-	-
Fe	2.93%	1.85%	2.57%	2.16%	3.78%	2.06%	2.48%	0.91%	13.8%	4%	-	-	-	-	-	-	-	-	1
Hg	0.028	0.076	0.089	0.12	0.061	0.074	0.076	0.159	0.097	0.06	-	-	-	-	-	-	-	1	-
K	1.3%	2.64%	2.66%	2.67%	2.32%	2.42%	2.86%	3.22%	0.17%	1.4%	-	-	-	-	-	-	-	1	-
Li	15	22.7	35.5	33.9	28.9	28.9	34.4	24	6.4	25	-	-	-	-	-	-	-	-	-
Mg	1.22%	0.81%	1.04%	0.73%	0.78%	0.68%	0.68%	0.58%	0.88%	0.5%	1	-	-	-	-	-	-	-	-
Mn	1130	138.5	137	240	667	250	547	43	3040	1000	-	-	-	-	-	-	-	-	1
Mo	0.35	1.34	1.21	0.46	1.17	0.55	0.87	2.22	0.34	1.2	-	-	-	-	-	-	-	-	-
Na	2.12%	0.412%	0.163%	0.643%	0.797%	0.852%	0.182%	0.436%	0.095%	0.5%	1	-	-	-	-	-	-	-	-
Ni	39.5	82.8	21.7	13.55	25.5	21.3	22.4	25.7	25.1	50	-	-	-	-	-	-	-	-	-
P	0.088%	0.066%	0.078%	0.039%	0.079%	0.052%	0.05%	0.018%	0.088%	0.08%	-	-	-	-	-	-	-	-	-
Pb	11.75	17.2	19.35	22.7	22.3	22.4	28.9	28.1	15.65	35	-	-	-	-	-	-	-	-	-
S	0.02%	0.09%	0.55%	0.18%	0.06%	0.08%	0.08%	0.04%	0.25%	0.07%	-	-	2	1	-	-	-	-	1
Sb	0.37	0.52	0.62	0.77	0.55	0.62	0.43	0.73	0.464	1	-	-	-	-	-	-	-	-	-
Se	0.053	0.349	0.764	0.584	0.405	0.524	0.432	0.494	0.307	0.4	-	-	-	-	-	-	-	-	-
Sn	1.65	2.88	3.45	3.59	3.11	3.43	3.66	3.47	0.46	4	-	-	-	-	-	-	-	-	-
Sr	239	175	185	175	196	191	264	150	152.5	250	-	-	-	-	-	-	-	-	-
Te	0.019	0.068	0.091	0.08	0.074	0.072	0.083	0.121	0.033	0.02	-	2	3	2	2	2	2	3	1
Th	6.79	11.85	13.1	14.55	13.15	13.45	18.3	15.6	4.15	9	-	-	-	-	-	-	-	-	-
Ti	0.372%	0.42%	0.436%	0.453%	0.423%	0.456%	0.427%	0.415%	0.003%	0.5%	-	-	-	-	-	-	-	-	-
Tl	0.323	0.71	0.742	0.715	0.658	0.686	0.75	0.926	0.193	0.2	-	1	1	1	1	1	1	2	-
U	1.69	2.91	2.95	3.33	3.11	3.08	5.47	4.07	0.468	2	-	-	-	-	-	-	1	-	-
V	88.7	106	112.5	92.9	104	107.5	95.4	106	39	90	-	-	-	-	-	-	-	-	-
W	1.54	1.88	2.15	2.35	2.14	2.26	2.39	2.36	0.052	1.5	-	-	-	-	-	-	-	-	-
Zn	70.3	92.8	97.1	101	79.1	110.5	81.5	192	61	90	-	-	-	-	-	-	-	1	-
Zr	107.5	143.5	139.5	152.5	148.5	155	177.5	151.5	13.2	400	-	-	-	-	-	-	-	-	-

All data from BHP geochemical database from samples collected by BMA or BHP. 4acid = 4-acid digest. ICP-MS analysis. All results mg/kg except w here show n.
Results for selected minor elements (Ce, Cs, Ga, Ge, Hf, In, La, Nb, Rb, Re, Sc, Ta, Y) not show n, and all have GAI values of 1 or <1.

Table B2 (cont.) Total Element Concentrations and Geochemical Abundance Indices for Potential Spoil and Coal

Sample ID:	201537-R01 _WC_54	201537 _WC_08	201537 _WC_13	201537 _WC_26	201537 _WC_36	201847 _WC_03	201847 _WC_05		201537-R01 _WC_54	201537 _WC_08	201537 _WC_13	201537 _WC_26	201537 _WC_36	201847 _WC_03	201847 _WC_05
Waste Type:	Permian, fresh, carbonaceous (Gp5)								Permian, fresh, carbonaceous (Gp5)						
Lithology:	Carb. Siltstone	Carb. Siltstone	Siltstone; minor carbonaceous	Carb. Siltst.; minor coal	Carb. Siltstone	Carbonaceous Siltst. & Coal	Carb. Siltstone	*Median Soil*	Carb. Siltstone	Carb. Siltstone	Siltstone; minor carbonaceous	Carb. Siltst.; minor coal	Carb. Siltstone	Carbonaceous Siltst. & Coal	Carb. Siltstone
Element	2acid	2acid	2acid	2acid	2acid	2acid	4acid	*Abundance*	Geochemical Abundance Index (GAI)						
Ag	0.052	0.096	0.035	0.105	0.115	0.022	0.15	0.05	-	-	-	-	1	-	1
Al	0.35%	0.69%	1.04%	0.58%	0.74%	0.47%	9.18%	7.1%	-	-	-	-	-	-	-
As	18.45	12.35	44.9	2.03	9.22	2.36	4.79	6	1	-	2	-	-	-	-
Ba	486	22	209	1850	137.5	86.1	263	500	-	-	-	1	-	-	-
Be	0.57	0.93	2.27	0.95	1.09	0.79	2.27	0.3	-	1	2	1	1	1	2
Bi	0.31	0.504	0.0876	0.506	0.619	0.271	0.551	0.2	-	1	-	1	1	-	1
Ca	0.09%	0.19%	15.15%	0.19%	0.24%	0.11%	0.21%	1.5%	-	-	3	-	-	-	-
Cd	0.037	0.22	0.03	0.249	0.228	0.062	0.142	0.35	-	-	-	-	-	-	-
Co	1.255	4.92	11.05	10.3	21.3	1.05	29	8	-	-	-	-	1	-	1
Cr	2.05	8.57	7.66	8.55	5.73	4.11	51.6	70	-	-	-	-	-	-	-
Cu	37.8	64.2	9.18	48.1	70.6	19.65	50.3	30	-	1	-	-	1	-	-
Fe	0.28%	0.42%	18.6%	0.53%	3.17%	0.43%	2.68%	4%	-	-	2	-	-	-	-
Hg	0.062	0.08	0.421	0.175	0.08	0.04	0.133	0.06	-	-	2	1	-	-	1
K	0.14%	0.19%	0.23%	0.18%	0.25%	0.17%	2.92%	1.4%	-	-	-	-	-	-	-
Li	2.2	5.2	9.7	7.5	9.8	4.1	32.2	25	-	-	-	-	-	-	-
Mg	0.13%	0.24%	1.13%	0.22%	0.36%	0.2%	1.13%	0.5%	-	-	1	-	-	-	1
Mn	8.7	43.7	3190	57.1	1365	41.1	233	1000	-	-	1	-	-	-	-
Mo	0.29	1.08	1.49	0.57	0.73	0.06	2.54	1.2	-	-	-	-	-	-	-
Na	0.047%	0.086%	0.119%	0.072%	0.105%	0.06%	0.121%	0.5%	-	-	-	-	-	-	-
Ni	6.61	17.85	43.2	19.7	39.7	17.4	77.3	50	-	-	-	-	-	-	-
P	0.001%	0.004%	>1.00%	0.001%	0.017%	0.002%	0.056%	0.08%	-	-	-	-	-	-	-
Pb	9.18	19.1	12.2	16.65	19.25	9.4	28.6	35	-	-	-	-	-	-	-
S	0.14%	0.02%	0.62%	0.07%	0.07%	0.09%	0.25%	0.07%	-	-	3	-	-	-	1
Sb	0.126	0.14	1.16	0.206	0.838	0.055	1.58	1	-	-	-	-	-	-	-
Se	0.309	1.14	1.795	0.509	1.61	0.374	1.595	0.4	-	1	2	-	1	-	1
Sn	0.29	0.64	0.34	0.54	0.6	0.34	3.72	4	-	-	-	-	-	-	-
Sr	41.3	106	1200	131	116.5	37.4	170.5	250	-	-	2	-	-	-	-
Te	0.062	0.121	0.028	0.07	0.189	0.048	0.104	0.02	2	3	1	2	4	2	3
Th	0.636	2.14	1.385	2.4	1.61	1.265	13.35	9	-	-	-	-	-	-	-
Ti	0.001%	0.007%	0.007%	0.002%	0.002%	0.001%	0.389%	0.5%	-	-	-	-	-	-	-
Tl	0.013	0.032	0.103	0.013	0.015	0.03	0.885	0.2	-	-	-	-	-	-	2
U	0.217	0.3	1.35	0.459	0.301	0.18	2.85	2	-	-	-	-	-	-	-
V	6.1	19.3	51.4	24.8	19.8	7.2	142.5	90	-	-	-	-	-	-	-
W	0.019	0.029	0.166	0.023	0.017	0.022	1.985	1.5	-	-	-	-	-	-	-
Zn	14	60.7	20	150.5	86.6	32.4	102.5	90	-	-	-	-	-	-	-
Zr	2.7	4.83	18.5	5.26	2.07	3.04	153	400	-	-	-	-	-	-	-

All data from BHP geochemical database from samples collected by BMA or BHP. 4acid/2acid = 4- or 2-acid digest. ICP-MS analysis. All results mg/kg except w here show n.
Results for selected minor elements (Ce, Cs, Ga, Ge, Hf, In, La, Nb, Rb, Re, Sc, Ta, Y) not show n, and all have GAI values of 1 or <1.

Table B2 (cont.) Total Element Concentrations and Geochemical Abundance Indices for Potential Spoil and Coal

Sample ID:	201847 _WC_08	201847 _WC_15	201847 _WC_24	201537 _WCC_75	201847 _WCC_46		201847 _WC_08	201847 _WC_15	201847 _WC_24	201537 _WCC_75	201847 _WCC_46
Waste Type:	Permian, fresh, carb. (Gp5)			Fresh, coal (Gp6)			Permian, fresh, carb. (Gp5)			Fresh, coal (Gp6)	
Lithology:	Carb. Siltstone; minor coal	Carb. Siltstone; minor Pyrite	Carbonaceous Siltstone	Coal & Claystone	Coal	*Median Soil*	Carb. Siltstone; minor coal	Carb. Siltstone; minor Pyrite	Carbonaceous Siltstone	Coal & Claystone	Coal
Element	2acid	2acid	2acid	2acid	2acid	*Abundance*	Geochemical Abundance Index (GAI)				
Ag	0.071	0.12	0.098	0.026	0.048	0.05	-	1	-	-	-
Al	0.62%	0.51%	0.54%	0.3%	0.56%	7.1%	-	-	-	-	-
As	4.08	18.9	3.76	2.94	4.97	6	-	1	-	-	-
Ba	19	332	807	25.7	523	500	-	-	-	-	-
Be	0.7	1.26	0.96	0.28	0.87	0.3	1	1	1	-	1
Bi	0.312	0.469	0.344	0.192	0.242	0.2	-	1	-	-	-
Ca	0.2%	0.19%	0.15%	0.11%	0.25%	1.5%	-	-	-	-	-
Cd	0.139	0.215	0.209	0.052	0.111	0.35	-	-	-	-	-
Co	2.59	26.2	7.62	2.37	4.39	8	-	1	-	-	-
Cr	6.76	2.44	4.98	2.2	3.46	70	-	-	-	-	-
Cu	27.9	44.5	51.9	17.95	37.4	30	-	-	-	-	-
Fe	0.6%	0.26%	0.97%	0.34%	1.13%	4%	-	-	-	-	-
Hg	0.069	0.217	0.076	0.024	0.077	0.06	-	1	-	-	-
K	0.16%	0.18%	0.22%	0.08%	0.19%	1.4%	-	-	-	-	-
Li	7.9	5.3	5.4	2.1	5	25	-	-	-	-	-
Mg	0.26%	0.17%	0.13%	0.11%	0.24%	0.5%	-	-	-	-	-
Mn	57.1	43.2	194	120.5	285	1000	-	-	-	-	-
Mo	0.19	0.8	0.61	0.64	1.01	1.2	-	-	-	-	-
Na	0.082%	0.158%	0.103%	0.073%	0.094%	0.5%	-	-	-	-	-
Ni	9.13	35	8.55	4	7.95	50	-	-	-	-	-
P	0.002%	0.004%	0.01%	0.016%	0.014%	0.08%	-	-	-	-	-
Pb	13.55	20.7	18.45	5.24	10.35	35	-	-	-	-	-
S	0.03%	0.08%	0.05%	0.07%	0.28%	0.07%	-	-	-	-	1
Sb	0.107	1.62	0.243	0.055	0.292	1	-	-	-	-	-
Se	0.304	1.285	0.732	0.857	0.765	0.4	-	1	-	1	-
Sn	0.46	0.74	0.77	0.24	0.48	4	-	-	-	-	-
Sr	56.6	96.7	59	34.9	60	250	-	-	-	-	-
Te	0.041	0.096	0.039	0.057	0.059	0.02	1	3	1	2	2
Th	1.905	2.58	8.58	1.835	3.59	9	-	-	-	-	-
Ti	0.003%	0.001%	0.001%	0.001%	0.001%	0.5%	-	-	-	-	-
Tl	0.019	0.055	0.029	0.001	0.009	0.2	-	-	-	-	-
U	0.306	0.345	1.09	0.257	0.592	2	-	-	-	-	-
V	12.1	7.1	13	8.8	16.1	90	-	-	-	-	-
W	0.02	0.016	0.041	0.017	0.045	1.5	-	-	-	-	-
Zn	56.8	98.2	100	19.6	59.8	90	-	-	-	-	-
Zr	3.66	2.84	4.22	2.19	2.76	400	-	-	-	-	-

All data from BHP geochemical database from samples collected by BMA or BHP. 2acid = 2-acid digest. ICP-MS analysis. All results mg/kg except where shown.
Results for selected minor elements (Ce, Cs, Ga, Ge, Hf, In, La, Nb, Rb, Re, Sc, Ta, Y) not shown, and all have GAI values of 1 or <1.

