Waratah Coal

Waste Rock, Rejects and Tailings Report

China First Coal Project – Galilee Basin

November 2012

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Table of Contents

Executive Summary

The China First Coal Mining Project includes two open-cut mines and four longwall mines. The Project will produce 56Mtpa of ROM coal. Waste from this volume will include 10.7Mtpa of coarse rejects and 5.3Mtpa of tailings paste.

Prior to transport, coarse rejects will be drained and tailings will be filter pressed to remove moisture. They will then be trucked to properly designed containment cells in the box cut and other spoil areas. The cells will be clay lined to be effectively impervious and cells will be raised in stages. The wastes will be dumped in the cells, spread by dozer and track compacted. This will reduce permeability, minimise seepage and prevent oxidisation.

To date assays have found the majority of spoil materials to be benign. Any potentially saline or oxidisable materials will be placed in the central areas of spoil piles and buried. Spoil will initially be placed at angle of repose. During rehabilitation, spoil piles will be flattened to geotechnically stable and erosion resistant batter angles, topsoiled and seeded.

Geochemical tests have been completed on overburden drill cores. Total sulphur ranged from 0.03% to 0.42%. The pH variation was 5.2% to 8.5% and the net acid production potential ranged from non-acid forming to uncertain acid forming. Concentrations of the trace elements arsenic, cadmium, chromium, copper lead, nickel and zinc, are standard for coal seam overburden.

When samples of rejects and tailings are available static geochemical testing which will be completed includes pH, electrical conductivity, total sulphur, chromium reducible sulphur and acid neutralising capacity.

The objectives of the rehabilitation and closure strategy are to achieve acceptable post-disturbance land use suitability, create a stable post-disturbance landform and preservation achieved by implementing proper rehabilitation procedures including re-shaping and topsoiling, selection of suitable species of vegetation and ongoing monitoring. Progressive rehabilitation will proceed conjunctively with mining.

Success criteria have been defined to ensure proper rehabilitation results. The success criteria will be reviewed every three to five years. Maintenance of rehabilitated areas will be undertaken to ensure that all areas are returned to an acceptable standard.

1.0 Introduction

This report has been developed to assess the impacts of waste products produced through mining operations at the Galilee Coal Project (which is also known as, and hereafter referred to, as the China First Coal Mining Project). The assessment was completed to facilitate the development and implementation of appropriate environmental management strategies for mining waste materials and comply with Environmental Authority (DEHP, 2012) requirements. The report provides a detailed description of waste generated through open-cut mining activities from the overburden and coal processing waste products known as coarse rejects and fine tailings. The report accounts for site geology, waste quantities being developed through mining activities, the manner in which different wastes are stored, the characterisation of waste products, the geochemical nature of coal and waste materials, and the mitigation and management measures put in place to handle waste.

Waratah Coal intends to establish a new coal mine, railway and coal stockyards and supporting infrastructure to export high volatile, low sulphur, steaming coal to international markets. The coal will be sourced from Waratah Coal's proposed mining lease near Alpha in the Galilee Basin, in Central Queensland and exported through the port site of Abbot Point.

The proposed mine site is situated in the Galilee Basin approximately 35km north west of Alpha. To date the exploration program has identified 3.68 billion tonnes of JORC resource coal within the proposed mining area. Coal quality tests have confirmed that these coal resources average less than 0.5% of sulphur and possess an average calorific value of 26 MJ/kg.

The mine site will consist of two open-cut areas each producing 10Mtpa of ROM coal and four underground longwall systems each producing 9Mtpa of ROM coal. The mine will be developed in a staged process with open-cut coal being produced initially and later underground longwall coals.

Coal is formed in an environment where forests were buried under layers of sediments and soil over 300 million years ago. Becoming compressed and protected from biodegradation and oxidisation and placed under extreme pressure and temperature, dead vegetation was slowly converted to coal. Within this environment there is some potential to produce sulphides within the coals and overlying sediments. However, generally speaking, at the China First Mine, sediments within the interburden and overburden layers will have very low sulphide content.

The mining activities conducted on this site, which include removal of overburden and interburden and the removal of coal, may result in the disturbance of sulphides which can oxidise after being exposed to air and water. This oxidisation of sulphides can form an acidic leachate with concentrations of sulphate salts. The report looks at the levels of sulphides within coal and mining waste materials and whether there is a potential to oxidise and overcome any natural inherent inhibitor.

The development of the mine will see the progress of coal mining and waste generation activities which have the potential to develop levels of poor quality leachate. The assessment of coal mining materials and waste will analyse the geochemical characteristics and provide guidance for methods adopted to manage wastes and rehabilitation.

The first form of waste produce through the mining sequence will be box cut overburden, followed by coal rejects and tailings. All three will be placed within the box cut spoil emplacement facility foot print. Later, during the mining life, these same waste materials will be placed within dedicated areas of in-pit spoil areas as shown in Figure 1. The correct design philosophies and management will be put in place to manage erosion and run off. Where there exists the potential of saline or sodic materials, water management strategies will be put in place to ensure run off reports to the pit voids to be recycled as process water.

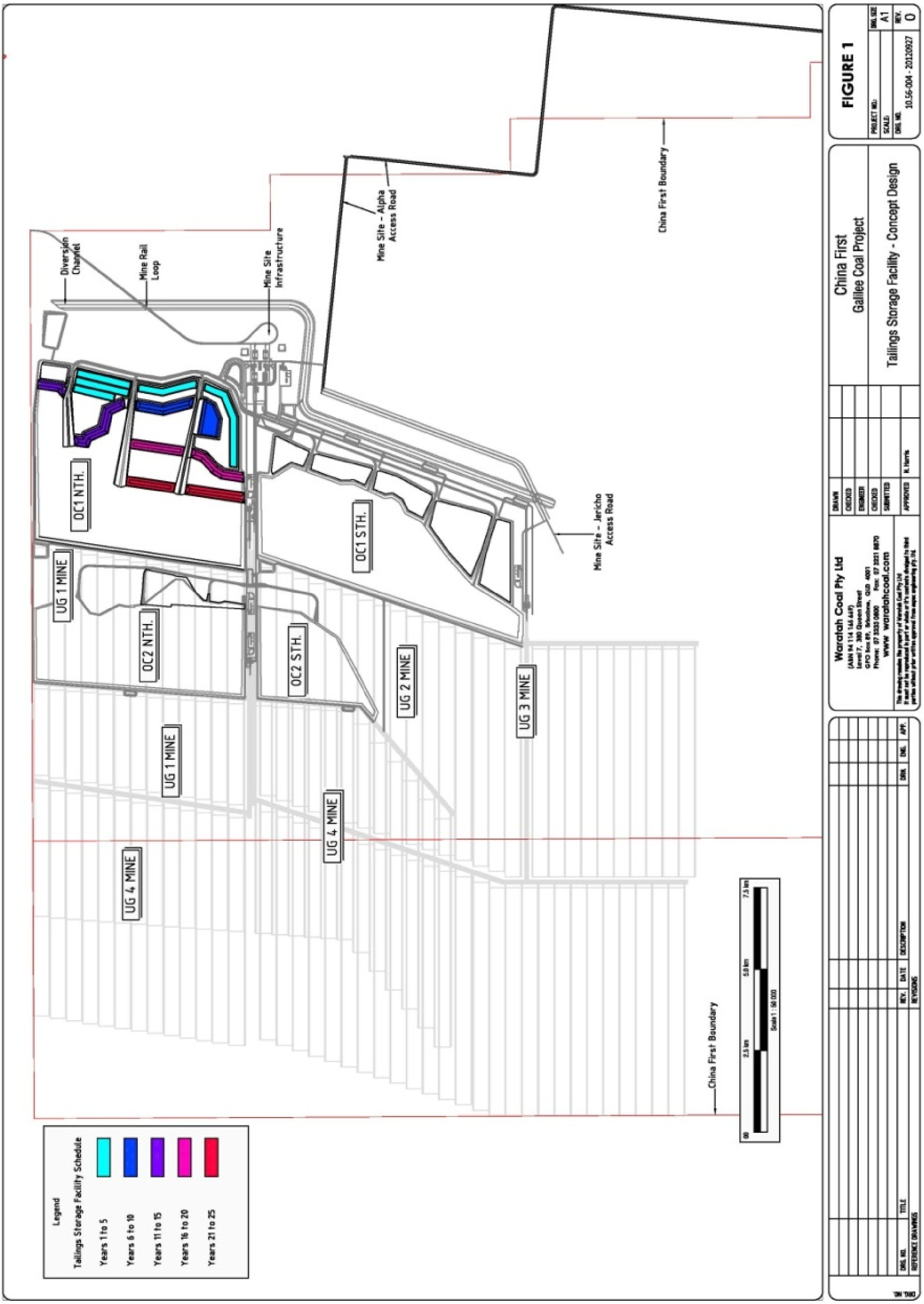

Figure 1: Open-cut and Underground Mine Layout

1.1 Geology

The China First Project mine site coal deposit forms part of the eastern edge of the Galilee Basin. The main target coal seams are (from youngest to oldest) B, C and D Seams. The basin can be best described as intracratonic and is filled with late Carboniferous to middle Triassic sediments. These rocks are dominantly fluvial in origin with minor glacial material developed at the base of the succession.

The stratigraphy in the vicinity of the mine site can be generally described as Quaternary alluvials and Tertiary sands, clays and laterites which unconformably overlie the distinctive grey-greenish Triassic mudstones and claystones of the Rewan Formation. The Rewan Formation, in turn, conformably overlies the Late Permian shales, siltstones, sandstones and coal seams of the Bandanna Formation and Colinlea Formation. The 'B' seam, is found within the Bandanna Formation and the 'C' and 'D' seams found in the Colinlea Formation. This stratigraphic section is shown in Figure 2.

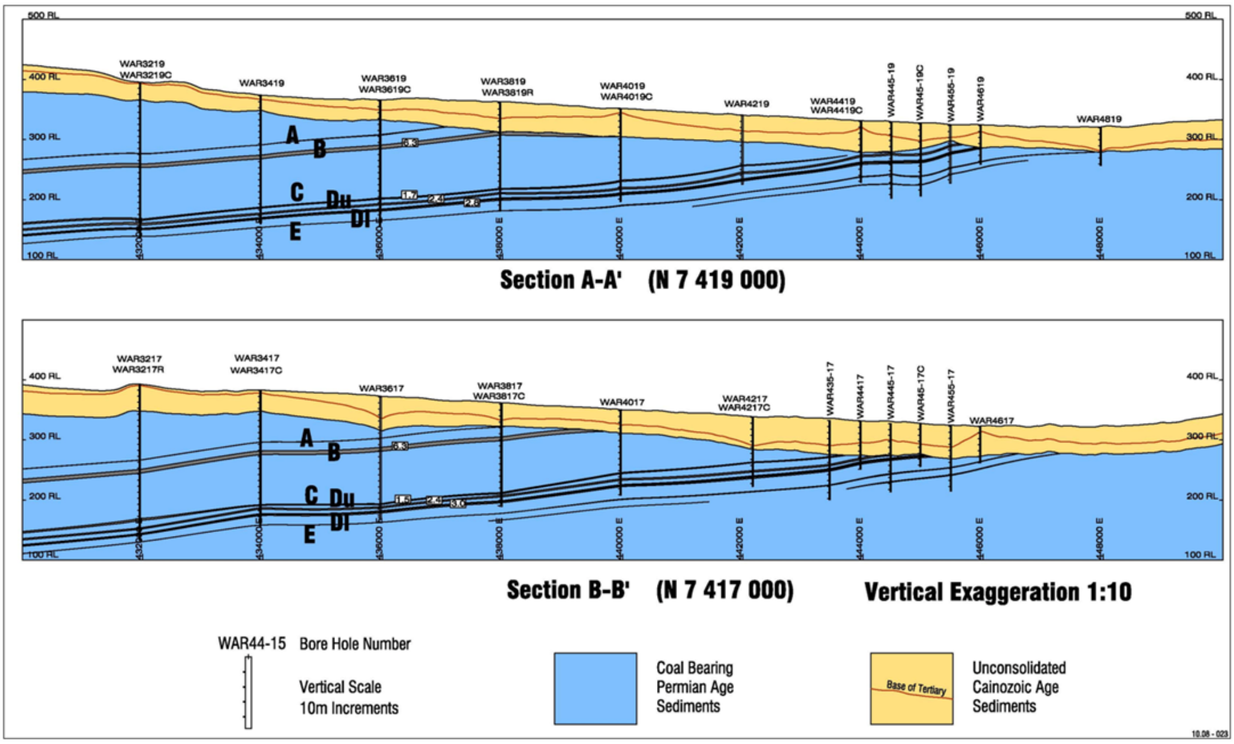

Figure 2: Stratigraphic Section

1.1.1 Cainozoic-Tertiary Cover

Unconsolidated Cainozoic and Tertiary sediments dominate the surface lithology of the Project area. Unconsolidated sands, silts and clay, lateritised in part, form an extensive blanket over the Project area, with a thickness of up to 90m in eastern and central sections. The Permian does not outcrop in the Project tenements. There is a variety of Recent and Quaternary sediments within the Cainozoic which post-dates the Tertiary blanket. In the east of the tenements, the Tertiary sediments sit directly on the Permian. This contact is unconformable and represents an extensive time gap. The contact is erosional in part.

The Cainozoic tends to thin in the west and Waratah's drilling and previous exploration show the Triassic Rewan Formation is rarely at outcrop or shallow depth in this region. The Rewan Formation is conformable on the Permian strata and consists of the greenish sandstones and siltstones well known in association with the Rangal Coal Measures in the Bowen Basin to the east. The contact between the Rewan and Permian sits generally 20m to 40m above the A seam.

1.1.2 Permian

The Permian consists of competent sandstones, siltstones, mudstones and claystones with intercollated coal seams. The Permian dips gently to the west at <1˚ dip and appears to be free of significant structure. The coal seams names are currently allocated from the selection process of alphabetical sequence used by previous explorers in the area. The A and B seams are in the Bandanna Formation and the sequence for C downwards is in the Colinlea Sandstone. It is acknowledged that the E and F seams may belong to a lower Formation again.

2.0 Mining Waste

Waratah Coal Pty Ltd proposes to develop the China First Coal Project within the Galilee Basin, 35km north-west of the township of Alpha. The China First Coal Project is an integrated Project developing new coal mines and a high capacity rail system, and using future or existing coal export facilities at the Port of Abbot Point and the Abbot Point State Development Area, to export high quality thermal coal to international markets.

The coal mines will be contained within the exploration permit for coal tenements 1040 and part of 1079, and mining lease application (MLA) 70454. These tenures occur in a broad strike valley draining to the north, with the Great Dividing Range to the west and the Drummond Range to the east. Tallarenha Creek flows along the eastern side of the mine site and converges with Beta Creek to form Lagoon Creek, which then drains to the north of the mine site. Lagoon Creek will require diversion into Saltbush Creek.

2.1 Coal and Mining Waste Quantities

The new coal mining Project consists of two open-cut operations and four underground longwall mines. The two open-cut operations have a combined strike length of approximately 26km and will have a final footprint area of 9655ha. The two open-cuts will produce 20Mtpa of ROM coal, combined with 36Mtpa of underground longwall coal ROM coal. The combined tonnage of 56Mtpa will be processed to produce 40Mtpa of product coal. The waste products produced from the combined open-cut and underground operations are open-cut overburden, coarse coal rejects and fine coal tailings.

2.1.1 Open-cut Overburden Waste

The total volume of overburden handled is approximately 7.56 billion tonnes over a 25-year mine life, which equates to 302Mtpa to expose 20Mtpa of open-cut raw coal. The coarse rejects produced from 56Mtpa of raw coal is 10.7Mtpa, with a further 5.3Mtpa of fine tailings paste also produced. The overburden emplacement area footprint of the northern open-cut one is suitable for tailings paste and rejects storage and will be utilised accordingly. The production of ROM coal, product coal, overburden, coarse rejects and fine rejects is shown in Table 1. A further description of overburden quantities expressed over life of mine for 25 years is shown in Figure 3.

Table 1: Waste quantities produced on an annual and life of mine time scale

	Annual Production	Life of Mine (25 years)
ROM Coal	56Mtpa	1400 Mt
Product Coal	40Mtpa	1000 Mt
Coarse Rejects	10.7Mtpa	267.5 Mt
Fine Paste Tailings	5.3Mtpa	132.5 Mt
Overburden	302Mtpa	7550 Mt

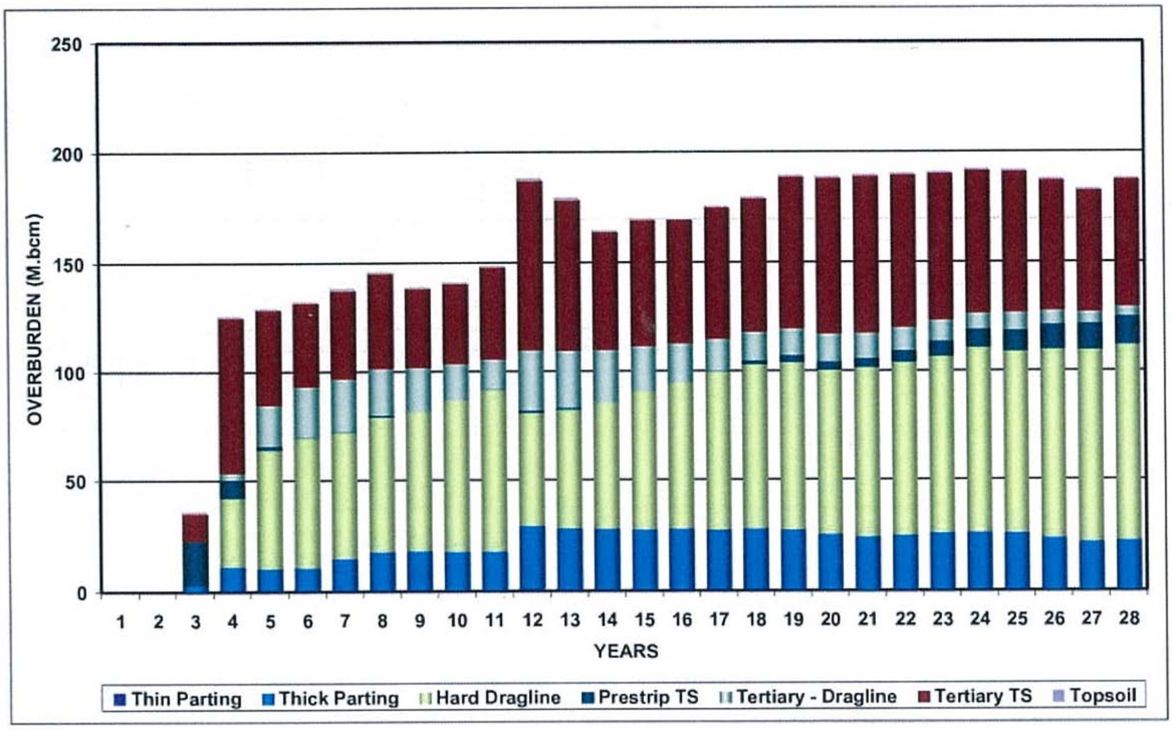

Figure 3: Overburden quantities by type

2.1.2 Rejects and Tailings Paste Quantities

The quantity of tailings and rejects has been calculated based on the ramp up period being three years before full production of 56Mtpa of raw coal occurs. Table 2 indicates the tailings and rejects schedule.

Table 2: Tailings Schedule

Years	Cell Number	Stage Number	Crest RL	Storage Capacity	Cumulative	Life of Mine
				000 (m³)	Capacity	
					000 (m³)	
1 to 5	1	1	10	6457533	6457533	1
	1	2	20	10926811	17384344	2
	1	3	30	13452609	30836953	3
	1	4	40	13565152	44402105	4
	1	5	50	13565152	57967256	5
6 to 10	2	1	10	13565152	71532408	6
	2	2	20	13565152	85097560	7
	2	3	30	13565152	98662711	8
	2	4	40	13565152	112227863	9
	2	5	50	13565152	125793015	10
11 to 15	3	1	10	13565152	139358166	11
	3	2	20	13565152	152923318	12
	3	3	30	13565152	166488470	13
	3	4	40	13565152	180053621	14
	3	5	50	13565152	193618773	15
16 to 20	4	1	10	13565152	207183925	16
	4	2	20	13565152	220749076	17
	4	3	30	13565152	234314228	18
	4	4	40	13565152	247879380	19
	4	5	50	13565152	261444531	20
21 to 25	5	1	10	13565152	275009683	21
	5	2	20	13565152	288574835	22
	5	3	30	13565152	302139986	23
	5	4	40	13565152	315705138	24
	5	5	50	13565152	329270290	25

The Tailings Storage Facilities (TSF) will be designed to receive and store tailings produced by the CHPP for the nominal 25 years mine life. Tailings paste and rejects will be trucked to dedicated TSF cells within the box cut and other spoil areas. Table 3 lists the tailings storage capacity required for the life of the mine.