Table B2 (cont.) Total Element Concentrations and Geochemical Abundance Indices for Potential Spoil and Coal

Sample ID:	Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8		Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8
Waste Type:	Tertiary (Gp1)	Permian, weath. & fresh, non-carb. (Gp2/4)		Permian, fresh, non-carbonaceous (Gp4)						Tertiary (Gp1)	Permian, weath. & fresh, non-carb. (Gp2/4)		Permian, fresh, non-carbonaceous (Gp4)				
Lithology:	Clay	Sandst.; minor clayey sand	Siltstone	Sandstone, fine	Sandstone, fine-med.	Siltstone. trace carb.	Mudstone	Sandstone, very fine	*Median Soil Abundance*	Clay	Sandst.; minor clayey sand	Siltstone	Sandstone, fine	Sandstone, fine-med.	Siltstone. trace carb.	Mudstone	Sandstone, very fine
Element	2-acid digest; ICP-AES analysis. All results mg/kg except where shown. URS, 2007									Geochemical Abundance Index (GAI)							
Ag	<2	<2	<2	<2	<2	<2	<2	<2	0.05	-	-	-	-	-	-	-	-
Al	1.77	1.62	1.22	1.27	1.26	1.16	1.35	1.09	7.1%	-	-	-	-	-	-	-	-
As	<5	<5	7	6	6	<5	<5	6	6	-	-	-	-	-	-	-	-
B	<50	<50	<50	<50	<50	<50	<50	<50	10	-	-	-	-	-	-	-	-
Ba	330	160	440	140	80	260	290	150	500	-	-	-	-	-	-	-	-
Be	1	<1	<1	1	1	1	1	1	0.3	1	-	-	1	1	1	1	1
Bi	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	-	-	-	-	-	-	-	-
Ca	1.28	2.67	0.569	2.31	2.27	0.655	0.536	1.2	1.5%	-	-	-	-	-	-	-	-
Cd	<1	<1	<1	<1	<1	<1	<1	<1	0.35	-	-	-	-	-	-	-	-
Co	19	18	11	12	13	7	10	10	8	1	1	-	-	-	-	-	-
Cr	36	42	13	21	12	8	10	12	70	-	-	-	-	-	-	-	-
Cu	26	29	38	23	24	26	26	29	30	-	-	-	-	-	-	-	-
Fe	3.05	4.36	2.84	4.54	3.62	2.26	3.48	2.94	4%	-	-	-	-	-	-	-	-
Hg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.06	-	-	-	-	-	-	-	-
K	0.153	0.216	0.235	0.291	0.363	0.412	0.408	0.295	1.4%	-	-	-	-	-	-	-	-
Mg	0.535	1.1	0.578	0.936	0.731	0.377	0.441	0.67	0.5%	-	1	-	-	-	-	-	-
Mn	681	897	481	1000	866	406	835	652	1000	-	-	-	-	-	-	-	-
Mo	<2	<2	<2	<2	<2	<2	<2	<2	1.2	-	-	-	-	-	-	-	-
Na	0.211	0.132	0.194	0.114	0.126	0.123	0.142	0.146	0.5%	-	-	-	-	-	-	-	-
Ni	33	39	33	35	28	20	19	32	50	-	-	-	-	-	-	-	-
Pb	10	10	13	14	14	17	16	15	35	-	-	-	-	-	-	-	-
Sb	<5	<5	<5	<5	<5	<5	<5	<5	1	-	-	-	-	-	-	-	-
Se	<5	<5	<5	<5	<5	<5	<5	<5	0.4	-	-	-	-	-	-	-	-
Sn	<5	<5	<5	<5	<5	<5	<5	<5	4	-	-	-	-	-	-	-	-
Sr	62	88	41	115	139	82	88	74	250	-	-	-	-	-	-	-	-
Th	<5	<5	<5	<5	<5	<5	<5	<5	9	-	-	-	-	-	-	-	-
V	58	70	31	39	32	20	27	26	90	-	-	-	-	-	-	-	-
Zn	40	59	67	62	65	69	74	71	90	-	-	-	-	-	-	-	-

Table B2 (cont.) Total Element Concentrations and Geochemical Abundance Indices for Potential Spoil and Coal

Sample ID:	Comp.9	Comp.10	Comp.11	Comp.13	Comp.16	Comp.12	Comp.15	Comp.14	
Waste Type:	Permian, fresh, non-carbonaceous (Gp4)					Permian, fresh, partly carbonaceous (Gp4/5)			
Lithology:	Sandstone, vf. to fine	Sandstone, fine-med.	Sandstone, fine-med.	Siltstone	Claystone & Mudstone	Sandstone; minor coal	Siltstone; minor sandst. & coal	Carb. Siltstone	*Median Soil Abundance*
Element	2-acid digest; ICP-AES analysis. All results mg/kg except where shown. URS, 2007								
Ag	<2	<2	<2	<2	<2	<2	<2	<2	0.05
Al	1.24	0.893	1.22	1.48	1.55	0.743	1.28	1.36	7.1%
As	7	8	6	7	7	17	9	9	6
B	<50	<50	<50	<50	<50	<50	<50	<50	10
Ba	160	100	80	210	150	300	100	150	500
Be	1	1	1	1	1	<1	1	1	0.3
Bi	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Ca	1.61	1.45	1.29	1.31	0.901	0.3	1.23	0.816	1.5%
Cd	<1	<1	<1	<1	<1	<1	<1	<1	0.35
Co	12	9	11	11	11	8	11	10	8
Cr	13	7	11	12	13	4	12	10	70
Cu	24	25	29	32	33	34	45	38	30
Fe	3.86	3.02	2.91	3.65	3.33	1.92	3.62	3.9	4%
Hg	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1	0.06
K	0.329	0.296	0.391	0.37	0.434	0.218	0.256	0.41	1.4%
Mg	0.81	0.533	0.654	0.648	0.658	0.295	0.756	0.588	0.5%
Mn	891	612	601	691	608	326	696	884	1000
Mo	<2	<2	<2	<2	<2	<2	<2	<2	1.2
Na	0.123	0.126	0.13	0.116	0.122	0.085	0.089	0.119	0.5%
Ni	29	19	28	27	31	13	21	18	50
Pb	14	18	16	15	17	17	14	17	35
Sb	<5	<5	<5	<5	<5	<5	<5	<5	1
Se	<5	<5	<5	<5	<5	<5	<5	<5	0.4
Sn	<5	<5	<5	<5	<5	<5	<5	<5	4
Sr	127	121	86	119	102	143	86	93	250
Th	<5	<5	<5	<5	<5	<5	<5	<5	9
V	32	22	29	33	31	17	37	29	90
Zn	65	74	77	75	80	60	66	80	90

Sample ID:	Comp.9	Comp.10	Comp.11	Comp.13	Comp.16	Comp.12	Comp.15	Comp.14
Waste Type:	Permian, fresh, non-carbonaceous (Gp4)					Permian, fresh, partly carbonaceous (Gp4/5)		
Lithology:	Sandstone, vf. to fine	Sandstone, fine-med.	Sandstone, fine-med.	Siltstone	Claystone & Mudstone	Sandstone; minor coal	Siltstone; minor sandst. & coal	Carb. Siltstone
Element	Geochemical Abundance Index (GAI)							
Ag	-	-	-	-	-	-	-	-
Al	-	-	-	-	-	-	-	-
As	-	-	-	-	-	1	-	-
B	-	-	-	-	-	-	-	-
Ba	-	-	-	-	-	-	-	-
Be	1	1	1	1	1	-	1	1
Bi	-	-	-	-	-	-	-	-
Ca	-	-	-	-	-	-	-	-
Cd	-	-	-	-	-	-	-	-
Co	-	-	-	-	-	-	-	-
Cr	-	-	-	-	-	-	-	-
Cu	-	-	-	-	-	-	-	-
Fe	-	-	-	-	-	-	-	-
Hg	-	-	-	-	-	-	-	-
K	-	-	-	-	-	-	-	-
Mg	-	-	-	-	-	-	-	-
Mn	-	-	-	-	-	-	-	-
Mo	-	-	-	-	-	-	-	-
Na	-	-	-	-	-	-	-	-
Ni	-	-	-	-	-	-	-	-
Pb	-	-	-	-	-	-	-	-
Sb	-	-	-	-	-	-	-	-
Se	-	-	-	-	-	-	-	-
Sn	-	-	-	-	-	-	-	-
Sr	-	-	-	-	-	-	-	-
Th	-	-	-	-	-	-	-	-
V	-	-	-	-	-	-	-	-
Zn	-	-	-	-	-	-	-	-

Table B3. Quantitative X-Ray Diffraction Results from Potential Spoil

	Sample ID:	201537 _WCC_59	201847 _WCC_33	201537-R01 _WC_52	201537 _WC_01	201847 _WC_02	201537 _WC_08	201537 _WC_13	201847 _WC_05	201847 _WC_08	201847 _WC_15
	Waste Type:	Permian, weathered, non-carbonaceous (Gp2)		Permian, fresh, non-carbonaceous (Gp4)			Permian, fresh, carbonaceous (Gp5)				
	Lithology:	Sandstone, fine	Sandstone, very fine	Tuff	Sandstone, fine	Siltstone	Carbonaceous Siltstone	Siltstone; minor carbonaceous	Carbonaceous Siltstone	Carbonaceous Siltstone; minor coal	Carbonaceous Siltstone; minor Pyrite
Mineral	Mineral Group	Quantitative XRD weight %									
Illite-smectite	Clay	0.2	**19.0**	**9.2**	**16.7**	**15.6**	**12.5**	**12.6**	**17.9**	**14.3**	**12.8**
Kaolinite	Clay	**2.8**	**9.0**	**14.0**	**13.9**	**5.1**	**22.1**	**18.6**	**9.0**	**8.9**	**25.8**
Montmorillonite	Clay	<0.1	**6.9**	**2.3**	**4.8**	**4.3**	**8.4**	**13.8**	<0.1	**2.8**	**7.8**
Muscovite	Clay	0.1	1.4	0.8	1.1	**6.2**	1.7	0.0	**3.1**	0.9	1.5
Amorphous/ Coal	Non-Crystalline	<0.1	**24.1**	<0.1	<0.1	<0.1	**12.1**	**17.3**	**26.0**	**20.9**	**21.8**
Quartz	Quartz	**8.1**	**32.7**	**66.8**	**47.8**	**47.5**	**38.0**	**29.4**	**33.6**	**44.3**	**24.6**
Ankerite	Carbonate	0.2	0.4	0.3	**2.5**	0.6	0.5	0.7	0.5	0.3	0.3
Calcite	Carbonate	0.5	0.4	0.2	0.7	0.5	0.3	0.3	0.4	0.4	0.3
Siderite	Carbonate	**45.1**	0.4	0.2	1.5	0.3	0.5	**4.4**	0.9	0.2	0.8
Marcasite	Sulfide	<0.1	0.3	0.2	<0.1	0.2	0.4	0.3	0.5	0.1	0.4
Pyrite	Sulfide	0.2	0.8	0.3	0.4	0.4	0.7	0.7	0.9	0.5	0.7
Jarosite	Sulfate	0.2	0.2	0.2	0.4	0.2	0.2	0.2	<0.1	<0.1	0.2
Apatite	Phosphate	**39.3**	<0.1	0.5	0.6	0.6	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorite	Chlorite	0.2	<0.1	**2.9**	**4.0**	**6.2**	<0.1	<0.1	**4.5**	<0.1	<0.1
Anatase	Oxide	<0.1	0.4	0.2	0.4	0.4	0.6	0.5	0.4	0.4	0.5
Goethite	Hydroxide	0.2	0.6	0.5	0.7	0.5	0.2	<0.1	0.2	<0.1	<0.1
Albite	Feldspar	**2.6**	**2.1**	1.4	**3.8**	**11.0**	0.8	0.1	0.8	**4.8**	**2.1**
Microcline	Feldspar	0.3	1.3	<0.1	0.7	0.4	1.0	1.1	1.3	1.2	0.4

Data from BHP database. Mineral proportions greater than 2% shown in bold

Table B4. Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Potential Spoil and Coal

Sample ID:	201537 _WCC_53	201847 _WCC_26	201537 _WCC_56	201537 _WCC_59	201537 _WCC_63	201847 _WCC_28	201847 _WCC_31	201847 _WCC_33
Waste Type:	Tertiary (Gp1)		Permian, w eathered, non-carbonaceous (Gp2)					
Lithology:	Gravelly Sand	Clayey Sand	Sandstone, very fine	Sandstone, fine	Sandstone, fine	Sandstone, fine; clayey	Sandstone, very fine	Sandstone, very fine
pH	8.1	8.7	8.6	8.6	8.6	8.7	8.1	7.6
EC (µS/cm)	699	616	778	544	825	668	968	483
Alk.^ - Total	3400	10200	2460	12840	9780	3000	858	612
Alk.^ - HCO3	3400	10040	2340	12700	9600	3000	858	612
Alk.^ - CO3	<1	170	122.4	140	170	17.6	<1	<1
Acidity	8	<1	<1	<1	<1	<1	<1	50.4
SO4	39	19	51	15	68	14	56	37
Cl	109	142	167	78	189	125	235	105
F	1	1	0.8	0.6	0.5	1.1	2.2	0.3
Ca	16	9	8	6	12	4	7	1
Mg	11	12	9	6	10	4	12	2
Na	111	110	137	89	154	114	177	102
K	7	6	2	3	8	7	9	6
Al	0.01	0.05	0.02	0.03	0.03	0.06	0.03	0.02
As	0.002	<0.001	<0.001	<0.001	<0.001	0.001	0.003	0.002
B	0.14	0.12	<0.05	<0.05	<0.05	0.08	0.14	0.28
Ba	0.054	0.015	0.002	0.003	0.007	<0.001	0.016	0.003
Be	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bi	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cd	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Co	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr	<0.001	0.003	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
Cu	0.011	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Fe	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	0.048	0.001	0.002	0.001	0.002	<0.001	<0.001	0.014
Mo	0.008	0.005	0.005	0.006	0.009	0.004	0.005	0.006
Ni	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
P	<1	<1	<1	<1	<1	<1	<1	<1
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sn	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sr	0.194	0.174	0.097	0.061	0.17	0.045	0.125	0.022
Th	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ti	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
U	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	0.005	<0.001
V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
W	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001	<0.001
Zn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zr	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Data from BHP geochemical database. All results mg/L except EC (µS/cm) and pH. ^ Alkalinity as CaCO3.