Table 3: Tailings and Rejects Storage Capacity for the Life of the Mine

Life of mine	Raw coal	Solid rejects	Rejects moisture	Solid tailings	Tailings moisture	Stored	Cumulative	TSF stage	Five year stage
Year	000 tonnes	000 tonnes 19%	16.00%	000 tonnes 9.5%	26%	tailings and rejects	tailings and rejects		
			Ml/yr	Ml/yr	Ml/yr	m³/yr	m³		m³
Construction 1	0								
Construction 2	0								
Construction 3	0								
1	26681	5096	815	2535	659	6457533	6457533		
2	45147	8623	1380	4289	1115	10926811	17384344		
3	55583	10616	1699	5280	1373	13452609	30836953		
4	56048	10705	1713	5325	1384	13565152	44402105		
5	56048	10705	1713	5325	1384	13565152	57967256	Stage 1 - Out of Pit	57967256
6	56048	10705	1713	5325	1384	13565152	71532408		
7	56048	10705	1713	5325	1384	13565152	85097560		
8	56048	10705	1713	5325	1384	13565152	98662711		
9	56048	10705	1713	5325	1384	13565152	112227863		
10	56048	10705	1713	5325	1384	13565152	125793015	Stage 2 - In pit	67825758
11	56048	10705	1713	5325	1384	13565152	139358166		
12	56048	10705	1713	5325	1384	13565152	152923318		
13	56048	10705	1713	5325	1384	13565152	166488470		
14	56048	10705	1713	5325	1384	13565152	180053621		
15	56048	10705	1713	5325	1384	13565152	193618773	Stage 3 - In pit	67825758
16	56048	10705	1713	5325	1384	13565152	207183925		
17	56048	10705	1713	5325	1384	13565152	220749076		
18	56048	10705	1713	5325	1384	13565152	234314228		
19	56048	10705	1713	5325	1384	13565152	247879380		
20	56048	10705	1713	5325	1384	13565152	261444531	Stage 4 - In pit	67825758
21	56048	10705	1713	5325	1384	13565152	275009683		
22	56048	10705	1713	5325	1384	13565152	288574835		
23	56048	10705	1713	5325	1384	13565152	302139986		
24	56048	10705	1713	5325	1384	13565152	315705138		
25	56048	10705	1713	5325	1384	13565152	329270290	Stage 5 - In pit	67825758

The methodology for staging of tailings disposal is indicated schematically in Figure 4, and tabulated in Table 6. Stage 1 dedicated for mine life of 1 to 5 years will be an out of pit storage facility located within the bounds of initial box cut spoil. Stages 2, 3, 4 and 5 will be for the remaining mine's life of years 6 to 25. These stages are purpose built storage facilities set within the open-cut spoil areas.

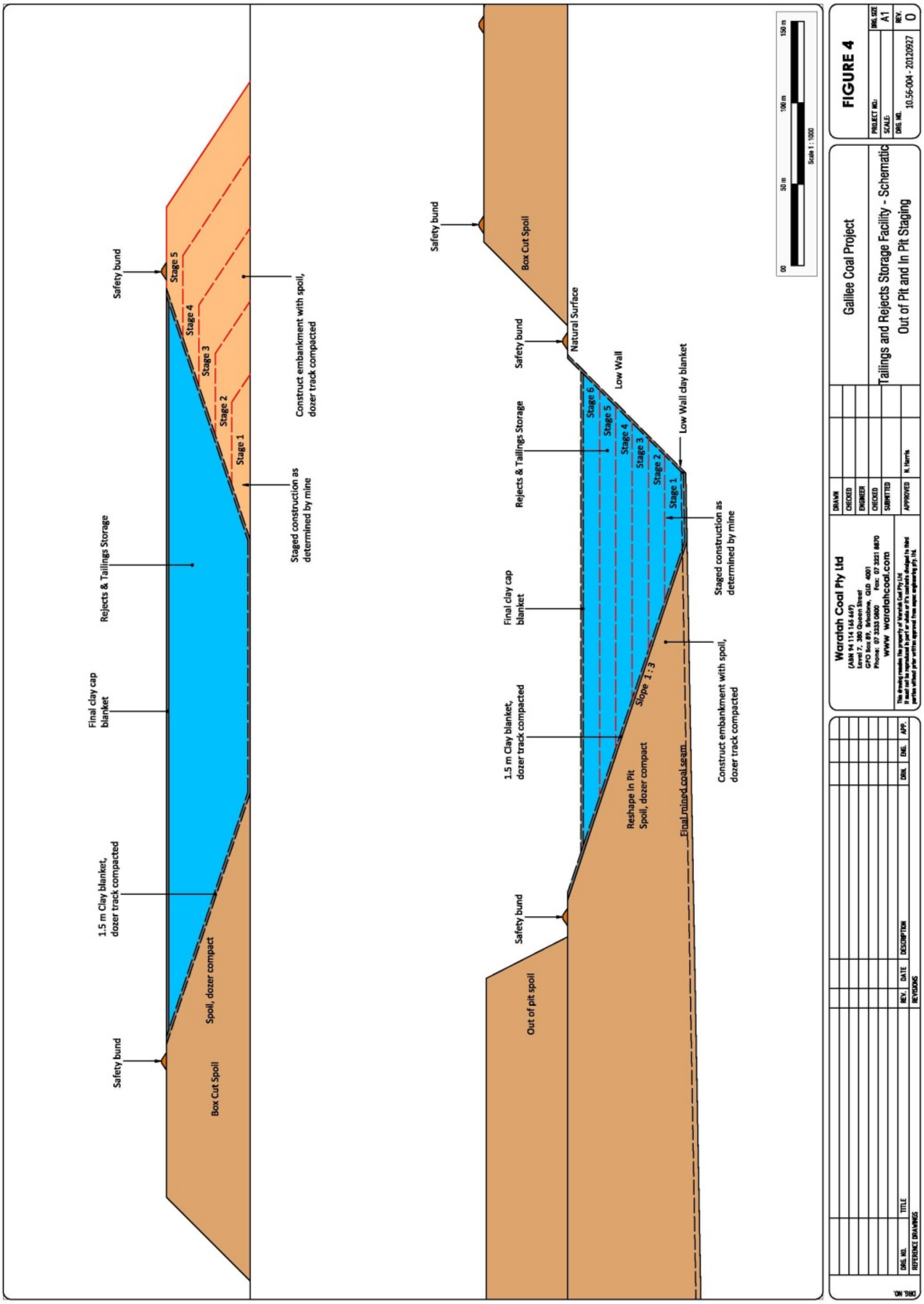

Figure 4: Sectional view of TSF development cell staging

2.2 Overburden and Coal Mine Waste Storage

2.2.1 Overburden

All materials overlying the coal seams are categorised as overburden, which is removed to gain access to coal seams. The overburden is removed by drill and blast operation followed by either a truck and shovel excavation operation, or dragline excavation operation, or the combination of both. The overburden once removed and disturbed is classified as spoil and reports to dedicated spoil areas either within the open pit void or within the bounds of out of pit spoil emplacement areas. The out of pit emplacement areas run parallel and east of the initial box cut areas and accommodate spoil from the initial box cut.

To date assays have found the majority of spoil materials to be geochemically benign, however certain environmental management activities for spoil materials will be put in place. Where it is apparent, potentially saline materials will be placed within the central areas of spoil piles, then covered by benign materials, reshaped and topsoiled with vegetation as part of the rehabilitation campaign. Spoil piles will be appropriately reshaped and contoured as per rehabilitation guidelines to assist in spoil drainage and minimising slope erosion.

2.2.2 Coal Mining

Coal being exposed through removal of overburden will be handled by a truck and shovel fleet and transported to a ROM facility located next to the Coal Handling Processing Plant. The coal is stacked in various process staged stockpiles as it is transformed from raw coal to product coal. There are essentially three stockpiles for ROM, raw and product coal. The final storage area is the product stockpile before being conveyed to train loadout surge bin ready for rail transportation to port.

Any saline materials derived from coal processing will be controlled through the capture in dirty water dams being suitably sized and strategically placed. Run off water reporting to dirty water dams will be recycled and will report to the process water dam to be used in coal processing.

2.2.3 Coarse Rejects

Coarse rejects which is one of two waste products developed through coal processing, reports to rejects storage bin. The rejects storage surge bin is located next to coal handling processing plant.

The rejects storage surge bin will load trucks, which will haul rejects to dedicated rejects storage sites within spoil emplacement areas. The rejects will be dumped in layers and tracked rolled by dozers. The rejects storage facilities within spoil areas will be clay lined and clay capped to be later topsoiled and rehabilitated.

Compaction of rejects will minimise oxidisation, exposure to water and seepage. Run off water will report to pit voids and be recycled for coal processing.

2.2.4 Tailings

Fine tailings will be processed through a filter press dewatering the tailings and forming a dry paste which will be stockpiled. The tailings paste will be loaded onto trucks and transported to containment cells within the spoil piles where it will be dumped and track rolled by dozers, together with coarse rejects. The tailings storage facilities within spoil areas will be clay lined and clay capped to be later topsoiled and rehabilitated.

Compaction of tailings paste and rejects will minimise oxidisation, exposure to water and seepage. Run off water will report to pit voids and be recycled for coal processing.

3.0 Coal and Mining Waste Characterisation

3.1 Overview of Approach

Acid rock drainage (ARD) is produced by the exposure of sulphide minerals such as pyrite to atmospheric oxygen and water. The ability to identify in advance any mine materials that could potentially produce ARD is essential for timely implementation of mine waste management strategy.

A number of procedures have been developed to assess the acid forming characteristics of mine waste materials. The most widely used methods are the Acid-Base Account (ABA) and Net Acid Generation (NAG) tests. These methods are referred to as static procedures because each involves a single measurement time.

3.2 Acid Base Account

The acid-base account involves static laboratory procedures that evaluate the balance between acid generation processes (oxidation of sulphide minerals) and acid neutralising processes (dissolution of alkaline carbonates, displacement of exchangeable bases, and weathering of silcates).

The values arising from the acid-base account are referred to as the potential acidity and acid neutralising capacity value. The difference between the potential acidity and the acid neutralising capacity is referred to as the net acid producing potential (NAPP).

3.3 Net Acid Generation (NAG) Test

The NAG test is used in association with the NAPP to classify the acid generating potential of a sample. The NAG test involves reaction of a sample with hydrogen peroxide to rapidly oxidise any sulphide minerals contained within a sample. During the NAG test both acid generation and acid neutralisation reactions can occur simultaneously. The end result represents a direct measurement of the net amount of acid generated by the sample. The final pH is referred to as the NAGpH and the amount of acid produced is commonly referred to as the NAG capacity, and is expressed in the same units as the NAPP (kg H_2SO_4/t).

Several variations of the NAG test have been developed to accommodate the wide geochemical variability of mine waste materials. The four main NAG test procedures currently used here are the single addition NAG test, the sequential NAG test, the kinetic NAG test, and the extended boil and calculated NAG test.

3.4 Sample Classification

The acid forming potential of a sample is classified on the basis of the acid-base and NAG test and results one of the following categories:

- Barren
- Non-acid forming (NAF)
- Potentially acid forming (PAF); and
- Uncertain (UC)

Barren: A sample classified as barren essentially has no acid generating capacity and no acid buffering capacity.

Non-acid forming (NAF): A sample classified as NAF may, or may not, have significant sulphur content but the availability of ANC within the sample is more than adequate to neutralise all the acid that theoretically could be produced by any contained sulphide minerals. Materials classified as NAF are considered unlikely to be a source of acidic drainage.

Potential acid forming (PAF): Materials considered PAF always have a significant sulphur content, the acid generating potential of which exceeds the inherent acid neutralising capacity of the material.

Uncertain (UC): An uncertain classification is used when there is an apparent conflict between the NAPP and NAG results.

For further information regarding these classifications refer to attachment ‘A’ of EGi ‘Preliminary Report on the Geochemical Assessment of the Galilee Coal Project’ The EGi report is presented in Appendix A of this report.

4.0 Geochemical Nature of Coal and Mining Waste Materials

4.1 Bore Hole Samples

There were a total of 395 exploration bores holes completed within the China First proposed mine site to define the mineral resources and reserves. See Figure 5 for bore location details. Cores taken from exploration drilling were submitted to ALS Brisbane laboratory, and, among other tests, some cores were subjected to a series of static geochemical tests. A summary of those parameters involved in completing a static geochemical assessment of mine waste materials is attached.

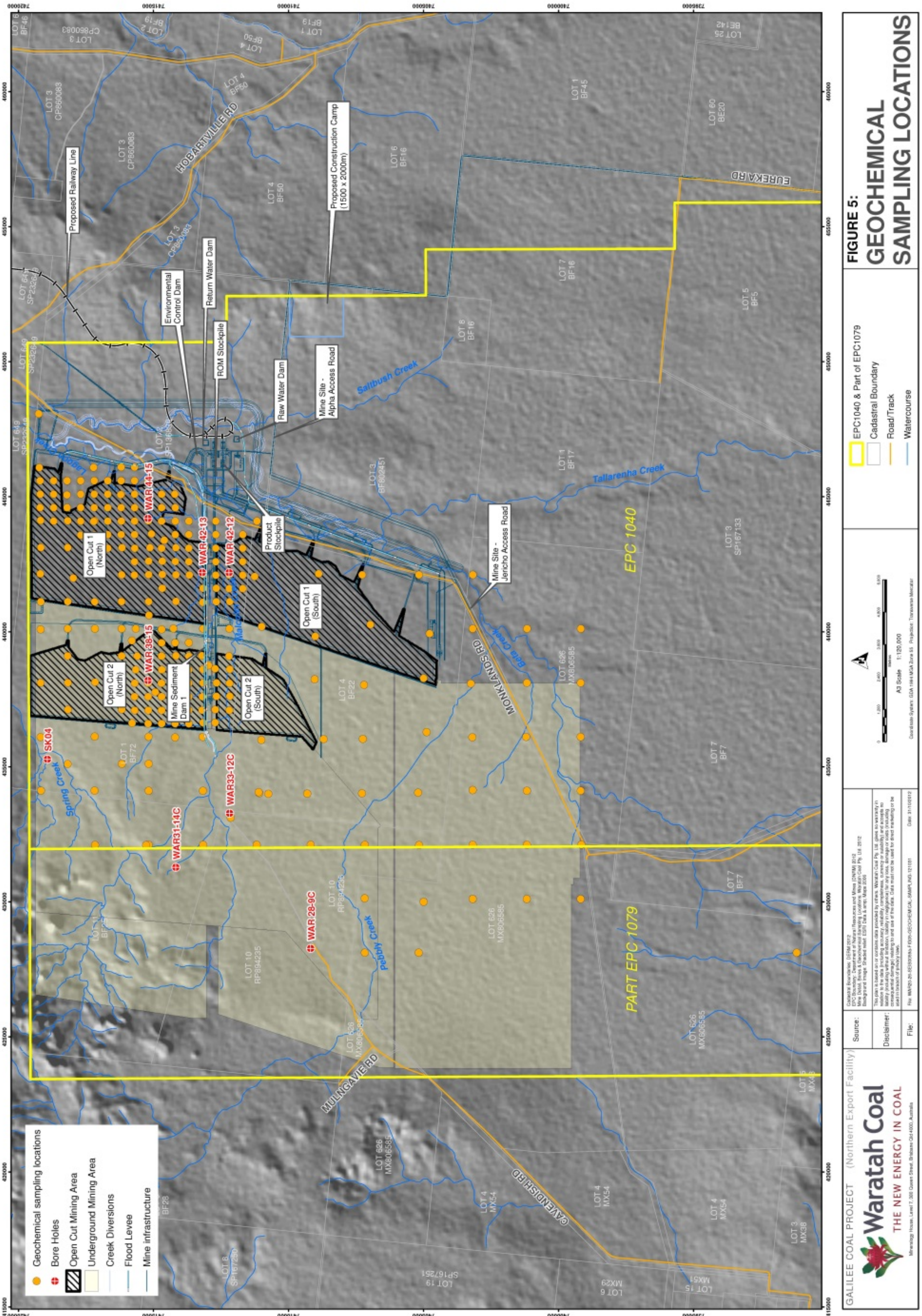

Figure 5: Exploration bore hole locations

4.2 Results of Samples

4.2.1 Waste Rock Analysis

Four cored holes SK04, WAR28-9C, WAR3114C and WAR3312C were examined to check for evidence of pyrite and neutralising carbonate occurrence, and to obtain a better understanding of continuity and variation of major rock types.

All four holes were representative of the full mine stratigraphic sequence, with SK04 located on the northern margin and to the west of the western pit shell, WAR28-9C located within the underground resource area in the southern part of the lease, WAR3114C located to the west of open-cut number 2 and above undergrounds 1 and 4 and WAR3312C located to the west of open-cut number 2 and above underground number 2 and 4. These four broadly spaced diamond drill holes are representative of the proposed mine overburden and interburden stratigraphy across the Project area.

Samples taken from each of these holes provided a continuous sample of the stratigraphic column. The determination of intervals was decided by both Waratah Coal geologists and EGi consultants to match up with the geological boundaries present within the Project area. The ranges of these geological boundaries are from 0.5m to over 5m. A total of 285 samples were collected for analysis.

The preparation of core was carried out by ALS Laboratory Group (Emerald), involving drying, crushing to a nominal -5mm, splitting, pulverising a 300g to 500g split to -212µm, and dispatch of 300g to 500g of -212 µm pulverised samples and 500g of -4mm sample.

The cores examined were representative of the Project stratigraphy and gave a better understanding of the continuity and variation of major rock types. Pyrite appears to be generally very minor throughout the stratigraphy, and was mainly apparent by the presence of iron staining and jarosite and sulphate salts due to partial oxidiation of pyrite. The pyrite mainly occurred as traces and as thin veneers on bedding surfaces associated with carbonaceous partings and lenses, scattered blebs and spheroids in sandstone and one case associated with A Seam coal. Refer to Appendix A – EGi 'Preliminary Report on the Geochemical Assessment of the Galilee Coal'.

Cored hole WAR28-9C was drilled in November 2009, and with over 2 years of exposure any major pyritic zones should have been readily apparent during the inspection due to the presence of distinctive jarosite and sulphate salts. Only two zones with apparently elevated pyrite were identified at depths of 246.0 to 247.5m, and 261.5 to 264.5m just above 'C' Seam. The general lack of extensive pyrite oxidation products suggests the units intersected by WAR28-9C are likely to have low pyrite contents overall.

During inspection of the core, 10% HCI was applied to the core intermittently to provide an indication of the presence of reactive carbonate such as calcite and dolomite. Results show common strong fizzing throughout the core, indicating the presence of calcite carbonate. Strong fizzing was observed mainly above 'C' seam. Below 'C' seam, fizzing was generally absent or weak, with intermittent strong fizzing zones. The calcite carbonate was most often associated carbonate grains or matrix in sandstone units, and sideritic lenses in siltstone and sandstone. The occasional intercepts of intrusive igneous rock also included veins of calcitic carbonate within the igneous rock and in the surrounding country rock.

All 285 overburden samples have been analysed for Leco equivalent total S, and the following standard ARD tests are in progress for these samples:

- pH and electrical conductivity (EC) of deionised water extracts at a ratio of 1 part solid to 2 parts water (pH 1:2 and EC 1:2);
- acid neutralising capacity (ANC);
- net acid producing potential (NAPP), calculated from total S and ANC; and
- standard single addition net acid generation (NAG) test.

Results to date of total S testing of overburden and interburden samples are shown in Table 4. Total S ranges from below detection to 4.6% S, with 93% of samples having very low total S of 0.05% or less. Samples with 0.05% or less have a negligible risk of producing ARD and are classified NAF. The remaining 7% of samples require further testing to classify.

Table 4: Total S results for overburden and interburden samples.