Table B4 (cont.) Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Potential Spoil and Coal

Sample ID:	201537 _WCC_66	201537 _WCC_70	201537-R01 _WC_52	201537 _WC_01	201537 _WC_05	201537 _WC_07	201537 _WC_09	201537 _WC_11
Waste Type:	Permian, fresh, non-carbonaceous (Gp4)							
Lithology:	Sandstone, fine	Sandstone, very fine	Tuff	Sandstone, fine	Sandstone, very fine	Siltstone	Siltstone	Siltstone; trace calcite
pH	8.6	8.5	8.5	9.1	9.3	8.9	9.1	9.2
EC (µS/cm)	832	540	174	367	350	224	234	256
Alk.^ - Total	2380	1540	202	866	2800	524	280	796
Alk.^ - HCO3	2280	1522	183.8	832	2760	490	262	786
Alk.^ - CO3	105	17.6	17.6	35	35	35	17.6	10
Acidity	<1	<1	<1	<1	<1	<1	<1	<1
SO4	91	62	40	48	54	36	25	30
Cl	150	57	21	26	25	35	37	41
F	1.4	0.4	0.1	0.1	0.1	0.2	0.1	0.3
Ca	12	9	<1	1	2	<1	<1	<1
Mg	13	10	<1	<1	1	<1	<1	<1
Na	137	86	35	72	80	44	49	64
K	20	21	2	8	7	3	4	4
Al	0.03	0.03	0.19	0.04	0.05	0.13	0.14	0.06
As	0.018	0.004	0.023	0.102	0.248	0.497	0.09	0.003
B	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05
Ba	0.019	0.004	0.015	<0.001	0.001	<0.001	<0.001	<0.001
Be	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bi	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cd	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Co	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cu	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Fe	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	0.004	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Mo	0.116	0.095	0.106	0.113	0.052	0.078	0.038	0.087
Ni	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
P	<1	<1	<1	<1	<1	<1	<1	<1
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sb	0.003	0.004	0.002	0.002	0.006	0.006	<0.001	0.003
Se	0.02	0.04	<0.01	0.02	0.01	0.04	0.03	0.01
Sn	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sr	0.229	0.176	0.007	0.052	0.083	0.009	0.012	0.032
Th	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ti	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01
U	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
V	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	0.04	<0.01
W	<0.001	<0.001	<0.001	<0.001	0.001	0.002	0.001	<0.001
Zn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zr	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Data from BHP geochemical database. All results mg/L except EC (µS/cm) and pH. ^ Alkalinity as CaCO3.

Table B4 (cont.) Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Potential Spoil and Coal

Sample ID:	201537 _WC_15	201537 _WC_21	201537 _WC_32	201537 _WC_35	201537 _WC_41	201537 _WC_47	201847 _WCC_37	201847 _WCC_40
Waste Type:	Permian, fresh, non-carbonaceous (Gp4)							
Lithology:	Siltstone	Sandstone, fine-med.	Sandstone, fine-med.	Sandstone, fine-med.	Siltstone	Siltstone	Sandstone, fine	Sandstone, fine
pH	9.1	9.1	9.3	9.2	9.2	9.3	9.0	9.0
EC (µS/cm)	186	210	177	256	163	163	356	391
Alk.^ - Total	348	436	262	612	342	358	2900	2920
Alk.^ - HCO3	338	420	246	596	324	358	2880	2900
Alk.^ - CO3	10	16.8	16.8	16.8	17.6	<1	17.6	17.6
Acidity	<1	<1	<1	<1	<1	<1	<1	<1
SO4	46	39	9	22	46	41	46	46
Cl	25	22	31	24	19	25	31	32
F	0.3	0.1	0.1	0.3	0.1	0.1	0.5	1.9
Ca	<1	<1	<1	1	<1	<1	6	9
Mg	<1	<1	<1	<1	<1	<1	5	7
Na	34	51	34	56	30	38	56	52
K	2	4	3	9	<1	1	16	16
Al	0.19	0.11	0.22	0.12	0.28	0.45	0.1	0.09
As	0.488	0.151	0.074	0.217	0.079	0.875	0.029	0.008
B	<0.05	<0.05	<0.05	<0.05	0.16	0.16	0.05	<0.05
Ba	<0.001	<0.001	0.002	0.011	<0.001	<0.001	0.006	0.011
Be	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bi	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cd	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Co	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cu	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Fe	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.003	0.007
Mo	0.15	0.024	0.01	0.02	0.282	0.035	0.06	0.083
Ni	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001
P	<1	<1	<1	<1	<1	<1	<1	<1
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sb	0.012	0.008	0.001	0.007	0.019	0.013	0.012	0.007
Se	0.04	0.04	0.02	<0.01	0.03	0.06	<0.01	<0.01
Sn	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sr	0.004	0.021	0.008	0.075	0.002	0.004	0.125	0.171
Th	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ti	0.01	<0.01	0.02	<0.01	<0.01	0.01	<0.01	<0.01
U	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
V	0.01	0.01	<0.01	0.02	<0.01	0.03	<0.01	<0.01
W	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.001	<0.001
Zn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zr	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Data from BHP geochemical database. All results mg/L except EC (µS/cm) and pH. ^ Alkalinity as CaCO3.

Table B4 (cont.) Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Potential Spoil and Coal

Sample ID:	201847 _WCC_43	201847 _WC_02	201847 _WC_04	201847 _WC_11	201847 _WC_13	201847 _WC_16	201847 _WC_18	201847 _WC_20	201847 _WC_22
Waste Type:	Permian, fresh, non-carbonaceous (Gp4)								
Lithology:	Sandstone, fine	Siltstone	Siltstone; minor Py.	Siltstone	Siltstone	Siltstone	Siltstone	Siltstone	Siltstone
pH	9.1	8.3	8.0	8.4	9.0	8.8	8.9	9.2	8.6
EC (µS/cm)	403	243	289	237	207	239	343	322	340
Alk.^ - Total	8200	350	262	306	272	332	350	288	262
Alk.^ - HCO3	8020	332	262	288	236	316	332	272	262
Alk.^ - CO3	170	17.6	<1	17.6	35	17.6	17.6	17.6	<1
Acidity	<1	<1	4	<1	<1	<1	<1	<1	<1
SO4	34	79	54	62	31	56	50	58	61
Cl	36	16	23	9	10	14	42	41	30
F	0.4	0.2	0.4	0.3	0.3	0.3	0.3	0.3	0.3
Ca	8	<1	<1	<1	<1	<1	<1	<1	<1
Mg	5	<1	<1	<1	<1	<1	<1	<1	<1
Na	63	49	57	48	54	52	68	63	87
K	16	7	6	4	4	4	4	2	6
Al	0.1	0.06	0.05	0.07	0.17	0.2	0.08	0.11	0.03
As	0.046	0.186	0.017	0.078	0.131	0.37	0.037	0.051	0.007
B	<0.05	0.06	0.08	0.11	0.09	0.1	0.17	0.3	0.14
Ba	0.005	0.015	0.005	0.002	<0.001	0.004	0.009	<0.001	0.023
Be	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bi	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cd	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Co	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cu	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Fe	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
Mo	0.015	0.118	0.096	0.016	0.051	0.032	0.05	0.228	0.035
Ni	<0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
P	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sb	0.003	0.004	0.008	0.006	0.004	0.004	0.003	0.012	0.003
Se	<0.01	0.02	0.05	0.04	0.02	0.05	0.03	0.07	0.02
Sn	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sr	0.162	0.015	0.011	0.007	0.008	0.007	0.011	0.003	0.017
Th	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ti	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
U	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
V	<0.01	<0.01	0.02	0.02	0.01	0.03	0.01	0.03	<0.01
W	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.001	<0.001
Zn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zr	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Data from BHP geochemical database. All results mg/L except EC (µS/cm) and pH. ^ Alkalinity as CaCO3.

Table B4 (cont.) Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Potential Spoil and Coal

Sample ID:	201537-R01 _WC_54	201537 _WC_08	201537 _WC_13	201537 _WC_26	201537 _WC_36	201847 _WC_03	201847 _WC_05
Waste Type:	Permian, fresh, carbonaceous (Gp5)						
Lithology:	Carb. Siltstone	Carb. Siltstone	Siltstone; minor carbonaceous	Carb. Siltst.; minor coal	Carb. Siltstone	Carbonaceous Siltst. & Coal	Carb. Siltstone
pH	9.2	9.0	8.8	9.4	9.5	5.9	7.5
EC (µS/cm)	187	177	198	201	219	278	337
Alk.^ - Total	166.2	254	1050	258	402	70	202
Alk.^ - HCO3	148.8	236	1050	248	402	70	202
Alk.^ - CO3	17.6	17.6	<1	10	<1	<1	<1
Acidity	<1	<1	4	<1	<1	90.4	19.2
SO4	30	24	41	41	26	61	77
Cl	22	26	28	18	24	10	21
F	0.2	2.7	1.2	0.1	0.3	0.1	0.3
Ca	<1	<1	12	<1	<1	1	<1
Mg	<1	<1	7	<1	<1	1	<1
Na	47	35	24	46	51	58	68
K	3	1	6	2	3	7	7
Al	0.08	0.16	0.04	0.06	0.11	0.28	0.06
As	0.038	0.789	<0.001	0.028	0.05	0.005	0.004
B	<0.05	0.06	<0.05	<0.05	<0.05	0.15	0.09
Ba	0.021	<0.001	0.019	0.024	0.006	0.007	0.002
Be	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bi	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cd	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Co	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.002
Cr	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
Cu	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001
Fe	<0.05	<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	<0.0001
Mn	<0.001	<0.001	0.006	<0.001	<0.001	0.002	0.001
Mo	0.027	0.093	0.083	0.035	0.069	0.006	0.132
Ni	<0.001	<0.001	0.006	<0.001	<0.001	0.006	0.047
P	<1	<1	<1	<1	<1	<1	<1
Pb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sb	0.003	0.003	<0.001	0.004	0.032	<0.001	0.016
Se	0.02	0.07	<0.01	0.03	0.04	0.01	0.04
Sn	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sr	0.028	0.006	0.436	0.021	0.021	0.044	0.027
Th	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ti	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01
U	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
V	0.03	0.09	<0.01	0.05	0.02	<0.01	<0.01
W	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zr	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Data from BHP geochemical database. All results mg/L except EC (µS/cm) and pH. ^ Alkalinity as CaCO3.

Table B4 (cont.) Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Potential Spoil and Coal

Sample ID:	201847 _WC_08	201847 _WC_15	201847 _WC_24	201537 _WCC_75	201847 _WCC_46
Waste Type:	Permian, fresh, carb. (Gp5)			Fresh, coal (Gp6)	
Lithology:	Carb. Siltstone; minor coal	Carb. Siltstone; minor Pyrite	Carbonaceous Siltstone	Coal & Claystone	Coal
pH	9.4	7.6	8.5	8.3	9.3
EC (µS/cm)	305	520	295	491	383
Alk.^ - Total	218	170	324	131.2	498
Alk.^ - HCO3	148.8	140	306	131.2	482
Alk.^ - CO3	70	<1	17.6	<1	17.6
Acidity	<1	20	<1	7.2	<1
SO4	19	199	63	72	46
Cl	7	12	38	88	62
F	0.3	0.5	0.7	0.2	0.6
Ca	<1	<1	<1	10	2
Mg	<1	<1	<1	10	1
Na	63	119	66	106	96
K	3	3	4	5	6
Al	0.07	<0.01	0.06	<0.01	0.07
As	0.258	0.052	0.091	<0.001	0.036
B	0.12	0.26	0.19	0.07	0.1
Ba	0.001	0.007	0.015	0.007	0.024
Be	<0.001	<0.001	<0.001	<0.001	<0.001
Bi	<0.001	<0.001	<0.001	<0.001	<0.001
Cd	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Co	<0.001	0.002	<0.001	<0.001	<0.001
Cr	<0.001	<0.001	<0.001	<0.001	<0.001
Cu	<0.001	<0.001	<0.001	0.001	0.002
Fe	<0.05	<0.05	<0.05	<0.05	<0.05
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	<0.001	<0.001	<0.001	0.027	<0.001
Mo	0.015	0.078	0.039	0.044	0.062
Ni	<0.001	0.011	<0.001	0.001	0.001
P	<1	<1	<1	<1	<1
Pb	<0.001	<0.001	<0.001	<0.001	<0.001
Sb	0.002	0.032	0.008	0.002	0.006
Se	0.02	0.1	0.04	0.02	0.03
Sn	<0.001	<0.001	<0.001	<0.001	<0.001
Sr	0.024	0.05	0.008	0.262	0.074
Th	<0.001	<0.001	<0.001	<0.001	<0.001
Ti	<0.01	<0.01	<0.01	<0.01	<0.01
U	<0.001	<0.001	<0.001	<0.001	0.001
V	0.04	<0.01	0.02	<0.01	0.02
W	<0.001	<0.001	0.002	<0.001	0.002
Zn	<0.005	<0.005	<0.005	<0.005	<0.005
Zr	<0.005	<0.005	<0.005	<0.005	<0.005

Data from BHP geochemical database. All results mg/L except EC (µS/cm) and pH. ^ Alkalinity as CaCO3.

Table B4 (cont.) Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Potential Spoil and Coal

Sample ID:	Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8	Comp.9	Comp.10	Comp.11	Comp.13	Comp.16	Comp.12	Comp.15	Comp.14
Waste Type:	Tertiary (Gp1)	Permian, weath. & fresh, non-carb. (Gp2/4)		Permian, fresh, non-carbonaceous (Gp4)										Permian, fresh, partly carbonaceous (Gp4/5)		
Lithology:	Clay	Sandst.; minor clayey sand	Siltstone	Sandstone, fine	Sandstone, fine-med.	Siltstone. trace carb.	Mudstone	Sandstone, very fine	Sandstone, vf. to fine	Sandstone, fine-med.	Sandstone, fine-med.	Siltstone	Claystone & Mudstone	Sandstone; minor coal	Siltstone; minor sandst. & coal	Carb. Siltstone
pH*	8.0	8.4	7.8	8.5	8.3	8.2	8.3	8.4	8.3	8.3	8.4	8.3	8.1	8.2	8.3	8.2
EC (µS/cm)*	1384	726	1178	561	630	619	826	875	671	583	693	711	676	726	642	554
Alk.*^ - Total	4034	4522	588	3107	2957	1219	415	564	2389	1317	255	767	1557	2279	1624	524
Alk.*^ - HCO3	4029	4512	586	3077	2941	1219	410	549	2379	1313	243	759	1547	2274	1610	524
Alk.*^ - CO3	13	19	<10	28	19	<10	<10	18	12	11	13	11	13	<10	12	<10
Acidity*	55	<10	35	<10	<10	<10	<10	<10	<10	<10	<10	11	38	14	10	10
SO4	64	34	26	34	32	44	50	56	34	32	44	36	40	28	46	38
F	2.2	1.2	1	1	1	1	1.4	1.2	1	1	1.4	1.2	1	0.8	1	0.4
Ca	24	12	<2	4	6	4	6	8	4	4	4	6	6	6	4	2
Mg	16	8	2	2	2	2	4	6	2	<2	4	4	2	2	4	2
Na	168	96	108	82	86	94	104	140	80	94	90	80	72	64	70	46
K	8	22	20	32	42	46	46	44	32	28	40	44	36	34	32	18
Ag	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Al	<0.2	<0.2	<0.2	0.2	0.2	<0.2	<0.2	<0.2	0.2	0.2	<0.2	<0.2	0.4	<0.2	<0.2	<0.2
As	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
B	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ba	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Be	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Bi	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cd	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Co	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cr	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cu	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Fe	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Hg	<0.0001	<0.0001	<0.0001	<0.0001	0.00012	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Mo	<0.02	0.02	0.02	0.04	0.02	0.04	0.02	0.04	0.02	0.02	0.04	<0.02	0.02	<0.02	0.06	0.04
Ni	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Pb	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sb	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Se	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sn	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sr	0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Th	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
V	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Zn	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Data from URS, 2007. All results mg/L except EC (µS/cm) and pH. ^ Alkalinity as CaCO3. * pH, EC, Alkalinity and Acidity are average values from component samples.

Table B5. Exchangeable Cations and Emerson Aggregate Class Test Results in Potential Spoil

Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Material Group	pH 1:5	EC 1:5	Cl 1:5	Exch. Ca	Exch. Mg	Exch. K	Exch. Na	CEC	ESP	Sodicity Rating	Emerson Class No. & Description	
							µS/cm	mg/L	meq/100g					%			
201537-R01_WC_52	201537_R01	47.3-47.4	Fresh	Tuff (P Tuff)	Gp4	8.5	174	21	3.3	5.1	0.3	2	11	19	strongly sodic	2	Slaking. Some dispersion
201537_WC_01	201537	56-56.05	Fresh	Sandstone, fine	Gp4	9.1	367	26	5.2	6.2	0.6	3.5	15	22.5	strongly sodic	2	Slaking. Some dispersion
201537_WC_05	201537	60-60.05	Fresh	Sandstone, very fine	Gp4	9.3	350	25	6.3	7.5	0.6	4.2	19	22.4	strongly sodic	7	No slaking. Sw elling
201537_WC_07	201537	88.95-89	Fresh	Siltstone	Gp4	8.9	224	35	4.6	4.7	0.4	2.9	13	23.2	strongly sodic	2	Slaking. Some dispersion
201537_WC_08	201537	91.04-91.1	Fresh	Carbonaceous Siltstone	Gp5	9.0	177	26	4.5	4.4	0.4	3.1	12	24.9	strongly sodic	8	No slaking. No sw elling
201537_WC_09	201537	95.44-95.5	Fresh	Siltstone	Gp4	9.1	234	37	3.9	3.9	0.4	2.7	11	25	strongly sodic	2	Slaking. Some dispersion
201537_WC_11	201537	114-114.05	Fresh	Siltstone; minor calcite	Gp4	9.2	256	41	4.5	4.4	0.5	3.7	13	28.2	strongly sodic	8	No slaking. No sw elling
201537_WC_13	201537	116.37-116.44	Fresh	Siltstone; minor carbonaceous	Gp5	8.8	198	28	4.9	0.8	<0.2	0.5	6.1	8.1	sodic	8	No slaking. No sw elling
201537_WC_15	201537	119.32-119.37	Fresh	Siltstone	Gp4	9.1	186	25	4.2	2.9	0.6	3.1	11	29	strongly sodic	8	No slaking. No sw elling
201537_WC_21	201537	123.4-123.46	Fresh	Sandstone, fine-medium	Gp4	9.1	210	22	3.4	2.6	0.4	2.6	9.0	28.5	strongly sodic	8	No slaking. No sw elling
201537_WC_26	201537	126.59-126.67	Fresh	Carb. Siltstone; coaly	Gp5	9.4	201	18	2.3	1.2	0.3	2.2	6.0	36.7	strongly sodic	8	No slaking. No sw elling
201537_WC_32	201537	133.1-133.15	Fresh	Sandstone, fine-medium	Gp4	9.3	177	31	4.6	2.4	0.4	3.3	11	30.5	strongly sodic	8	No slaking. No sw elling
201537_WC_35	201537	174.95-175	Fresh	Sandstone, fine-medium	Gp4	9.2	256	24	3.3	1.7	0.3	2.2	7.5	29.8	strongly sodic	7	No slaking. Sw elling
201537_WC_36	201537	176-176.05	Fresh	Carbonaceous Siltstone	Gp5	9.5	219	24	3.1	1.4	0.4	3.3	8.2	40.6	strongly sodic	8	No slaking. No sw elling
201537_WC_41	201537	195.95-196	Fresh	Siltstone	Gp4	9.2	163	19	7.2	4.4	0.4	6	18	33.4	strongly sodic	2	Slaking. Some dispersion
201537_WC_47	201537	199.95-200	Fresh	Siltstone	Gp4	9.3	163	25	4.7	2.4	0.5	4.3	12	36.1	strongly sodic	8	No slaking. No sw elling
201847_WC_02	201847	43.06-43.13	Fresh	Siltstone	Gp4	8.3	243	16	4.6	4.7	0.8	3	13	22.7	strongly sodic	8	No slaking. No sw elling
201847_WC_03	201847	43.77-43.89	Fresh	Carb. Siltstone; & Coal	Gp5	5.9	278	10	3.3	4.7	0.5	2.3	11	21.3	strongly sodic	8	No slaking. No sw elling
201847_WC_04	201847	45.47-45.53	Fresh	Siltstone; minor pyrite	Gp4	8.0	289	23	5	4.1	1.1	4	14	28.3	strongly sodic	8	No slaking. No sw elling
201847_WC_05	201847	46.05-46.1	Fresh	Carbonaceous Siltstone	Gp5	7.5	337	21	4.4	3.8	0.9	3.7	13	29	strongly sodic	8	No slaking. No sw elling
201847_WC_08	201847	54.31-54.4	Fresh	Carb. Siltstone; coaly	Gp5	9.4	305	7	2.5	2.6	0.4	2.9	8.4	34.2	strongly sodic	8	No slaking. No sw elling
201847_WC_11	201847	55.43-55.49	Fresh	Siltstone	Gp4	8.4	237	9	3.6	3.9	0.7	4.3	13	34.1	strongly sodic	8	No slaking. No sw elling
201847_WC_13	201847	64.05-64.1	Fresh	Siltstone	Gp4	9.0	207	10	3.1	3	0.6	4	11	37.1	strongly sodic	8	No slaking. No sw elling
201847_WC_15	201847	65.35-65.42	Fresh	Carb. Siltstone; minor pyrite	Gp5	7.6	520	12	3.9	5.2	0.7	6.2	16	38.8	strongly sodic	8	No slaking. No sw elling
201847_WC_16	201847	66.64-66.7	Fresh	Siltstone	Gp4	8.8	239	14	2.3	2.6	0.4	3.8	9.1	41.2	strongly sodic	8	No slaking. No sw elling
201847_WC_18	201847	77.25-77.3	Fresh	Siltstone	Gp4	8.9	343	42	4.2	4.5	0.7	6.1	16	39.2	strongly sodic	8	No slaking. No sw elling
201847_WC_20	201847	82.26-82.34	Fresh	Siltstone	Gp4	9.2	322	41	4.1	5.5	0.8	6.6	17	38.6	strongly sodic	8	No slaking. No sw elling
201847_WC_22	201847	95-95.07	Fresh	Siltstone	Gp4	8.6	340	30	2.1	3.1	0.4	3.2	8.8	36.7	strongly sodic	8	No slaking. No sw elling
201847_WC_24	201847	99.5-99.56	Fresh	Carbonaceous Siltstone	Gp5	8.5	295	38	2.7	2.5	0.5	4.1	10	41.5	strongly sodic	8	No slaking. No sw elling

Data from BHP geochemical database. pH, EC and Cl on 1:5 w ater extracts; CEC = Cation exchange capacity; ESP = Exchangeable sodium percentage.

Table B5 (cont.) Exchangeable Cations and Emerson Aggregate Class Test Results in Potential Spoil

Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Material Group	pH 1:5	EC 1:5	Cl 1:5	Exch. Ca	Exch. Mg	Exch. K	Exch. Na	CEC	ESP	Sodicity Rating
							μS/cm	mg/L	meq/100g					%	
GT478_01	127478	4.58-4.87	Weathered	Siltstone	Gp2	7.9	1,100	320	2.0	12.0	0.78	6.8	21	32	strongly sodic
GT478_02	127478	5.22-5.5	Weathered	Siltstone	Gp2	8.0	940	260	2.2	11.0	0.64	6.2	20	31.3	strongly sodic
GT478_03	127478	6.13-6.33	Weathered	Siltstone	Gp2	8.0	860	240	2.4	11.0	0.74	6	20	29.8	strongly sodic
GT478_05	127478	7.59-7.88	Distinctly	Siltstone	Gp2	7.6	890	260	2.5	11.0	0.74	6.4	21	30.6	strongly sodic
GT478_06	127478	8.62-8.99	Distinctly	Sandstone, v. fine; carb. wisps	Gp2	8.1	630	166	2.5	9.5	0.55	5	18	28.6	strongly sodic
GT478_07	127478	9.8-10.16	Distinctly	Sandstone, fine-medium	Gp2	9.4	610	136	4.4	8.3	0.43	3	16	18.8	strongly sodic
GT478_08	127478	10.16-10.49	Distinctly	Sandstone, fine-medium	Gp2	9.4	650	144	5.4	9.2	0.45	3	18	16.8	strongly sodic
GT478_11	127478	12.77-13.09	Fresh	Carbonaceous Siltstone	Gp5	8.9	780	168	2.6	8.5	0.83	5.4	17	31.1	strongly sodic
GT478_12	127478	13.29-13.69	Fresh	Siltstone; trace carb.	Gp4	8.5	920	170	3.8	8.1	0.73	4.5	17	26.3	strongly sodic
GT478_15	127478	16.42-16.62	Fresh	Siltstone	Gp4	8.4	660	144	2.4	6.6	0.81	4.4	14	30.8	strongly sodic
GT478_16	127478	17.7-17.97	Fresh	Sandst., f.-med.; minor Siltst.	Gp4	8.8	750	160	2.4	6.0	0.50	3	12	25.3	strongly sodic
GT478_17	127478	18.17-18.52	Fresh	Sandstone, fine-medium	Gp4	9.1	760	160	7.0	8.1	0.41	2.9	18	15.7	strongly sodic
GT478_19	127478	21.19-21.56	Fresh	Siltstone; minor carb.	Gp4	9.0	590	126	2.7	7.7	0.90	3.4	15	23.4	strongly sodic
GT478_24	127478	27.06-27.41	Fresh	Siltstone; with Sandstone	Gp4	8.6	600	122	2.9	6.0	0.66	3.1	13	24.3	strongly sodic
GT479_002	127479	4.907-5.167	Distinctly	Sandstone, fine-medium	Gp2	5.7	750	186	0.9	6.7	1.00	6.8	15	44.1	strongly sodic
GT479_004	127479	6.947-7.217	Weathered	Sandstone, med.; minor carb.	Gp2	9.4	760	158	4.9	8.1	0.89	4.1	18	22.6	strongly sodic
GT479_006	127479	11.027-11.747	Slightly	Sandstone, v. fine	Gp2	8.1	600	138	3.2	7.4	1.00	4.1	16	25.9	strongly sodic
GT479_008	127479	14.407-14.677	Slightly	Sandstone, v. fine; minor Siltst.	Gp2	8.1	420	90	2.0	4.6	0.74	2.9	10	28.5	strongly sodic
GT479_010	127479	17.247-17.567	Fresh	Sandstone, fine; minor Siltst.	Gp4	9.2	660	128	2.4	7.2	1.40	4	15	26.7	strongly sodic
GT479_014	127479	23.318-23.698	Fresh	Sandstone, f.-med.; clayey	Gp4	8.2	890	158	3.8	8.0	0.92	3.2	16	20	strongly sodic
GT479_015	127479	26.178-26.538	Fresh	Sandstone, fine	Gp4	8.9	670	130	4.8	8.7	0.94	4.5	19	23.7	strongly sodic
GT479_017	127479	31.81-32.08	Fresh	Sandst., fine; minor Siltst.	Gp4	9.1	520	72	9.5	6.9	0.61	2.1	19	11.1	sodic
GT480_003	127480	13.95-14.32	Slightly	Sandstone, v. fine; minor Siltst.	Gp2	6.6	380	80	1.1	8.0	1.20	4.7	15	31.3	strongly sodic
GT480_004	127480	17.42-17.71	Fresh	Coal, 40-60% bright (DY Lower)	Gp6	6.5	56	<1	0.2	0.4	0.09	0.29	1.0	29.4	strongly sodic
GT480_008	127480	22.25-22.56	Fresh	Sandst., fine; part Siltst.	Gp4	9.1	360	11	3.2	7.9	1.10	3.1	15	20.4	strongly sodic
GT480_010	127480	26.31-26.65	Fresh	Sandstone, medium-coarse	Gp4	9.4	390	22	3.6	5.0	0.42	1.9	11	17.4	strongly sodic
GT481_001	127481	4.7-5.12	Distinctly	Sandstone, medium-coarse	Gp2	7.9	680	176	5.1	6.9	0.26	2.6	15	17.6	strongly sodic
GT481_005	127481	28.134-28.484	Fresh	Sandstone, medium	Gp4	9.3	270	16	4.6	6.7	0.40	1.6	13	12.2	sodic
GT481_013	127481	38.857-39.137	Fresh	Sandstone, very fine;	Gp4	9.2	310	28	4.4	7.3	1.10	2.5	15	16.2	strongly sodic
GT481_014	127481	39.137-39.477	Fresh	Sandstone, fine	Gp4	9.3	330	30	4.8	7.2	0.78	2.5	15	16.3	strongly sodic
GT481_016	127481	42.76-43.05	Fresh	Sandstone, fine	Gp4	9.5	400	30	14.0	6.6	0.71	2.4	24	10.3	sodic
GT481_017	127481	43.72-44.02	Fresh	Sandstone, fine	Gp4	9.3	400	44	4.0	7.1	0.78	3	15	20.1	strongly sodic
GT481_018	127481	47.57-47.81	Fresh	Sandstone, fine	Gp4	9.5	440	46	4.0	6.5	0.57	2.7	14	19.7	strongly sodic

Data from PW Baker, 2013. pH, EC and Cl on 1:5 w ater extracts; CEC = Cation exchange capacity; ESP = Exchangeable sodium percentage.