Hole Name	From	To	Interval	Lithology	Seam	Weathering	Comments	Coal Quality Sample No	Galilee Sample No	EGi Sample No	Total S (%)	ARD Classification
SK04	33.00	34.80	1.80	S1		SW	Chip					
SK04	34.80	39.35	4.55	S1		FR			80268	4126	<0.01	NAF
SK04	39.35	41.44	2.09	ST		FR			80269	4127	<0.01	NAF
SK04	41.44	41.60	0.16	KL								
SK04	41.60	44.60	3.00	ST		FR			80270	4128	<0.01	NAF
SK04	44.60	46.04	1.44	ST		FR			80271	4129	<0.01	NAF
SK04	46.04	46.97	0.93	SS/ST		HW			80272	4130	<0.01	NAF
SK04	46.97	47.43	0.46	ST		FR			80273	4131	<0.01	NAF
SK04	47.43	47.60	0.17	KL								
SK04	47.60	50.71	3.11	ST		FR			80274	4132	<0.01	NAF
SK04	50.71	51.72	1.01	ST/SS		FR			80275	4133	<0.01	NAF
SK04	51.72	54.02	2.30	SS		FR			80276	4134	<0.01	NAF
SK04	54.02	55.97	1.95	SS		FR			80277	4135	<0.01	NAF
SK04	55.97	59.60	3.63	ST		FR			80278	4136	<0.01	NAF
SK04	59.60	62.60	3.00	ST		FR			80279	4137	<0.01	NAF
SK04	62.60	65.60	3.00	ST		FR			80280	4138	<0.01	NAF
SK04	65.60	66.66	1.06	SS		FR			80281	4139	<0.01	NAF
SK04	66.66	67.04	0.38	Coal	A	FR		65091				
SK04	67.04	68.00	0.96	S2		FR			80282	4140	<0.01	NAF
SK04	68.00	71.60	3.60	S2		FR			80283	4141	<0.01	NAF
SK04	71.60	74.66	3.06	S2		FR			80284	4142	<0.01	NAF
SK04	74.66	77.36	2.70	S3		FR			80285	4143	<0.01	NAF
SK04	77.36	78.21	0.85	ST		FR			80286	4144	<0.01	NAF
SK04	78.21	80.60	2.39	S1		FR			80287	4145	<0.01	NAF
SK04	80.60	83.60	3.00	ST		FR			80288	4146	<0.01	NAF
SK04	83.60	84.00	0.40	S2		FR			80289	4147	<0.01	NAF
SK04	84.00	84.11	0.11	S2	B	FR		65082				
SK04	84.11	85.19	1.08	Coal	B	FR		65083				
SK04	85.19	85.49	0.30	S3	B	FR		65084				
SK04	85.49	86.18	0.69	Coal	B	FR		65085				
SK04	86.18	86.33	0.15	TF	B	FR		65086				
SK04	86.33	86.60	0.27	KL								
SK04	86.60	86.94	0.34	ST/CM		FR			80290	4148	<0.01	NAF
SK04	86.94	87.04	0.10	ST	B	FR		65087				
SK04	87.04	87.48	0.44	Coal	B	FR		65088				
SK04	87.48	87.80	0.32	ST/CM	B	FR		65089				
SK04	87.80	89.67	1.87	Coal	B	FR		65090				
SK04	89.67	90.56	0.89	Coal	B-Seam	FR		65092				
SK04	90.56	90.66	0.10	ST	B-Seam	FR		65093				
SK04	90.66	91.60	0.94	ST		FR			80291	4149	<0.01	NAF
SK04	91.60	93.58	1.98	ST		FR			80292	4150	<0.01	NAF
SK04	93.58	96.28	2.70	S2		FR			80293	4151	<0.01	NAF
SK04	96.28	96.47	0.19	ST		FR			80294	4152	<0.01	NAF
SK04	96.47	100.45	3.98	S2		FR			80295	4153	<0.01	NAF
SK04	100.45	100.63	0.18	CM		FR			80296	4154	<0.01	NAF
SK04	100.63	104.20	3.57	S2		FR	Coal at base		80297	4155	<0.01	NAF
SK04	104.20	107.60	3.40	SS		FR			80298	4156	<0.01	NAF
SK04	107.60	110.60	3.00	S2		FR			80299	4157	<0.01	NAF
SK04	110.60	113.60	3.00	ST		FR			80300	4158	<0.01	NAF
SK04	113.60	116.60	3.00	S2		FR			80301	4159	<0.01	NAF
SK04	116.60	119.60	3.00	S2		FR			80302	4160	<0.01	NAF
SK04	119.60	122.60	3.00	S2		FR			80303	4161	<0.01	NAF
SK04	122.60	125.60	3.00	S1		FR			80304	4162	<0.01	NAF
SK04	125.60	128.60	3.00	S1		FR			80305	4163	<0.01	NAF
SK04	128.60	131.03	2.43	ST		FR			80306	4164	<0.01	NAF
SK04	131.03	134.60	3.57	S2		FR			80307	4165	<0.01	NAF
SK04	134.60	137.60	3.00	ST		FR			80308	4166	<0.01	NAF
SK04	137.60	139.00	1.40	ST		FR			80309	4167	<0.01	NAF
SK04	139.00	142.60	3.60	ST		FR			80310	4168	<0.01	NAF
SK04	142.60	143.45	0.85	S1		FR			80311	4169	<0.01	NAF
SK04	143.45	143.60	0.15	KL								
SK04	143.60	146.60	3.00	ST		FR			80312	4170	<0.01	NAF
SK04	146.60	149.71	3.11	ST		FR	Minor SS		80313	4171	<0.01	NAF
SK04	149.71	150.70	0.99	ST		FR			80314	4172	<0.01	NAF
SK04	150.70	152.60	1.90	ST		FR			80315	4173	<0.01	NAF
SK04	152.60	155.60	3.00	ST		FR			80316	4174	<0.01	NAF
SK04	155.60	157.00	1.40	ST		FR			80317	4175	<0.01	NAF
SK04	157.00	158.60	1.60	ST/CL		FR			80318	4176	<0.01	NAF
SK04	158.60	161.15	2.55	ST		FR			80319	4177	0.08	UC
SK04	161.15	162.11	0.96	S1		FR			80320	4178	<0.01	NAF
SK04	162.11	164.60	2.49	ST		FR			80321	4179	<0.01	NAF
SK04	164.60	168.00	3.40	ST		FR			80322	4180	<0.01	NAF
SK04	168.00	170.71	2.71	ST		FR			80323	4181	0.40	UC
SK04	170.71	171.26	0.55	CM		FR			80324	4182	0.48	UC
SK04	171.26	171.48	0.22	CG		FR			80325	4183	<0.01	NAF
SK04	171.48	173.18	1.70	CM		FR			80326	4184	0.02	NAF
SK04	173.18	173.92	0.74	CM		FR			80327	4185	0.01	NAF
SK04	173.92	174.02	0.10	CM	C	FR		65094				
SK04	174.02	175.34	1.32	Coal	C	FR		65095				
SK04	175.34	175.43	0.09	CM	C	FR		65096				
SK04	175.43	175.88	0.45	S1		FR			80328	4186	0.01	NAF
SK04	175.88	176.60	0.72	ST		FR			80329	4187	0.02	NAF
SK04	176.60	177.69	1.09	S1		FR			80330	4188	<0.01	NAF
SK04	177.69	177.87	0.18	CM		FR			80331	4189	<0.01	NAF

Hole Name	From	To	Interval	Lithology	Seam	Weathering	Comments	Coal Quality Sample No	Galilee Sample No	EGi Sample No	Total S (%)	ARD Classification
SK04	177.87	180.00	2.13	S1		FR			80332	4190	0.27	UC
SK04	180.00	180.99	0.99	S1		FR			80333	4191	0.25	UC
SK04	180.99	182.08	1.09	Coal	DU	FR		65097				
SK04	182.08	182.19	0.11	TF	DU	FR		65098				
SK04	182.19	182.60	0.41	Coal	DU	FR		65099				
SK04	182.60	183.71	1.11	C4	DU	FR		65100				
SK04	183.71	183.81	0.10	ST	DU	FR		65101				
SK04	183.81	185.26	1.45	ST		FR			80334	4192	<0.01	NAF
SK04	185.26	188.60	3.34	SS		FR			80335	4193	<0.01	NAF
SK04	188.60	189.60	1.00	S3		FR			80336	4194	<0.01	NAF
SK04	189.60	190.50	0.90	S3		FR			80337	4195	<0.01	NAF
SK04	190.50	190.54	0.04	S3	DL	FR		65102				
SK04	190.54	191.25	0.71	Coal	DL	FR		65103				
SK04	191.25	191.53	0.28	S1	DL	FR		65104				
SK04	191.53	191.66	0.13	Coal	DL	FR		65105				
SK04	191.66	192.40	0.74	Coal	DL	FR		65106				
SK04	192.40	193.69	1.29	Coal	DL	FR		65107				
SK04	193.69	193.79	0.10	ST	DL	FR		65108				
SK04	193.79	194.41	0.62	S1		FR			80338	4196	<0.01	NAF
SK04	194.41	194.60	0.19	KL								
SK04	194.60	195.55	0.95	MS					80339	4197	<0.01	NAF
SK04	195.55	197.60	2.05	S2					80340	4198	<0.01	NAF
WAR3114C	89.00	89.60	0.60	SS/ST					17801	4199	<0.01	NAF
WAR3114C	89.60	92.80	3.20	S3					17802	4200	<0.01	NAF
WAR3114C	92.80	98.00	5.20	SS/ST					17803	4201	<0.01	NAF
WAR3114C	98.00	103.00	5.00	SS/ST					17804	4202	<0.01	NAF
WAR3114C	103.00	108.00	5.00	SS/ST					17805	4203	<0.01	NAF
WAR3114C	108.00	113.04	5.04	SS/ST					17806	4204	<0.01	NAF
WAR3114C	113.04	116.74	3.70	S3					17807	4205	<0.01	NAF
WAR3114C	116.74	117.49	0.75	SS/ST					17808	4206	<0.01	NAF
WAR3114C	117.49	119.11	1.62	S4					17809	4207	<0.01	NAF
WAR3114C	119.11	120.14	1.03	CY					17810	4208	<0.01	NAF
WAR3114C	120.14	122.69	2.55	S4					17811	4209	<0.01	NAF
WAR3114C	122.69	124.00	1.31	ST/SS					17812	4210	<0.01	NAF
WAR3114C	124.00	127.00	3.00	ST/SS			Rare Calcite		17813	4211	<0.01	NAF
WAR3114C	127.00	130.00	3.00	ST/SS			Rare Calcite		17814	4212	<0.01	NAF
WAR3114C	130.00	133.43	3.43	ST/SS			Rare Calcite		17815	4213	<0.01	NAF
WAR3114C	133.43	137.58	4.15	S4					17816	4214	0.01	NAF
WAR3114C	137.58	140.72	3.14	SS			Minor CM		17817	4215	0.27	UC
WAR3114C	140.72	142.31	1.59	ST					17818	4216	<0.01	NAF
WAR3114C	142.31	143.36	1.05	ST/SS					17819	4217	<0.01	NAF
WAR3114C	143.36	149.22	5.86	S2					17820	4218	<0.01	NAF
WAR3114C	149.22	153.15	3.93	ST/SS					17821	4219	<0.01	NAF
WAR3114C	153.15	154.65	1.50	S4/CM					17822	4220	<0.01	NAF
WAR3114C	154.65	158.13	3.48	S3					17823	4221	<0.01	NAF
WAR3114C	158.13	160.18	2.05	ST/SS					17824	4222	<0.01	NAF
WAR3114C	160.18	162.90	2.72	S7					17825	4223	0.01	NAF
WAR3114C	162.90	165.31	2.41	S4			Siderite		17826	4224	<0.01	NAF
WAR3114C	165.31	169.08	3.77	S4					17827	4225	<0.01	NAF
WAR3114C	169.08	170.90	1.82	ST/SS					17828	4226	<0.01	NAF
WAR3114C	170.90	172.80	1.90	CM/TF					17829	4227	0.05	NAF
WAR3114C	172.80	173.80	1.00	TF/CM					17830	4228	0.01	NAF
WAR3114C	173.80	174.50	0.70	TF/CM					17831	4229	<0.01	NAF
WAR3114C	174.50	175.05	0.55	TF					17832	4230	<0.01	NAF
WAR3114C	175.05	175.79	0.74	Coal	B2			287719				
WAR3114C	175.79	177.92	2.13	Coal/TF	B3/B4/B5/B7			287720				
WAR3114C	177.92	180.19	2.28	Coal	B7B81/B82/B83			287721				
WAR3114C	180.19	180.44	0.25	ST					17833	4231	<0.01	NAF
WAR3114C	180.44	181.76	1.32	TF					17834	4232	<0.01	NAF
WAR3114C	181.76	183.94	2.18	ST/SS					17835	4233	<0.01	NAF
WAR3114C	183.94	188.00	4.06	SS			Minor ST		17836	4234	<0.01	NAF
WAR3114C	188.00	191.43	3.43	SS			Minor ST		17837	4235	<0.01	NAF
WAR3114C	191.43	195.00	3.57	CL					17838	4236	<0.01	NAF
WAR3114C	195.00	198.00	3.00	CL					17839	4237	<0.01	NAF
WAR3114C	198.00	200.66	2.66	CL								
WAR3114C	200.66	201.82	1.16	SS/CM					17841	4238	<0.01	NAF
WAR3114C	201.82	203.00	1.18	CM					17842	4239	<0.01	NAF
WAR3114C	203.00	204.08	1.08	CM					17843	4240	<0.01	NAF
WAR3114C	204.08	206.95	2.87	S3					17844	4241	<0.01	NAF
WAR3114C	206.95	210.45	3.50	ST					17845	4242	<0.01	NAF
WAR3114C	210.45	211.86	1.41	CM					17846	4243	<0.01	NAF
WAR3114C	211.86	216.50	4.64	S2					17847	4244	<0.01	NAF
WAR3114C	216.50	220.94	4.44	S2					17848	4245	<0.01	NAF
WAR3114C	220.94	225.45	4.51	S1					17849	4246	<0.01	NAF
WAR3114C	225.45	229.52	4.07	S1					17850	4247	<0.01	NAF
WAR3114C	229.52	231.82	2.29	SS/ST			Minor TF		17851	4248	<0.01	NAF
WAR3114C	231.82	234.52	2.71	ST/SS			Minor TF		17852	4249	<0.01	NAF
WAR3114C	234.52	236.17	1.65	ST/SS					17853	4250	<0.01	NAF
WAR3114C	236.17	239.52	3.35	ST/SS					17854	4251	<0.01	NAF
WAR3114C	239.52	241.27	1.74	CM					17855	4252	<0.01	NAF
WAR3114C	241.27	242.41	1.15	SS/TF					17856	4253	0.01	NAF
WAR3114C	242.41	243.40	0.99	SS/CM					17857	4254	0.01	NAF
WAR3114C	243.40	245.40	2.00	SS/ST					17858	4255	<0.01	NAF
WAR3114C	245.40	246.27	0.87	ST/SS					17859	4256	<0.01	NAF

Hole Name	From	To	Interval	Lithology	Seam	Weathering	Comments	Coal Quality Sample No	Galilee Sample No	EGi Sample No	Total S (%)	ARD Classification
WAR3114C	246.27	254.41	8.14	S7					17860	4257	<0.01	NAF
WAR3114C	254.41	254.78	0.37	ST/SS					17861	4258	0.27	UC
WAR3114C	254.78	255.28	0.50	ST/SS			C Roof	?				
WAR3114C	255.28	255.89	0.61	SS					17863	4259	1.56	UC
WAR3114C	255.89	256.22	0.33	CM			Minor Pyrite		17864	4260	4.56	UC
WAR3114C	256.22	257.03	0.81	Coal	C			288710				
WAR3114C	257.03	258.22	1.19	S4					17865	4261	0.02	NAF
WAR3114C	258.22	258.72	0.50	S4			C Floor	287712				
WAR3114C	258.72	258.93	0.20	SS					17867	4262	0.05	NAF
WAR3114C	258.93	260.71	1.78	ST/SS					17868	4263	<0.01	NAF
WAR3114C	260.71	262.16	1.45	S4					17869	4264	<0.01	NAF
WAR3114C	262.16	262.72	0.56	ST					17870	4265	<0.01	NAF
WAR3114C	262.72	263.68	0.96	ST/SS					17871	4266	<0.01	NAF
WAR3114C	263.68	265.85	2.17	S4					17872	4267	<0.01	NAF
WAR3114C	265.85	268.00	2.15	S7					17873	4268	<0.01	NAF
WAR3114C	268.00	269.60	1.60	S7					17874	4269	<0.01	NAF
WAR3114C	269.60	270.10	0.50	S4			Geotech sample	287713				
WAR3114C	270.10	270.85	0.75	S4					17875	4270	<0.01	NAF
WAR3114C	270.85	271.53	0.68	Coal	DU			WR0002				
WAR3114C	271.53	272.54	1.01	S7					17876	4271	0.02	NAF
WAR3114C	272.54	273.95	1.41	SS/Coal					17877	4272	0.08	UC
WAR3114C	273.95	274.96	1.01	S3					17878	4273	<0.01	NAF
WAR3114C	274.96	275.44	0.48	S3			DU Floor	287714				
WAR3114C	275.44	277.78	2.34	S3					17879	4274	<0.01	NAF
WAR3114C	277.78	278.60	0.82	SS					17880	4275	0.01	NAF
WAR3114C	278.60	278.93	0.33	ST					17881	4276	0.01	NAF
WAR3114C	278.93	282.42	3.49	S8			DL Roof	287715	287715	4277	<0.01	NAF
WAR3114C	282.42	282.48	0.06	ST					17882	4278	0.01	NAF
WAR3114C	282.48	284.60	2.12	Coal	DL			287716				
WAR3114C	284.60	284.89	0.29	Coal	DL			287717				
WAR3114C	284.89	285.19	0.30	ST/SS			DL Floor	287718				
WAR3114C	285.19	285.42	0.23	C5								
WAR3114C	285.42	285.87	0.44	SS								
WAR3114C	285.87	286.76	0.89	SS								
WAR3114C	286.76	288.76	2.00	SS/ST								
WAR3114C	288.76	290.50	1.74	S4								
WAR3312C	102.00	107.44	5.44	S2					17901	4279	0.01	NAF
WAR3312C	107.44	110.74	3.30	S3					17902	4280	<0.01	NAF
WAR3312C	110.74	115.17	4.43	ST/SD					17903	4281	<0.01	NAF
WAR3312C	115.17	117.50	2.33	CY					17904	4282	<0.01	NAF
WAR3312C	117.50	120.40	2.90	CY					17905	4283	0.01	NAF
WAR3312C	120.40	120.65	0.25	S1					17906	4284	0.02	NAF
WAR3312C	120.65	122.00	1.35	CY					17907	4285	0.02	NAF
WAR3312C	122.00	123.08	1.08	CY					17908	4286	0.02	NAF
WAR3312C	123.08	123.53	0.45	ST					17909	4287	0.02	NAF
WAR3312C	123.53	125.47	1.94	Coal/CL	B2/B3		Minor Calcite	287701				
WAR3312C	125.47	126.81	1.34	Coal/CL	B4/B5			287702				
WAR3312C	126.81	127.59	0.78	CL/Coal	B6/B7			287703				
WAR3312C	127.59	128.71	1.12	Coal	Coal			287704				
WAR3312C	128.71	130.00	1.29	Coal	B82/B83		Minor Py	287705				
WAR3312C	130.00	130.50	0.50	SS/MS					17910	4288	0.05	NAF
WAR3312C	130.50	131.48	0.98	S3					17911	4289	0.02	NAF
WAR3312C	131.48	133.07	1.59	CY					17912	4290	0.02	NAF
WAR3312C	133.07	133.58	0.51	ST/CY					17913	4291	0.03	NAF
WAR3312C	133.58	137.75	4.17	S3					17914	4292	0.02	NAF
WAR3312C	137.75	140.96	3.21	S2					17915	4293	0.02	NAF
WAR3312C	140.96	141.24	0.28	ST					17916	4294	0.02	NAF
WAR3312C	141.24	144.03	2.79	S2					17917	4295	0.02	NAF
WAR3312C	144.03	149.32	5.29	S2					17918	4296	0.02	NAF
WAR3312C	149.32	154.64	5.32	S2					17919	4297	0.01	NAF
WAR3312C	154.64	155.60	0.96	MS					17920	4298	0.02	NAF
WAR3312C	155.60	156.74	1.14	MS					17921	4299	<0.01	NAF
WAR3312C	156.74	161.00	4.26	SS					17922	4300	<0.01	NAF
WAR3312C	161.00	165.00	4.00	S4					17923	4301	<0.01	NAF
WAR3312C	165.00	169.00	4.00	S4					17924	4302	<0.01	NAF
WAR3312C	169.00	174.00	5.00	S4					17925	4303	<0.01	NAF
WAR3312C	174.00	178.90	4.90	SS					17926	4304	<0.01	NAF
WAR3312C	178.90	181.48	2.58	ST			Minor CL at base		17927	4305	<0.01	NAF
WAR3312C	181.48	183.21	1.73	ST			Minor TF at base		17928	4306	<0.01	NAF
WAR3312C	183.21	185.22	2.01	ST					17929	4307	0.02	NAF
WAR3312C	185.22	188.07	2.85	ST					17930	4308	<0.01	NAF
WAR3312C	188.07	188.30	0.23	TF					17931	4309	0.01	NAF
WAR3312C	188.30	189.25	0.95	SS					17932	4310	0.01	NAF
WAR3312C	189.25	189.31	0.06	Coal	UNK							
WAR3312C	189.31	190.63	1.32	S1					17933	4311	<0.01	NAF
WAR3312C	190.63	193.41	2.78	SS					17934	4312	<0.01	NAF
WAR3312C	193.41	197.95	4.54	ST					17935	4313	<0.01	NAF
WAR3312C	197.95	198.64	0.69	TF/ST/CL					17936	4314	<0.01	NAF
WAR3312C	198.64	200.65	2.01	ST					17937	4315	0.10	UC
WAR3312C	200.65	201.28	0.63	ST					17938	4316	0.77	UC
WAR3312C	201.28	202.52	1.24	Coal	C5			287706				
WAR3312C	202.52	204.04	1.52	S7					17939	4317	<0.01	NAF
WAR3312C	204.04	205.00	0.96	ST					17940	4318	<0.01	NAF
WAR3312C	205.00	208.00	3.00	S4					17941	4319	<0.01	NAF