Table B5 (cont.) Exchangeable Cations and Emerson Aggregate Class Test Results in Potential Spoil

Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Material Group	pH 1:5	EC 1:5	Cl 1:5	Exch. Ca	Exch. Mg	Exch. K	Exch. Na	CEC	ESP	Sodicity Rating
							µS/cm	mg/L	meq/100g					%	
Composite 1	Various. Refer to composite component table in this Appendix	0-3	Extremely	Clay	Gp1	8.0*	1384*	-	27.5	14.7	1.6	6.2	50	12.4	sodic
Composite 2		1-38	Weath. & Fresh	Sandst., f.-m.; minor clayey sand	Gp2	8.4*	726*	-	20.8	7.7	2.1	3	34	8.9	sodic
Composite 3		3-42	Weath. & Fresh	Siltstone	Gp2	7.8*	1178*	-	6.1	9	2.4	5.8	23	25.0	strongly sodic
Composite 4		51-79	Fresh	Sandstone, fine	Gp4	8.5*	561*	-	19.2	5.7	2.7	2.6	30	8.6	sodic
Composite 5		82-196	Fresh	Sandstone, fine-medium	Gp4	8.3*	630*	-	20.6	4.7	3.6	2.7	32	8.6	sodic
Composite 6		50-189	Fresh	Siltstone, minor carb.	Gp4	8.2*	619*	-	17.2	5	4	3	29	10.3	sodic
Composite 7		73-165	Fresh	Mudstone	Gp4	8.3*	826*	-	10.3	6.3	5	3.7	25	14.7	strongly sodic
Composite 8		4-82	Fresh	Sandstone, very fine	Gp4	8.4*	875*	-	15.4	6.2	2.8	3.4	28	12.2	sodic
Composite 9		79-138	Fresh	Sandstone, very fine to fine	Gp4	8.3*	671*	-	14.7	5.5	3.1	2.9	26	11.1	sodic
Composite 10		138.1-200.87	Fresh	Sandstone, very fine to fine	Gp4	8.3*	583*	-	19.1	4.2	2.9	3.2	29	10.9	sodic
Composite 11		27.7-114	Fresh	Sandstone, v. fine to med.	Gp4	8.4*	693*	-	12.3	7.1	3.7	2.9	26	11.2	sodic
Composite 12		46.02-209.99	Fresh	Sandstone, v. fine; minor coal	Gp4	8.2*	726*	-	20.6	4.9	3.6	2.8	32	8.8	sodic
Composite 13		30-175.5	Fresh	Siltstone	Gp4	8.3*	711*	-	10.7	6.7	4.3	3	25	12.2	sodic
Composite 14		42-215	Fresh	Carbonaceous Siltstone	Gp5	8.2*	554*	-	6.4	5.7	2.2	2.5	17	14.9	strongly sodic
Composite 15		52.5-182.83	Fresh	Siltst.; minor Sandst.; partly coaly	Gp4	8.3*	642*	-	12	6.2	3.3	2.6	24	10.8	sodic
Composite 16		37.35-50.5	Fresh	Claystone and Mudstone	Gp4	8.1*	676*	-	6.2	7.4	5.4	2.8	22	13.0	sodic

Data from URS, 2007. pH, EC and Cl on 1:5 water extracts; * = Average pH and EC value calculated from pH and EC values from composite component samples (refer to composite table in this Appendix);
CEC = Cation exchange capacity; ESP = Exchangeable sodium percentage;

Table B6. Composite Sample Make-up from URS 2007 Geochemical Assessment

Sample Program	Component Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Material Group	pH 1:5	EC1:5	S	ANC	NAPP	Acid Classification	Composite Sample ID
								µS/cm	%	kg H2SO4/t			
URS, 2007	97951	48616	0-4	Extremely	Clay	Gp1	7.0	1860	0.02	10.5	-9.9	NAF	Composite 1
URS, 2007	97995	48617	0-3	Extremely	Clay	Gp1	7.8	1500	0.03	56.3	-55.4	NAF	
URS, 2007	113298	48627	0-2	Extremely	Clay	Gp1	8.6	1240	0.01	32.5	-32.2	NAF	
URS, 2007	*113311*	*48628*	*0-1*	*Extremely*	*Clay*	*Gp1*	*8.5*	*937*	*0.03*	*53.6*	*-52.7*	*NAF*	
URS, 2007	97956	48616	20.5-23	Fresh	Sandstone, fine-medium	Gp4	8.5	571	0.02	210	-209.4	NAF	Composite 2
URS, 2007	98000	48617	27-30	Fresh	Sandstone, v. fine; clayey	Gp4	8.4	721	0.03	91.4	-90.5	NAF	
URS, 2007	113285	48626	2-4	Weathered	Sandstone, fine-medium	Gp2	8.4	1100	0.01	42.9	-42.6	NAF	
URS, 2007	113299	48627	2-7	Weathered	Carb. Siltst.; clayey coaly	Gp3	8.4	918	<0.01	88.2	-88.0	NAF	
URS, 2007	113300	48627	7-24	Fresh	Sandstone, fine-medium	Gp4	8.4	601	0.05	100	-98.5	NAF	
URS, 2007	*113312*	*48628*	*1-15*	*Extremely*	*Clayey Sand*	*Gp1*	*8.5*	*735*	*<0.01*	*31.2*	*-31.0*	*NAF*	
URS, 2007	*113314*	*48628*	*31-38*	*Fresh*	*Sandstone, fine-medium*	*Gp2*	*8.5*	*433*	*0.05*	*155*	*-153.5*	*NAF*	
URS, 2007	97959	48616	38.5-42	Fresh	Siltstone; minor mudstone	Gp4	8.2	532	0.07	37.4	-35.3	NAF	Composite 3
URS, 2007	97998	48617	12-21	Weathered	Siltst.; lignitic and ferruginous	Gp2	7.7	1370	0.07	35.8	-33.7	NAF	
URS, 2007	113200	48618	3-6	Weathered	Siltstone; clayey	Gp2	6.9	1970	0.01	8.7	-8.4	NAF	
URS, 2007	113218	48619	18-24	Fresh	Siltst.; minor mudst. & sandst.	Gp4	8.5	841	0.03	32.6	-31.7	NAF	
URS, 2007	97967	48616	61-79	Fresh	Sandst., f.-med.; minor siderite	Gp4	8.7	494	0.02	132	-131.4	NAF	Composite 4
URS, 2007	113180	48617	51-55	Fresh	Sandstone, fine	Gp4	8.3	625	0.03	66	-65.1	NAF	
URS, 2007	113206	48618	60-67.5	Fresh	Sandstone, v. fine; micaceous	Gp4	8.3	518	0.04	37.3	-36.1	NAF	
URS, 2007	113224	48619	62.38-78	Fresh	Sandstone, fine-medium	Gp4	8.7	581	0.04	140	-138.8	NAF	
URS, 2007	113296	48626	71-73	Fresh	Sandstone, fine	Gp4	8.4	588	0.14	43	-38.7	NAF	
URS, 2007	97979	48616	149-157	Fresh	Sandst., f.-med.; minor Siltst.	Gp4	8.6	703	0.03	181	-180.1	NAF	Composite 5
URS, 2007	97989	48616	189-196	Fresh	Sandstone, very fine	Gp4	8.4	638	0.05	44.8	-43.3	NAF	
URS, 2007	113184	48617	82-98.8	Fresh	Sandst., f.-med.; part sideritic	Gp4	8.3	621	0.04	80.3	-79.1	NAF	
URS, 2007	113278	48619	101-103	Fresh	Sandstone, fine	Gp4	8.2	604	0.04	39.7	-38.5	NAF	
URS, 2007	*113329*	*48628*	*158-166*	*Fresh*	*Sandstone, fine; micaceous*	*Gp4*	*8.2*	*586*	*0.07*	*49.5*	*-47.4*	*NAF*	
URS, 2007	97964	48616	50-50.5	Fresh	Carbonaceous Siltstone	Gp5	7.9	388	0.19	10.2	-4.4	Uncertain	Composite 6
URS, 2007	97978	48616	144.7-149	Fresh	Siltstone	Gp4	8.2	773	0.03	36.3	-35.4	NAF	
URS, 2007	97988	48616	187-189	Fresh	Siltstone	Gp4	8.3	748	0.05	64	-62.5	NAF	
URS, 2007	113205	48618	54-60	Fresh	Siltstone	Gp4	8.2	568	0.04	30.2	-29.0	NAF	

Samples from drill-hole 48628 (blue italicised row s) are located south of Horse Pit on the southern side of Peak Dow ns Highw ay (ie. just outside Horse Pit area)
pH and EC on 1:5 w ater extracts [pulped samples]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential. Refer to report text for Acid Classification definition.

Table B6 (cont.) Composite Sample Make-up from URS 2007 Geochemical Assessment

Sample Program	Component Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Material Group	pH 1:5	EC1:5	S	ANC	NAPP	Acid Classification	Composite Sample ID
								µS/cm	%	kg H2SO4/t			
URS, 2007	97981	48616	163-165	Fresh	Mudstone	Gp4	8.2	744	0.06	41	-39.2	NAF	Composite 7
URS, 2007	113297	48626	73-76	Fresh	Mudstone	Gp4	8.4	907	0.08	37.2	-34.8	NAF	
URS, 2007	113181	48617	55-73.14	Fresh	Sandst., v. fine; sandy laminae	Gp4	8.6	576	0.03	110	-109.1	NAF	Composite 8
URS, 2007	113183	48617	76.94-82	Fresh	Sandstone, very fine	Gp4	8.4	389	0.06	39.1	-37.3	NAF	
URS, 2007	113204	48618	36.11-54	Fresh	Sandst., fine; minor mudstone	Gp4	8.3	677	0.05	33.6	-32.1	NAF	
URS, 2007	113286	48626	4-12.31	Weathered	Sandstone, v. fine; minor carb.	Gp2	8.3	1710	0.03	68	-67.1	NAF	
URS, 2007	113288	48626	17.85-24	Fresh	Sandstone, very fine	Gp4	8.4	1080	0.16	47.6	-42.7	NAF	
URS, 2007	113295	48626	66.56-71	Fresh	Sandstone, very fine	Gp4	8.2	815	0.08	33	-30.6	NAF	
URS, 2007	97968	48616	79-93.11	Fresh	Sandst., fine; minor siderite	Gp4	7.9	923	0.04	112	-110.8	NAF	Composite 9
URS, 2007	97976	48616	137.9-138.1	Fresh	Coal (D43 - DY Upper)	Gp6	8.2	594	0.06	41.4	-39.6	NAF	
URS, 2007	113192	48617	120.53-141.2	Fresh	Sandstone, fine-medium	Gp4	8.5	582	0.05	41.6	-40.1	NAF	
URS, 2007	113211	48618	88-99.75	Fresh	Sandstone, v. fine; micaceous	Gp4	8.2	565	0.05	176	-174.5	NAF	
URS, 2007	113281	48619	110.4-125.8	Fresh	Sandst., v. fine; micaceous	Gp4	8.4	637	0.06	56.3	-54.5	NAF	
URS, 2007	*113322*	*48628*	*113.18-129.33*	*Fresh*	*Sandstone, very fine*	*Gp4*	*8.4*	*723*	*0.07*	*41*	*-38.9*	*NAF*	
URS, 2007	97977	48616	138.1-144.7	Fresh	Sandstone, fine	Gp4	8.3	700	0.03	34.7	-33.8	NAF	Composite 10
URS, 2007	97990	48616	196-200.87	Fresh	Sandstone, very fine	Gp4	8.3	673	0.05	43.1	-41.6	NAF	
URS, 2007	113196	48617	155.52-168	Fresh	Sandstone, v. fine; trace carb.	Gp4	8.4	498	0.08	50.8	-48.4	NAF	
URS, 2007	113198	48617	175.17-181	Fresh	Sandstone, very fine	Gp4	8.4	490	0.05	82.7	-81.2	NAF	
URS, 2007	*113334*	*48628*	*182.83-209.05*	*Fresh*	*Sandst., f.; with mudst. & siltst.*	*Gp4*	*8.2*	*552*	*0.13*	*45.4*	*-41.4*	*NAF*	
URS, 2007	113213	48618	103.79-114	Fresh	Sandstone, v. fine; micaceous	Gp4	8.5	542	0.04	24	-22.8	NAF	Composite 11
URS, 2007	113221	48619	38.67-54	Fresh	Sandstone, fine; trace coal	Gp4	8.4	576	0.03	42	-41.1	NAF	
URS, 2007	113291	48626	27.7-44.35	Fresh	Sandst., v. fine; some Mudst.	Gp4	8.4	814	0.06	30.2	-28.4	NAF	
URS, 2007	113302	48627	29.37-36.55	Fresh	Sandst., v. fine; Siltst. & Mudst.	Gp4	8.3	838	0.28	31.9	-23.3	NAF	
URS, 2007	97973	48616	122.31-130.32	Fresh	Sandst.; minor siltst. & coal	Gp4	8.4	833	0.07	46	-43.9	NAF	Composite 12
URS, 2007	97982	48616	165-171.25	Fresh	Sandst., fine-med.; minor coal	Gp4	8.3	759	0.03	54.4	-53.5	NAF	
URS, 2007	97992	48616	205.34-209.99	Fresh	Sandst., v. fine; minor coal	Gp4	8.4	738	0.06	71.8	-70.0	NAF	
URS, 2007	113179	48617	46.02-51	Fresh	Sandst., v. fine; & Siltst.	Gp4	8.1	798	0.08	60.1	-57.7	NAF	
URS, 2007	*113324*	*48628*	*130.84-145.75*	*Fresh*	*Sandst.; minor siltst. & coal*	*Gp4*	*8.4*	*587*	*0.08*	*38.6*	*-36.2*	*NAF*	
URS, 2007	*113326*	*48628*	*146.2-153*	*Fresh*	*Sandst., v. fine, partly sideritic*	*Gp4*	*7.8*	*612*	*0.08*	*31.7*	*-29.3*	*NAF*	
URS, 2007	*113327*	*48628*	*153-154.95*	*Fresh*	*Carb. Sandst. & Coal*	*Gp5*	*7.8*	*754*	*0.12*	*34*	*-30.3*	*NAF*	

Samples from drill-hole 48628 (blue italicised rows) are located south of Horse Pit on the southern side of Peak Downs Highway (ie. just outside Horse Pit area)
pH and EC on 1:5 water extracts [pulped samples]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential. Refer to report text for Acid Classification definition.

Table B6 (cont.) Composite Sample Make-up from URS 2007 Geochemical Assessment

Sample Program	Component Sample ID	Drill-hole ID	Sample Interval (m)	Weathering	Description	Material Group	pH 1:5	EC1:5 µS/cm	S %	ANC kg H2SO4/t	NAPP kg H2SO4/t	Acid Classification	Composite Sample ID
URS, 2007	97975	48616	131.1-133	Fresh	Siltstone; trace carb.	Gp4	8.2	768	0.07	39.1	-37.0	NAF	Composite 13
URS, 2007	97984	48616	171.75-175.5	Fresh	Siltstone; minor Sandstone	Gp4	8.3	709	0.06	46	-44.2	NAF	
URS, 2007	113177	48617	30-40.64	Fresh	Siltstone; sandy laminae	Gp4	8.4	725	0.03	88.8	-87.9	NAF	
URS, 2007	113293	48626	48.69-61.45	Fresh	Siltstone; minor Mudst.	Gp4	8.5	854	0.09	31.3	-28.5	NAF	
URS, 2007	*113328*	*48628*	*154.95-158*	*Fresh*	*Siltst.; sandy laminae*	*Gp4*	*8.0*	*501*	*0.04*	*30.5*	*-29.3*	*NAF*	
URS, 2007	97960	48616	42-43.49	Fresh	Carbonaceous Siltstone	Gp5	8.0	441	1.05	9.3	22.9	PAF	Composite 14
URS, 2007	97993	48616	209.99-211.5	Fresh	Carbonaceous Siltstone	Gp5	8.2	702	0.07	39.3	-37.2	NAF	
URS, 2007	*113318*	*48628*	*68.05-70*	*Fresh*	*Carb. Siltst.; minor coal*	*Gp5*	*8.3*	*519*	*0.48*	*43.3*	*-28.6*	*NAF*	
URS, 2007	113209	48618	76.09-81.75	Fresh	Siltst.; & Sandst., micaceous	Gp4	7.9	660	0.03	68.8	-67.9	NAF	Composite 15
URS, 2007	113307	48627	60.24-73.62	Fresh	Siltst.; minor Mudst. & Sandst.	Gp4	8.5	621	0.12	31.3	-27.6	NAF	
URS, 2007	113309	48627	77.15-79	Fresh	Carb. Siltst. and Carb. Mudst.	Gp5	8.5	743	0.17	30.2	-25.0	NAF	
URS, 2007	*113316*	*48628*	*52.5-62.41*	*Fresh*	*Siltst.; minor carb. sandst.*	*Gp4*	*8.4*	*505*	*0.03*	*49.6*	*-48.7*	*NAF*	
URS, 2007	*113333*	*48628*	*175-182.83*	*Fresh*	*Siltst.; minor sandst. & coal*	*Gp4*	*8.0*	*680*	*0.1*	*39.2*	*-36.1*	*NAF*	
URS, 2007	97963	48616	48.68-50	Fresh	Claystone	Gp4	7.7	466	0.05	41	-39.5	NAF	Composite 16
URS, 2007	113304	48627	37.35-50.5	Fresh	Mudstone and Siltstone	Gp4	8.5	886	0.06	35	-33.2	NAF	

Samples from drill-hole 48628 (blue italicised row s) are located south of Horse Pit on the southern side of Peak Dow ns Highw ay (ie. just outside Horse Pit area)
pH and EC on 1:5 w ater extracts [pulped samples]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential. Refer to report text for Acid Classification definition.

Appendix C

Static Geochemical Results Tables – Coal Reject

- Table C1 – Acid-Base Characteristics of Coal Reject
- Table C2 – Total Element Concentrations and Geochemical Abundance Indices for Coal Reject
- Table C3 – Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Coal Reject

Table C1. Acid-Base Characteristics of Coal Reject

Data Source	Sample ID	Material Type	Collection Date	Collection Location		pH 1:5	EC1:5	S	ScR	MPA	ANC	NAPP	NAG pH after ox.	NAG@ pH4.5	NAG@ pH7.0	Acid Classification
							µS/cm	%		kg H_2SO_4/t				kg H_2SO_4/t		
BHP database	CVM TT U/F 10/09/2019	Tailings	10-Sep-19	CHPP	Thickener underflow	-	-	0.44	0.255	13.5	22.3	-8.8	4.1	0.4	8.5	NAF
						Extended Boil NAGpH = 6.5; Extended Boil Calculated NAG = -3.8 kg H2SO4/t										
BHP database	CVM TT U/F 17/09/2019	Tailings	17-Sep-19	CHPP	Thickener underflow	8.4	1330	0.48	0.384	14.7	16.6	-1.9	3.9	1.4	10.2	PAF-LC
						Extended Boil NAGpH = 3.4; Extended Boil Calculated NAG = -0.4 kg H2SO4/t										
BHP database	CVM 16/10 UF	Tailings	16-Oct-19	CHPP	Thickener underflow	-	-	0.42	0.28	12.9	20.2	-7.3	6.6	<0.1	0.5	NAF
BHP database	CVM UF 15/11/19	Tailings	15-Nov-19	CHPP	Thickener underflow	-	-	1.00	0.60	30.6	38.2	-7.6	4.9	<0.1	5.5	NAF
						ABCC ANC = 21 kg H2SO4/t; % of ANC @ pH4.5 = 55%; Carbonate mineral = Fe-Dolomite										
BHP database	CVM UF 3/12/19	Tailings	03-Dec-19	CHPP	Thickener underflow	7.7	1730	1.11	0.47	34.0	18.5	15.5	3.3	7.7	19.1	PAF
						Extended Boil NAGpH = 2.8; Extended Boil Calculated NAG = 5.9 kg H2SO4/t										
						ABCC ANC = 3.0 kg H2SO4/t; % of ANC @ pH4.5 = 16%; Carbonate mineral = Fe-Dol. & Sid.										
BHP database	CVM 15/1/20 UF	Tailings	15-Jan-20	CHPP	Thickener underflow	-	-	1.01	0.654	30.9	26.0	4.9	4.1	1.2	14	PAF-LC
						Extended Boil NAGpH = 3.8; Extended Boil Calculated NAG = -1.2 kg H2SO4/t										
						ABCC ANC = 13 kg H2SO4/t; % of ANC @ pH4.5 = 50%; Carbonate mineral = Fe-Dolomite										
BHP database	CVM DT 14/02/17	Fine rejects	14-Feb-17	CHPP	Fine rejects belt	9.0	655	0.56	0.24	17.2	32.1	-15.0	8.5	<0.1	<0.1	NAF
BHP database	CVM DT 28/02/17	Fine rejects	28-Feb-17	CHPP	Fine rejects belt	6.5	962	0.75	0.32	23.0	7.0	16.0	3.4	4.5	16.3	PAF
BHP database	CVM DT 20/03/18	Fine rejects	20-Mar-18	CHPP	Fine rejects belt	8.8	766	0.87	0.65	26.6	28.2	-1.6	3.5	4.5	19.3	UC(NAF)
BHP database	14060440	Fine rejects	15-May-14	CHPP	Fine rejects belt	7.6	379	0.82	0.44	25.1	4.7	20.4	3.0	8.1	17.2	PAF
BHP database	14060444	Fine rejects	05-Jun-14	CHPP	Fine rejects belt	6.6	302	0.63	0.12	19.3	2.6	16.7	3.2	9.6	21.9	PAF
BHP database	CVM CR 14/02/17	Coarse rejects	14-Feb-17	CHPP	Coarse rejects belt	8.8	261	0.32	0.07	9.8	21.3	-11.5	8.5	<0.1	<0.1	NAF
BHP database	CVM CR 28/02/17	Coarse rejects	28-Feb-17	CHPP	Coarse rejects belt	7.0	372	0.48	0.27	14.7	15.4	-0.7	3.7	2.4	12.0	UC(NAF)
BHP database	CVM CR 02/09/17	Coarse rejects	02-Sep-17	CHPP	Coarse rejects belt	7.9	435	0.52	0.28	15.9	7.0	8.9	2.9	28.2	65.0	PAF-LC
BHP database	CVM CR 20/03/18	Coarse rejects	20-Mar-18	CHPP	Coarse rejects belt	9.4	407	0.61	0.39	18.7	22.6	-3.9	3.6	4.2	21.2	UC(NAF)
BHP database	14060441	Coarse rejects	15-May-14	CHPP	Coarse rejects belt	7.8	403	0.62	0.27	19.0	4.9	14.1	2.9	10.5	21.4	PAF
BHP database	14060445	Coarse rejects	05-Jun-14	CHPP	Coarse rejects belt	7.4	239	0.42	0.07	12.9	4.5	8.4	2.6	34	55	PAF-LC
BHP database	CVM MPR 28/02/17	MPR	28-Feb-17	CHPP	Reject bin	7.0	962	1.16	0.79	35.5	7.9	27.6	3.0	21.0	39.2	PAF
BHP database	14060438	MPR	15-May-14	Heyford spoil	Heyford (11N, 250RL)	8.9	256	0.64	0.28	19.6	5.8	13.8	3.3	5.8	13.3	PAF
BHP database	14060439	MPR	15-May-14	Heyford spoil	Heyford (11N, 250RL)	7.8	251	0.76	0.35	23.3	4.4	18.9	2.7	13.4	23	PAF
BHP database	14060442	MPR	05-Jun-14	Heyford spoil	Heyford (11N, 260RL)	7.3	353	0.57	0.16	17.5	3.0	14.5	3.0	10.4	23.3	PAF
BHP database	14060443	MPR	05-Jun-14	Heyford spoil	Heyford (11N, 260RL)	7.1	370	0.7	0.25	21.4	2.5	18.9	2.9	6.1	12.6	PAF

MPR = Mixed plant reject. pH and EC on 1:5 water extracts [on sample pulp]. MPA = Maximum potential acidity [calculated from Total S]; ANC = Acid neutralising capacity;
NAPP = Net acid producing potential [calculated from MPA and ANC]; NAG = Net acid generation.
Selected samples have undergone Extended Boil NAG test and/or Acid Buffering Characterision Curve (ABCC) test to refine the acid classification. Refer to report body for explanation of results and acid classification.

Table C1 (cont.) Acid-Base Characteristics of Coal Reject

Data Source	Sample ID	Material Type	Collection Date	Collection Location	pH 1:2	EC 1:2	S	Scr	MPA	ANC	NAPP	NAG pH after ox.	NAG@ pH4.5	NAG@ pH7.0	Acid Classification
						µS/cm	%		kg H_2SO_4/t				kg H_2SO_4/t		
Highlands, 2020	5	Mixed plant reject	25-Aug-20	Horse (R50, 280RL)	8.1	1350	0.40	0.11	12.3	7.8	4.5	3.5	5.2	24.5	PAF-LC
Highlands, 2020	6	Mixed plant reject	25-Aug-20	Horse (R45, w et cell 6)	7.6	7750	0.81	0.45	24.8	17.0	7.8	3.3	13.1	19.3	PAF-LC
Highlands, 2020	7	Mixed plant reject	25-Aug-20	Horse (R45, w et cell 6)	7.8	2770	0.67	0.32	20.5	30.4	-9.9	8.0	<0.1	<0.1	NAF
Highlands, 2020	8	Mixed plant reject	25-Aug-20	Horse (R45S, 300RL)	8.0	3670	0.79	0.38	24.2	25.9	-1.7	8.2	<0.1	<0.1	NAF
Highlands, 2020	9	Mixed plant reject	25-Aug-20	Horse (R40N, 300RL)	7.9	3780	0.90	0.62	27.6	22.9	4.7	3.4	6.8	14.3	PAF-LC
Highlands, 2020	10	Mixed plant reject	25-Aug-20	Horse (R40N, 280RL)	7.5	2270	1.16	0.71	35.5	11.2	24.3	2.7	19.7	32.4	PAF
Highlands, 2020	11	Mixed plant reject	25-Aug-20	Horse (R40N, 280RL)	7.6	2470	0.65	0.36	19.9	13.3	6.6	3.5	4.7	18.2	PAF-LC
Highlands, 2020	12	Mixed plant reject	25-Aug-20	Horse (R30 w et cells)	7.9	2760	0.54	0.24	16.5	13.7	2.8	3.6	4.6	17.2	PAF-LC
Highlands, 2020	13	Mixed plant reject	25-Aug-20	Horse (R30 w et cells)	7.8	3660	0.79	0.40	24.2	18.8	5.4	3.9	2.5	11.8	PAF-LC

pH and EC on 1:2 w ater extracts. MPA = Maximum potential acidity [calculated from Total S]; ANC = Acid neutralising capacity; NAPP = Net acid producing potential [calculated from MPA and ANC];
NAG = Net acid generation. Refer to report body for explanation of results and acid classification.