Hole Name	From	To	Interval	Lithology	Seam	Weathering	Comments	Coal Quality Sample No	Galilee Sample No	EGi Sample No	Total S (%)	ARD Classification
WAR3312C	208.00	210.69	2.69	SS					17942	4320	<0.01	NAF
WAR3312C	210.69	213.92	3.23	SS					17943	4321	<0.01	NAF
WAR3312C	213.92	216.00	2.08	S9					17944	4322	<0.01	NAF
WAR3312C	216.00	218.00	2.00	S9					17945	4323	<0.01	NAF
WAR3312C	218.00	218.96	0.96	S2					17946	4324	0.28	UC
WAR3312C	218.96	220.37	1.41	Coal	DU			287707				
WAR3312C	220.37	220.69	0.32	ST					17947	4325	0.07	UC
WAR3312C	220.69	223.00	2.31	S3					17948	4326	<0.01	NAF
WAR3312C	223.00	223.73	0.73	S4					17949	4327	<0.01	NAF
WAR3312C	223.73	224.01	0.28	Coal	UNK				287709	4328	0.55	UC
WAR3312C	224.01	224.92	0.91	SS/ST					17950	4329	<0.01	NAF
WAR3312C	224.92	227.00	2.09	SS					17951	4330	<0.01	NAF
WAR3312C	227.00	230.50	3.50	SS					17952	4331	<0.01	NAF
WAR3312C	230.50	232.50	2.00	SS					17953	4332	<0.01	NAF
WAR3312C	232.50	233.36	0.86	S4					17954	4333	0.01	NAF
WAR3312C	233.36	235.35	1.99	Coal	DL1/DL3			287708				
WAR3312C	235.35	235.80	0.45	S2					17955	4334	<0.01	NAF
WAR3312C	235.80	236.50	0.70	S2					17956	4335	<0.01	NAF
WAR3312C	236.50	237.18	0.68	S2					17957	4336	<0.01	NAF
WAR3312C	237.18	237.74	0.56	ST					17958	4337	<0.01	NAF
WAR3312C	237.74	239.56	1.82	S3					17959	4338	<0.01	NAF
WAR2809C	89.00	90.00	1.00	CY		SW	Chips					
WAR2809C	90.00	95.00	5.00	ST		FR	Rewan Formation		80341	4339	<0.01	NAF
WAR2809C	95.00	100.00	5.00	ST		FR	Rewan Formation		80342	4340	<0.01	NAF
WAR2809C	100.00	103.40	3.40	ST		FR	Rewan Formation		80343	4341	<0.01	NAF
WAR2809C	103.40	108.03	4.63	S1		FR			80344	4342	<0.01	NAF
WAR2809C	108.03	113.00	4.97	ST		FR			80345	4343	<0.01	NAF
WAR2809C	113.00	117.43	4.43	ST		FR			80346	4344	<0.01	NAF
WAR2809C	117.43	122.00	4.57	SS/ST		FR			80347	4345	<0.01	NAF
WAR2809C	122.00	126.00	4.00	SS/ST		FR			80348	4346	<0.01	NAF
WAR2809C	126.00	130.00	4.00	SS/ST		FR			80349	4347	<0.01	NAF
WAR2809C	130.00	133.50	3.50	SS/ST		FR			80350	4348	<0.01	NAF
WAR2809C	133.50	138.50	5.00	SS/ST		FR			80351	4349	<0.01	NAF
WAR2809C	138.50	143.90	5.40	SS/ST		FR			80352	4350	<0.01	NAF
WAR2809C	143.90	148.00	4.10	S6		FR			80353	4351	0.06	UC
WAR2809C	148.00	151.00	3.00	S6		FR			80354	4352	<0.01	NAF
WAR2809C	151.00	152.90	1.90	S6		FR			80355	4353	0.04	NAF
WAR2809C	152.90	153.39	0.49	S1		FR			80356	4354	0.02	NAF
WAR2809C	153.39	153.80	0.41	C3	A	FR	Trace Py					
WAR2809C	153.80	154.50	0.70	ST		FR			80357	4355	<0.01	NAF
WAR2809C	154.50	156.60	2.10	ST		FR			80358	4356	<0.01	NAF
WAR2809C	156.60	160.02	3.42	ST		FR			80359	4357	<0.01	NAF
WAR2809C	160.02	163.00	2.98	S1		FR			80360	4358	<0.01	NAF
WAR2809C	163.00	167.48	4.48	S1		FR			80361	4359	<0.01	NAF
WAR2809C	167.48	170.00	2.52	XT		FR			80362	4360	<0.01	NAF
WAR2809C	170.00	172.47	2.47	XT		FR			80363	4361	<0.01	NAF
WAR2809C	172.47	175.79	3.32	S2		FR			80364	4362	<0.01	NAF
WAR2809C	175.79	178.00	2.21	S1		FR			80365	4363	<0.01	NAF
WAR2809C	178.00	180.00	2.00	S1		FR			80366	4364	<0.01	NAF
WAR2809C	180.00	180.92	0.92	S1		FR			80367	4365	0.02	NAF
WAR2809C	180.92	182.39	1.47	Coal	B2	FR		287956				
WAR2809C	182.39	182.77	0.38	CM/S1	B3	FR		287957				
WAR2809C	182.77	184.51	1.74	Coal	B4	FR		287958				
WAR2809C	184.51	184.69	0.18	TF/Coal	B5	FR		287959				
WAR2809C	184.69	185.00	0.31	C3	B6	FR		287960				
WAR2809C	185.00	185.21	0.21	TF/Coal	B7	FR		287961				
WAR2809C	185.21	185.74	0.53	Coal	B81	FR		287962				
WAR2809C	185.74	185.85	0.11	Coal	B81	FR						
WAR2809C	185.85	186.59	0.74	Coal	B82	FR		287963				
WAR2809C	186.59	187.17	0.58	Coal	B83	FR		287964				
WAR2809C	187.17	188.00	0.83	S6		FR			80368	4366	0.02	NAF
WAR2809C	188.00	189.00	1.00	S6		FR			80369	4367	<0.01	NAF
WAR2809C	189.00	191.04	2.04	S6		FR			80370	4368	<0.01	NAF
WAR2809C	191.04	193.00	1.96	S1		FR			80371	4369	<0.01	NAF
WAR2809C	193.00	198.00	5.00	S1		FR			80372	4370	<0.01	NAF
WAR2809C	198.00	203.00	5.00	S1		FR			80373	4371	<0.01	NAF
WAR2809C	203.00	207.52	4.52	S1		FR			80374	4372	<0.01	NAF
WAR2809C	207.52	212.40	4.88	S1		FR			80375	4373	<0.01	NAF
WAR2809C	212.40	217.00	4.60	S1		FR			80376	4374	<0.01	NAF
WAR2809C	217.00	222.00	5.00	S1		FR			80377	4375	<0.01	NAF
WAR2809C	222.00	227.00	5.00	S1		FR			80378	4376	<0.01	NAF
WAR2809C	227.00	231.63	4.63	S1		FR			80379	4377	<0.01	NAF
WAR2809C	231.63	233.50	1.87	ST/SS		FR			80380	4378	<0.01	NAF
WAR2809C	233.50	237.00	3.50	ST/SS		FR			80381	4379	<0.01	NAF
WAR2809C	237.00	239.92	2.92	ST/SS		FR			80382	4380	<0.01	NAF
WAR2809C	239.92	240.22	0.30	BS		FR			80383	4381	<0.01	NAF
WAR2809C	240.22	244.00	3.78	ST		FR			80384	4382	<0.01	NAF
WAR2809C	244.00	246.00	2.00	ST		FR			80385	4383	<0.01	NAF
WAR2809C	246.00	246.85	0.85	ST		FR			80386	4384	<0.01	NAF
WAR2809C	246.85	247.68	0.83	S1		FR			80387	4385	0.04	NAF
WAR2809C	247.68	250.49	2.81	S1		FR			80388	4386	<0.01	NAF
WAR2809C	250.49	253.00	2.51	S1		FR			80389	4387	<0.01	NAF
WAR2809C	253.00	256.00	3.00	S6		FR			80390	4388	<0.01	NAF
WAR2809C	256.00	259.70	3.70	S6		FR			80391	4389	<0.01	NAF

Hole Name	From	To	Interval	Lithology	Seam	Weathering	Comments	Coal Quality Sample No	Galilee Sample No	EGi Sample No	Total S (%)	ARD Classification
WAR2809C	259.70	261.70	2.00	S6		FR			80392	4390	<0.01	NAF
WAR2809C	261.70	263.50	1.80	S1		FR			80393	4391	0.62	UC
WAR2809C	263.50	264.45	0.95	S1		FR			80394	4392	1.02	UC
WAR2809C	264.45	265.77	1.32	Coal	C	FR	Pyrite	287965				
WAR2809C	265.77	266.92	1.15	S1		FR			80395	4393	0.11	UC
WAR2809C	266.92	267.44	0.52	Coal	UN	FR						
WAR2809C	267.44	268.50	1.06	S6		FR			80396	4394	<0.01	NAF
WAR2809C	268.50	270.50	2.00	S6		FR			80397	4395	<0.01	NAF
WAR2809C	270.50	274.50	4.00	S6		FR			80398	4396	<0.01	NAF
WAR2809C	274.50	276.50	2.00	S6		FR			80399	4397	<0.01	NAF
WAR2809C	276.50	277.64	1.14	S6		FR			80400	4398	0.01	NAF
WAR2809C	277.64	278.61	0.97	Coal	DU	FR		287966				
WAR2809C	278.61	280.00	1.39	S1		FR			80401	4399	<0.01	NAF
WAR2809C	280.00	281.16	1.16	S1		FR			80402	4400	<0.01	NAF
WAR2809C	281.16	281.32	0.16	Coal	UN	FR						
WAR2809C	281.32	282.30	0.98	S6		FR			80403	4401	<0.01	NAF
WAR2809C	282.30	284.30	2.00	S6		FR			80404	4402	<0.01	NAF
WAR2809C	284.30	286.70	2.40	S6		FR			80405	4403	<0.01	NAF
WAR2809C	286.70	288.70	2.00	S6		FR			80406	4404	<0.01	NAF
WAR2809C	288.70	289.69	0.99	S6		FR			80407	4405	<0.01	NAF
WAR2809C	289.69	289.94	0.25	Coal	DL1	FR		287967				
WAR2809C	289.94	291.04	1.10	Coal	DL2	FR		287968				
WAR2809C	291.04	292.00	0.96	Coal	DL3	FR		287969				
WAR2809C	292.00	292.54	0.54	S1		FR			80408	4406	0.04	NAF
WAR2809C	292.54	293.17	0.63	XT		FR			80409	4407	0.10	UC
WAR2809C	293.17	295.20	2.03	S1		FR			80410	4408	<0.01	NAF
WAR2809C	295.20	297.19	1.99	S1		FR			80411	4409	<0.01	NAF
WAR2809C	297.19	302.60	5.41	S6		FR			80412	4410	<0.01	NAF

KEY

NAF = Non-Acid Forming

UC = Uncertain Classification

Coal seam interval

Missing interval or sample not available

Figure 6 is a plot of total S profiles for drillholes tested. In addition to total S, the hole profiles also show coal seams and sample ARD classification, with NAF samples represented as blue symbols and unclassified samples as black symbols. The holes are approximately aligned according to coal seam stratigraphy. The plot emphasises the lack of elevated S in most of the overburden/interburden sequence. Elevated S appears to be mainly associated with the C Seam roof and DU Seam floor.

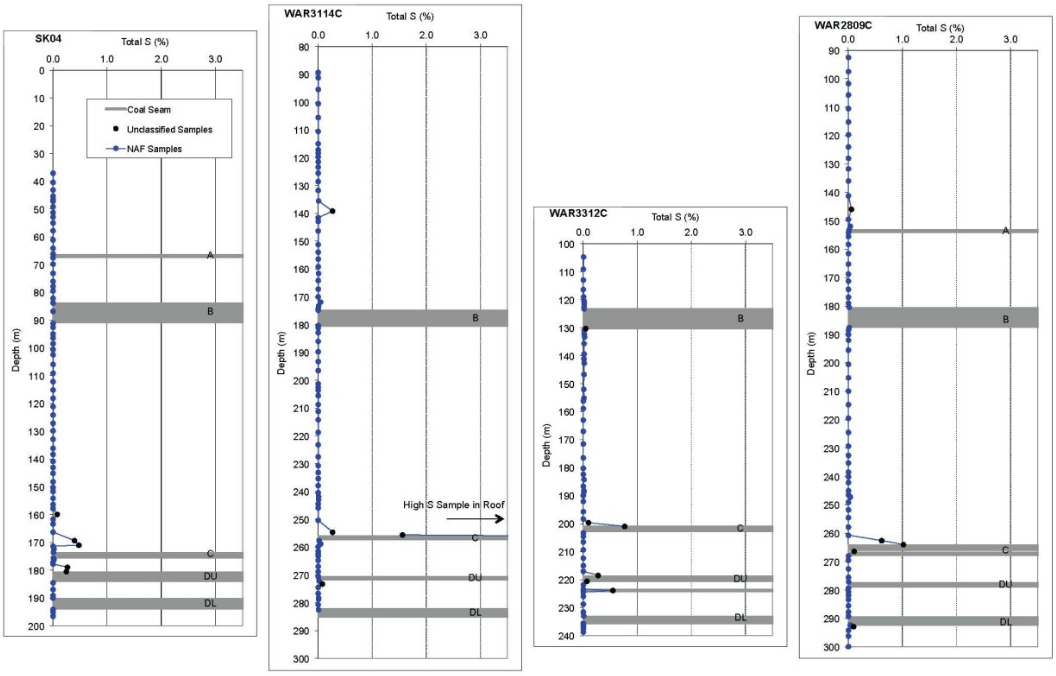

Figure 4: Plot of total S profiles for Galilee drill holes. NAF samples are shown as blue symbols, uncertain samples are shown as black symbols. Profiles are aligned by seam stratigraphy.