Table C2. Total Element Concentrations and Geochemical Abundance Indices for Coal Reject

Sample ID:	TT U/F 10/09/2019	TT U/F 17/09/2019	UF 16/10	UF 15/11/19	UF 3/12/19	UF 15/1/20	Median Soil Abundance	TT U/F 10/09/2019	TT U/F 17/09/2019	UF 16/10	UF 15/11/19	UF 3/12/19	UF 15/1/20
Collection Date:	10-Sep-19	17-Sep-19	16-Oct-19	15-Nov-19	3-Dec-19	15-Jan-20		10-Sep-19	17-Sep-19	16-Oct-19	15-Nov-19	3-Dec-19	15-Jan-20
Reject Type:	Tailings. Sampled from thickener underflow.							Tailings. Sampled from thickener underflow.					
Element	2-acid digest; ICP-MS analysis. All results mg/kg except where shown.							Geochemical Abundance Index (GAI)					
Ag	0.062	0.068	0.07	0.069	0.053	0.068	0.05	-	-	-	-	-	-
Al	0.55%	0.59%	0.46%	0.49%	0.58%	0.42%	7.1%						
As	7.35	5.44	12.05	9.99	11.35	8	6	-	-	-	-	-	-
B	<10	<10	<10	<10	<10	<10	10	-	-	-	-	-	-
Ba	435	514	561	358	265	377	500	-	-	-	-	-	-
Be	0.9	1	1.07	1	0.9	0.98	0.3	1	1	1	1	1	1
Bi	0.325	0.336	0.384	0.375	0.393	0.336	0.2	-	-	-	-	-	-
Ca	0.57%	0.4%	0.43%	1.12%	0.28%	0.64%	1.5%						
Cd	0.124	0.136	0.18	0.148	0.118	0.162	0.35	-	-	-	-	-	-
Co	3.68	3.83	8.63	5.18	6.99	4.25	8	-	-	-	-	-	-
Cr	2.73	2.33	3.81	2.54	3.71	2.26	70	-	-	-	-	-	-
Cu	23.4	23.4	34.6	27.4	18.9	33.1	30	-	-	-	-	-	-
Fe	1.58%	1.38%	1.76%	1.69%	2.05%	2.14%	4%						
Hg	0.125	0.137	0.154	0.161	0.255	0.109	0.06	-	1	1	1	2	-
K	0.15%	0.16%	0.16%	0.16%	0.13%	0.15%	1.4%						
Li	3.7	3.4	2.6	2.3	5.1	2.7	25	-	-	-	-	-	-
Mg	0.18%	0.18%	0.22%	0.19%	0.25%	0.22%	0.5%						
Mn	261	185.5	286	284	185	426	1000	-	-	-	-	-	-
Mo	1.7	2.87	2.01	2.13	1.97	1.48	1.2	-	1	-	-	-	-
Na	0.165%	0.174%	0.181%	0.186%	0.205%	0.123%	0.5%						
Ni	7.92	7.03	33.8	8.47	15.45	6.68	50	-	-	-	-	-	-
P	0.126%	0.105%	0.044%	0.093%	0.037%	0.044%	0.08%						
Pb	16.7	19.9	18.7	19	17.35	16.45	35	-	-	-	-	-	-
S	0.42%	0.44%	0.33%	0.76%	0.73%	0.72%	0.07%						
Sb	0.334	0.375	0.412	0.576	0.331	0.193	1	-	-	-	-	-	-
Se	1.105	1.265	1.22	1.6	1.565	1.34	0.4	1	1	1	1	1	1
Sn	0.65	0.81	0.69	0.65	0.69	0.55	4	-	-	-	-	-	-
Sr	86.8	99.5	80.9	93.9	304	60	250	-	-	-	-	-	-
Te	0.074	0.07	0.087	0.105	0.092	0.089	0.02	1	1	2	2	2	2
Th	5.31	6.45	5.49	5.87	4.05	4.13	9	-	-	-	-	-	-
Ti	<10%	0.001%	0.001%	0.001%	0.001%	0.001%	0.5%						
Tl	0.02	0.031	0.053	0.042	0.051	0.013	0.2	-	-	-	-	-	-
U	0.804	0.856	0.77	0.941	0.464	0.675	2	-	-	-	-	-	-
V	9.7	8.4	15.8	9.5	10.8	10.4	90	-	-	-	-	-	-
W	0.056	0.07	0.067	0.079	0.033	0.022	1.5	-	-	-	-	-	-
Zn	66.7	61.2	75.2	62.1	47.8	70.4	90	-	-	-	-	-	-
Zr	3.96	4.41	3.69	4.48	2.84	3.82	400	-	-	-	-	-	-

Data from BHP geochemical database. Results for selected minor elements (Ce, Cs, Ga, Ge, Hf, In, La, Nb, Rb, Re, Sc, Ta, Y) not shown, and all have GAI values of 1 or <1.

Table C2 (cont.) Total Element Concentrations and Geochemical Abundance Indices for Coal Reject

Sample ID:	CVM DT 14/02/17	CVM DT 28/02/17	CVM DT 20/03/18	14060440	14060444	CVM CR 14/02/17	CVM CR 28/02/17	CVM CR 02/09/17	CVM CR 20/03/18	14060441	14060445	CVM MPR 28/02/17	14060438	14060439	14060442	14060443
Collection Date:	14-Feb-17	28-Feb-17	20-Mar-18	15-May-14	5-Jun-14	14-Feb-17	28-Feb-17	2-Sep-17	20-Mar-18	15-May-14	5-Jun-14	28-Feb-17	15-May-14	15-May-14	5-Jun-14	5-Jun-14
Reject Type:	Fine Reject					Coarse Reject						Mixed Plant Reject (MPR)				
Element	2-acid digest; ICP-AES analysis. All results mg/kg except w here show n.															
Al	0.346%	0.987%	0.354%	0.393%	0.306%	0.109%	0.547%	0.222%	0.164%	0.196%	0.236%	0.491%	0.293%	0.27%	0.193%	0.252%
As								<5								
B	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Ba								160								
Be								<1								
Ca			0.833%						0.797%							
Cd	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Co								2								
Cr								<2								
Cu	21	38	25	35	20	12	26	27	46	47	29	29	30	23	21	20
Fe	2.68%	4.15%	1.69%	2.06%	0.464%	2.67%	2.71%	1.3%	1.1%	1%	0.616%	5.47%	1.5%	2.41%	0.391%	0.53%
Mg			0.177%						0.117%							
Mn		316	236				459	223	208			888				
Na			0.169%						0.093%							
Ni								3								
Pb								19								
Sb								<5								
Se								<5								
Sn								<5								
Sr								74								
V								6								
Zr	56	91	53	78	50	28	42	35	32	98	50	50	38	32	40	40

Data from BHP geochemical database. Geochemical Abundance Index (GAI) results not show n. All samples have GAI values <1 for all elements (w here results are available).

Table C3. Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Coal Reject

Sample Date:	17-Sep 2019	3-Dec 2019	17-Sep 2019	3-Dec 2019	15-May 2014	5-Jun 2014	14-Feb 2017	28-Feb 2017	20-Mar 2018	15-May 2014	5-Jun 2014	14-Feb 2017	28-Feb 2017	2-Sep 2017	20-Mar 2018	15-May 2014	15-May 2014	5-Jun 2014	5-Jun 2014	28-Feb 2017
Leach Type:	1:20 ASLP	1:20 ASLP	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5
Sample Type:	Tailings				Fine Reject					Coarse Reject						Mixed Plant Reject (MPR)				
pH	7.95	7.42	8.4	7.7	7.6	6.6	9.0	6.5	8.8	7.8	7.4	8.8	7.0	7.9	9.4	8.9	7.8	7.3	7.1	7.0
EC (μS/cm)	434	633	1330	1730	379	302	655	962	766	403	239	261	372	435	407	256	251	353	370	962
Alk.* - Total	27	27	300	428	18	13	1372	200	2120	13	13	214	70	122	63	26	20	13	20	30
Alk.* - HCO_3	27	27	300	428	18	13	1358	<1	2100	13	13	210	<1	122	46	26	20	13	20	<1
Alk.* - CO_3	<1	<1	<1	<1	<0.2	<0.2	14	<1	18	<0.2	<0.2	4	<1	<1	18	<0.2	<0.2	<0.2	<0.2	<1
SO_4	54	136	186	510	196	64	120	512	170	122	46	38	112	62	72	52	108	40	34	504
Cl	87	84	332	310	36	68	176	150	218	58	46	30	24	92	62	40	16	94	112	34
F	0.35	0.27	0.31	0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ca	4	12	18	46	4	<2	8	46	12	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	52
Mg	4	9	18	36	6	<2	6	30	12	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	34
Na	74	89	226	294	112	82	208	232	202	104	62	78	80	94	92	64	72	80	94	150
K	5	4	12	12	8	<2	2	4	8	2	<2	<2	<2	<2	2	<2	2	<2	<2	2
Al	1.8	0.61	<0.02	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
As	0.006	<0.001	<0.002	<0.002	-	-	-	<0.02	<0.02	-	-	-	<0.02	0.02	<0.02	-	-	-	-	<0.02
B	0.07	<0.05	<0.2	<0.2	-	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	-	-	-	-	<0.2
Ba	0.172	0.098	0.024	0.014	-	-	-	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	-	-	-	-	<0.2
Be	<0.001	<0.001	<0.002	<0.002	-	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	-	-	-	-	<0.02
Cd	<0.0001	<0.0001	<0.002	<0.002	-	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	-	-	-	-	<0.02
Co	<0.001	<0.001	<0.002	<0.002	-	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	-	-	-	-	<0.02
Cr	<0.001	<0.001	<0.002	<0.002	-	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	-	-	-	-	<0.02
Cu	0.002	<0.001	<0.002	<0.002	-	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	-	-	-	-	<0.02
Fe	0.2	0.08	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hg	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	<0.0001	<0.0001	-	-	-	<0.0001	<0.0001	<0.0001	-	-	-	-	<0.0001
Mn	0.004	0.018	0.006	0.092	-	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	-	-	-	-	<0.02
Mo	0.03	0.01	0.078	0.016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ni	<0.001	<0.001	<0.002	0.002	-	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	-	-	-	-	<0.02
Pb	0.002	<0.001	<0.002	<0.002	-	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	-	-	-	-	<0.02
Sb	0.001	<0.001	<0.002	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Se	<0.01	<0.01	<0.02	<0.02	-	-	-	<0.02	<0.02	-	-	-	<0.02	0.06	<0.02	-	-	-	-	<0.02
Sr	0.082	1.86	0.4	4.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V	<0.01	<0.01	<0.02	<0.02	-	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	-	-	-	-	<0.02
Zn	0.032	0.03	<0.01	<0.01	-	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02	<0.02	-	-	-	-	<0.02

Data from BHP database. 1:5 (solid:water) leaches and 1:20 modified ASLP leaches, as indicated. * Alkalinity as CaCO3. All results mg/L except EC (μS/cm) and pH. Results for selected elements from two tailings samples [17-Sep-2019 & 03-Dec-2019] not shown. Results not shown include hydroxide alkalinity, acidity, Bi, P, Sn, Th, Ti, U, W and Zr, and all have concentrations less than or equal to the laboratory LOR.

Appendix D

Acid Buffering Characterisation Curves for Potential Spoil and Coal Reject

Figure D1. Acid-Buffering Characterisation Curves for Potential Spoil

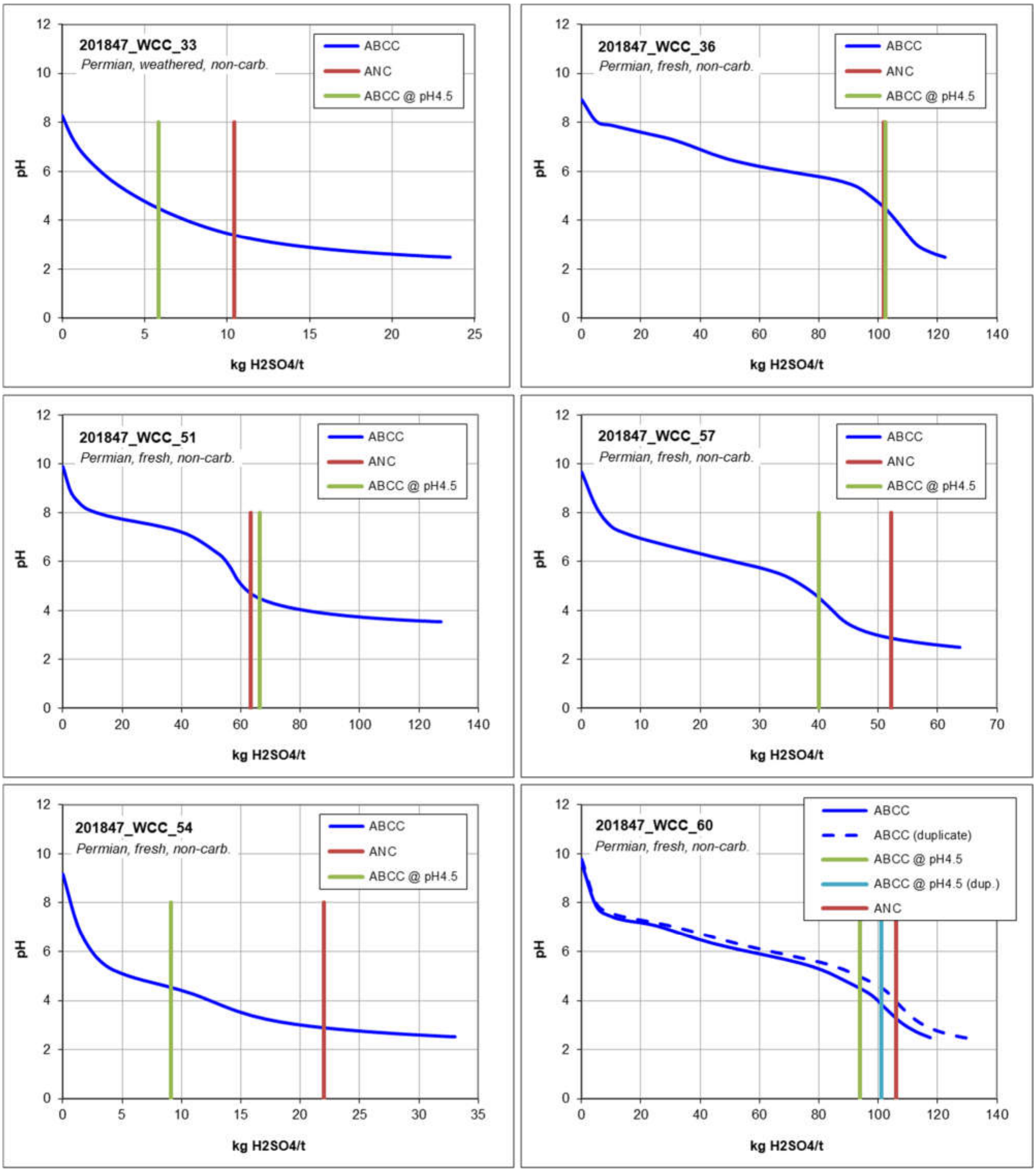


Figure D1 (cont.) Acid Buffering Characterisation Curves for Potential Spoil

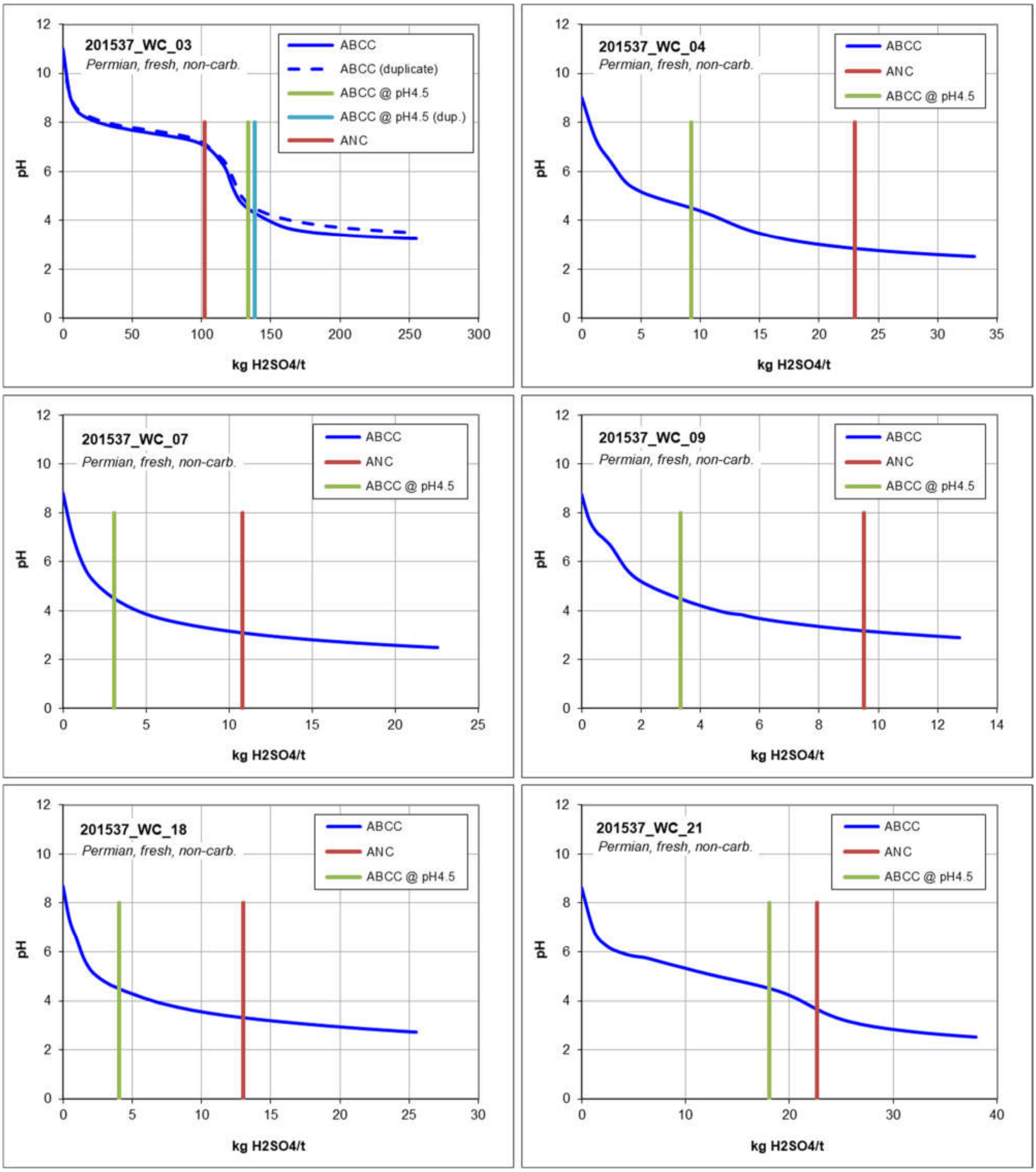


Figure D1 (cont.) Acid Buffering Characterisation Curves for Potential Spoil

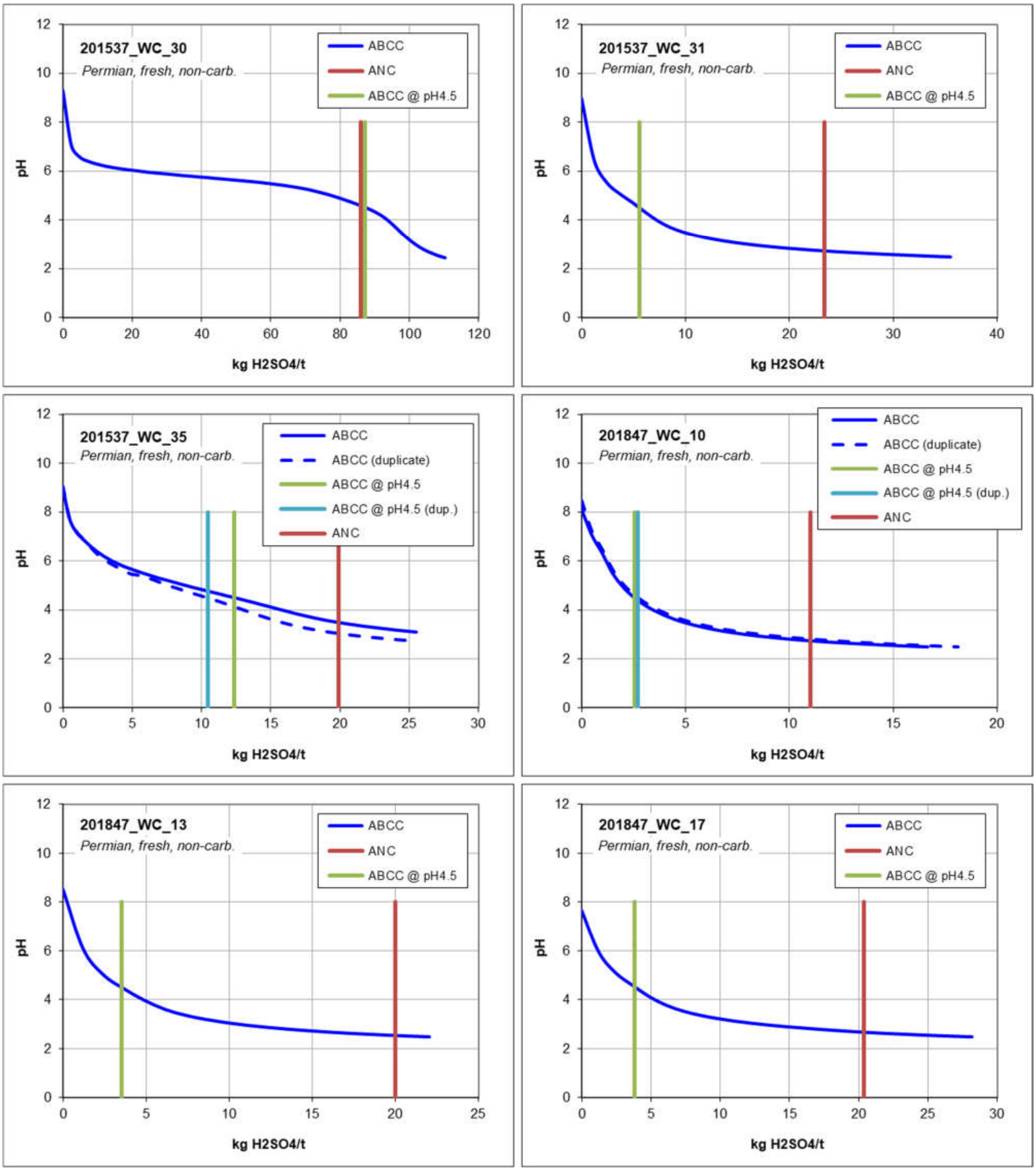


Figure D1 (cont.) Acid Buffering Characterisation Curves for Potential Spoil

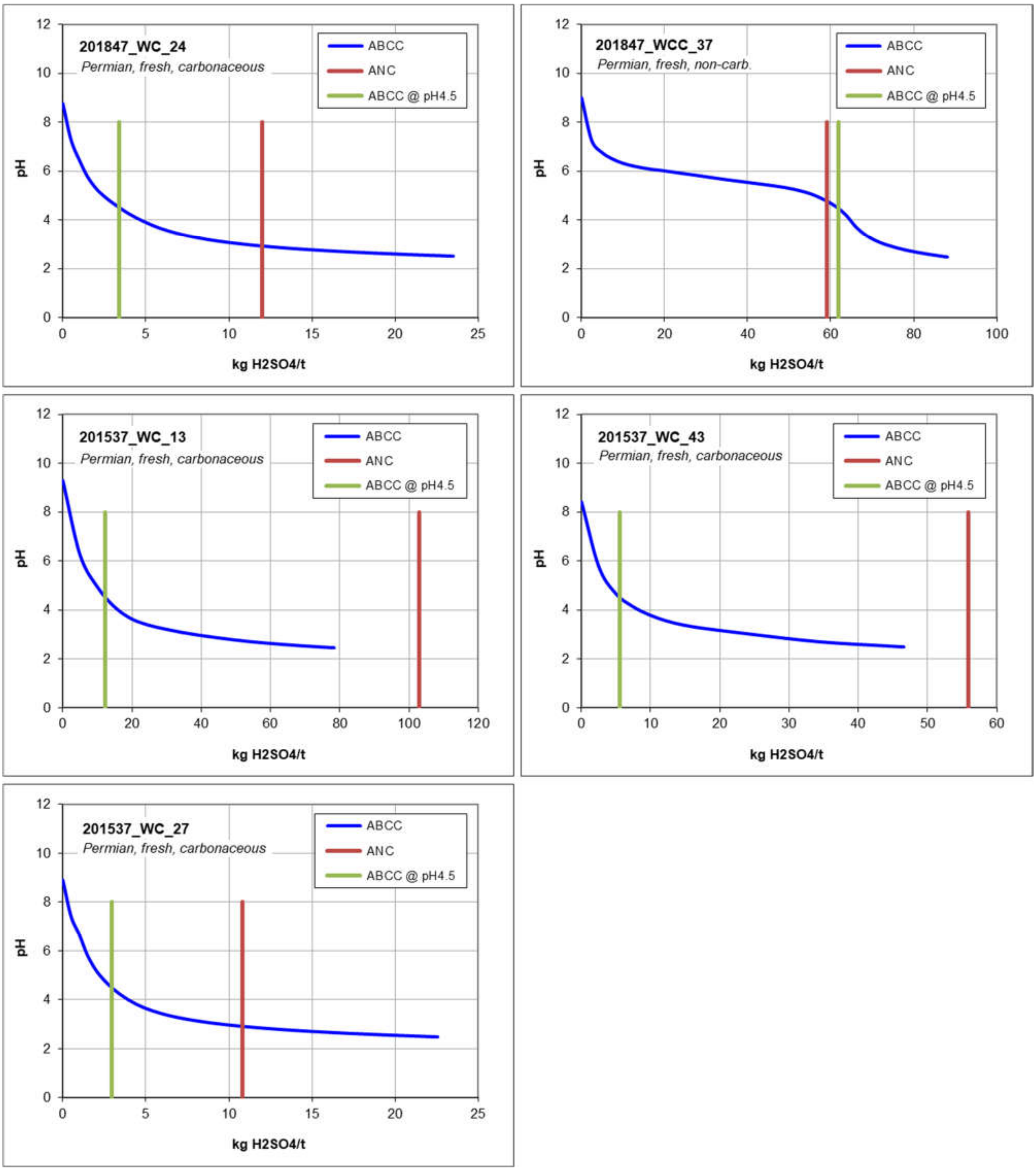
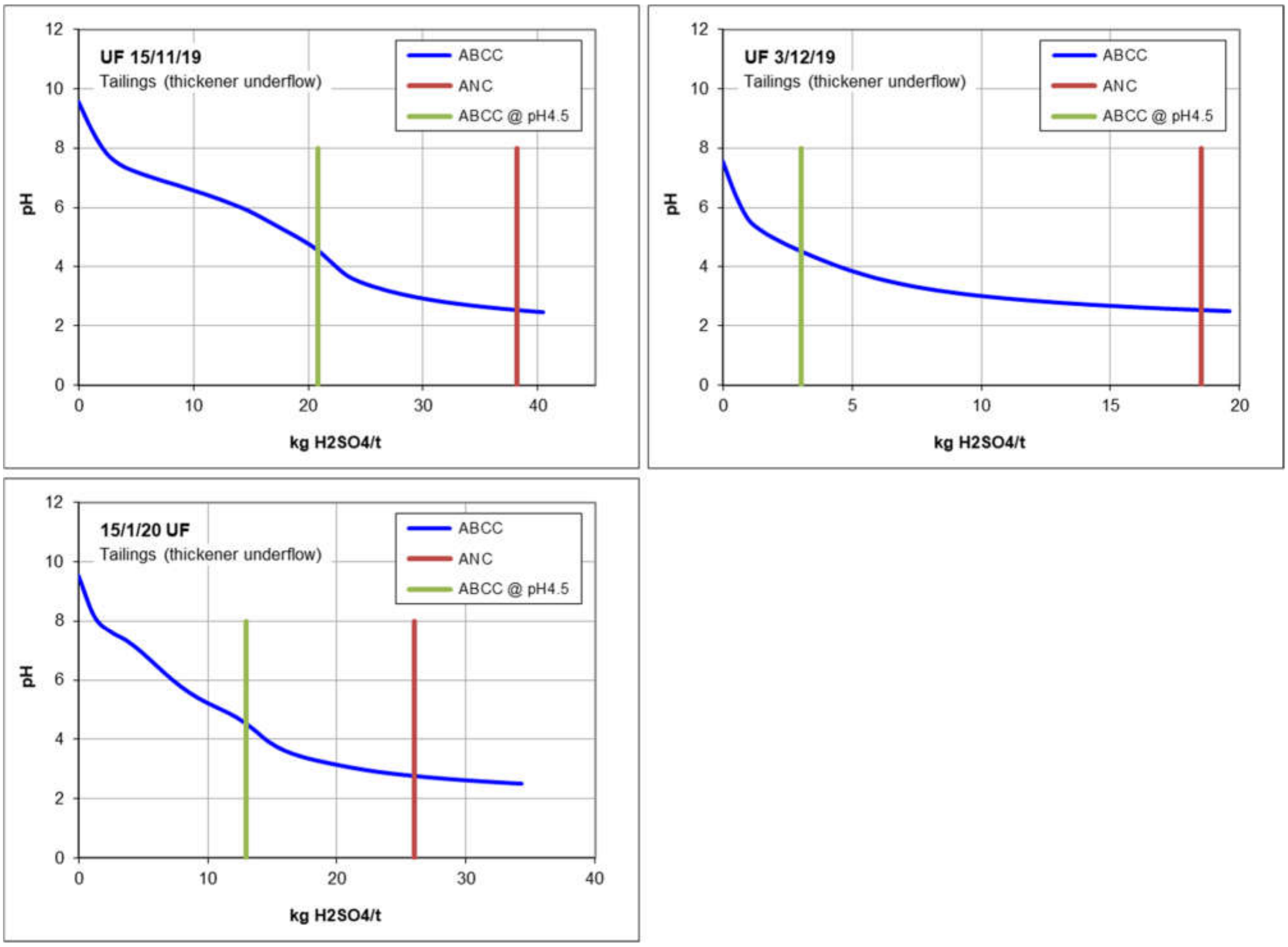


Figure D2. Acid-Buffering Characterisation Curves for Coal Reject (Tailings)



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