<u>Figure 6:</u> Plot of total S profiles for Galilee drillholes. NAF samples are shown as blue symbols, uncertain samples are shown as black symbols. Profiles are aligned by seam stratigraphy.

In summary, examination of the core shows that pyrite generally occurs in low abundance in overburden and interburden. The acid generation potential from pyrite in overburden and interburden is likely to be mostly offset by reactive acid neutralising calcitic carbonate.

4.2.2 Coarse Rejects and Tailings Paste Analysis

There are no specific regulatory requirements regarding sampling and testing of tailings and coarse reject materials at mines in Queensland. Testing of cores to date indicates that these waste products will be benign. When samples are available the following static geochemical testing will be completed:

- pH (1:5 w:v)
- Electrical conductivity (EC) (1:5 w:v)
- Total sulphur
- Chromium reducible sulphur (CRS)
- Acid neutralising capacity (ANC)

The annual production of rejects and tailings will be 10.7Mtpa and 5.3Mtpa respectively. Using the size envelope data, the expected splits to the dense medium cyclone and spirals circuits and to tailings is as in Table 5.

Table 5: Process Circuit Splits

Estimated Circuit Splits from Process Size Envelope			
Circuit/Stream	**Nominal %**	**Fine %**	**Coarse %**
DMC (+ 2.0mm)	69.0	59.9	78.1
Spirals (-2.0 - +0.125mm)	22.0	25.1	17.4
Tailings	9.0	14.9	4.5
Total	100.0	100.0	100.0

Tailings typical average properties are expected to be:

- Solids Content: 30 % solids by weight
- Sizing: Coarse coal +2mm, fine coal -2 - +0.125mm
- Solid Density: 1.68
- Slurry Density: 1.30
- Sizing: Tailings sub -0.125mm

The grading of the tailings will be that of fine silty sand. Rejects sizing will be -50mm.

Coarse rejects and fine tailings paste are to be transported to tailings storage facility, where they will be placed in layers and track compacted using a dozer. Permeability values for compacted rejects and tailings are listed in AMEC (2000) and are summarised in Table 6. These values are representative of values of Queensland coal mines.

Table 6: Summary of Permeability Values for Plant Rejects and Spoil from German Creek and Oaky Creek Mines

Material	Standard Compaction* (%)	Permeability (m/sec)	Comments
Plant Rejects (German Creek)	95	3.73×10^{-8}	Laboratory test (Reference 1)
Plant Rejects (German Creek)	91	1.42×10^{-6}	Laboratory test (Reference 1)
Plant Rejects (Talagai Pit, Oaky Creek)	95	10^{-6} to 10^{-8}	Field test (Reference 1)
Weathered Permian Spoil (Pit E, German Creek)	89 95	1.5×10^{-8} 1×10^{-9}	Laboratory test (Reference 1)
Fresh Permian Spoil (Pit E, German Creek)	90 96	1.5×10^{-6} 6×10^{-9}	Laboratory test (Reference 1)
Fresh Permian Spoil (Pit F, German Creek)	91 to 102	10^{-7} to 10^{-9}	Field test (Reference 1)
Tailings (German Creek)	Subaqueous deposition	4×10^{-8}	Laboratory test (Reference 1)

*AS1289

Table 7 summarises shear strength values for plant rejects and tailings samples obtained from German Creek Mines, which are representative of Queensland coal mines.

Table 7: Summary of Shear Strength Data for Plant Rejects and Tailings, German Creek Mines

Material	Description	Shear Strength	
		Friction Degrees	Cohesion kPa
Plant Rejects (German Creek)	Black, sandy gravel	34 to 45	0
Tailings (German Creek)	Fine, silty sand	32	0

The geochemical properties of tailings and rejects have been determined by examination and testing of drill cores. Based on these results, the tailings rejects will have a low capacity to be potentially acid forming. The totally sulphur content is average (Refer to Tables 8 and 9) and minor oxidisable pyrite has been detected in the core.

Table 8: Weighted Average Full Seam CF1.50 Product Coal Properties

Seam			**B**	**C**	**DU**	**DL1**	**DL2**
CF1.50 Yield (a.d.)	**%**	**Average**	51.2	85.4	71.0	82.9	71.6
		Standard Deviation	12.7	8.0	12.9	8.1	22.4
Moisture (a.d.)	**%**	**Average**	7.7	7.4	7.3	7.0	7.2
		Standard Deviation	0.4	0.5	0.5	0.4	0.6
Ash (d.b.)	**%**	**Average**	19.6	10.0	11.1	7.9	7.8
		Standard Deviation	1.4	1.6	3.8	2.7	1.2
Volatile Matter (d.b.)	**%**	**Average**	32.8	38.2	38.2	37.8	38.0
		Standard Deviation	0.4	0.8	3.9	2.1	2.4
Volatile Matter (d.a.f.)	**%**	**Average**	40.9	42.4	42.9	41.0	41.2
		Standard Deviation	0.9	1.0	3.3	1.5	2.7
Total Sulfur (a.d.)	**%**	**Average**	0.40	0.63	0.54	0.48	0.49
		Standard Deviation	0.03	0.25	0.08	0.14	0.07
Calorific Value (d.b.)	**MJ/kg**	**Average**	25.39	28.97	28.34	29.86	29.81
		Standard Deviation	0.47	0.56	1.37	1.02	0.63
Calorific Value (a.r.) at 15% Product Moisture	**kcal**	**Average**	5155	5885	5755	6065	6055
		Standard Deviation	100	115	280	210	130

Table 9: Weighted Average Full Seam Raw Coal Properties

Seam			B	C	DU	DL1	DL2
Thickness	m	Average	5.98	2.30	2.09	1.02	1.87
		Standard Deviation	0.73	1.31	0.72	0.49	0.62
Moisture (a.d.)	%	Average	10.4	9.5	9.7	8.7	8.5
		Standard Deviation	1.9	1.7	1.6	1.7	2.2
Ash (d.b.)	%	Average	47.3	29.8	21.6	22.1	24.4
		Standard Deviation	2.3	13.5	9.3	10.5	13.9
Total Sulfur (a.d.)	%	Average	0.38	0.94	0.67	0.53	0.55
		Standard Deviation	0.07	0.70	0.28	0.14	0.26
Calorific Value (d.b.)	MJ/kg	Average	15.41	22.04	25.10	24.95	24.04
		Standard Deviation	0.89	4.96	3.63	3.94	5.18
Relative Density (a.d.)	g/cm^3	Average	1.68	1.54	1.47	1.48	1.51
		Standard Deviation	0.06	0.14	0.09	0.13	0.21

No metal enrichment is expected in the tailings or rejects. Expected pH range is 6 to 8.5. Because the tailings and rejects will be encased in a properly constructed clay blanket, there will be no possibility of oxidisation occurring.

Geotechnical testing has been completed on cores from holes WAR 38, WAR 42, WAR 44 and WAR 48 by TMI Environmental Services. Total sulphur ranged from 0.03% to 0.42%. The pH variation was 5.2% to 8.5%. The Net Acid Production Potential which is summarised in Table 10 indicates a range from barren, non-acid forming to uncertain acid forming. Concentrations of the trace elements arsenic, cadmium, chromium, copper lead, nickel and zinc were determined. The results, which are included in Table 11, indicate concentrations which are standard for coal seam overburden.

Table 10: Net Acid Production Potential

				Client sample ID (Primary)	WAR44-15DL	WAR38-15B	WAR44-15DU	DU	WAR38-15Overburden B	WAR38-15TR	DL interburden	WAR 42-12Du interburden	WAR 44-15DL interburden	WAR 44-15TR	WAR 48-13TR	WAR 44-15DU interburden
EA009: Nett Acid Production Potential																
Net Acid Production Potential		kg H2SO4/t	0.5		2.6	-4.2	3	7.4	-23.6	<0.5	-0.7	-3	-3.7	-3	-2.8	-0.7
EA011: Net Acid Generation																
pH (OX)		pH Unit	0.1		5	7.6	3.7	6.6	8.6	5.6	4.6	5.9	6.3	5.1	6.4	6.2
NAG (pH 4.5)		kg H2SO4/t	0.1		<0.1	<0.1	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)		kg H2SO4/t	0.1		10.4	<0.1	16.4	1.2	<0.1	2.3	3.7	1.8	0.8	2.5	0.6	0.8
EA013: Acid Neutralising Capacity																
ANC as H2SO4		kg H2SO4 equiv./t	0.5		4.6	7.4	4.8	5.4	24.5	1.2	2.3	5.6	3.7	3	2.8	3.2
ANC as CaCO3		% CaCO3	0.1		0.5	0.8	0.5	0.6	2.5	0.1	0.2	0.6	0.4	0.3	0.3	0.3
Fizz Rating		Fizz Unit	0		0	0	0	0	2	0	0	0	0	0	0	0
Sulfur - Total as S (LECO)		%	0.01		0.23	0.1	0.26	0.4	0.03	0	0.05	0.1	<0.01	<0.01	<0.01	0.08

Classification
Barren non-acid forming
Non Acid Forming
Uncertain Acid Forming
Potentially Acid Forming Low Capacity

Table 11: Concentration of Trace Elements

Client - Ma	PULP			Sample Typ	REG	REG	REG	REG	REG	REG	REG	REG
Workgroup	EB1009892			ALS Sample	EB1009892001	EB1009892002	EB1009892003	EB1009892004	EB1009892005	EB1009892006	EB1009892007	EB1009892008
Project nar	b09216 11 WARATAH			Sample dat	5/06/2010	5/06/2010	5/06/2010	5/06/2010	5/06/2010	5/06/2010	5/06/2010	5/06/2010
				Client samp	WAR38-15Overbur	WAR38-15TR	DL interburden	WAR 42-12Du inter	WAR 44-15DL inter	WAR 44-15TR	WAR 48-13TR	WAR 44-15DU inter
				Client sample ID (Secondary):								
				Sample Site	WARATAH	WARATAH	WARATAH	WARATAH	WARATAH	WARATAH	WARATAH	WARATAH
				Purchase Order:								
Analyte grc	CAS Numb	Units	LOR									
EG005T: Total Metals by ICP-AES												
Arsenic	7440-38-2	mg/kg	5		<5	5	<5	10	<5	6	<5	9
Cadmium	7440-43-9	mg/kg	1		<1	<1	<1	<1	<1	2	<1	<1
Chromium	7440-47-3	mg/kg	2		<2	27	78	25	45	118	22	50
Copper	7440-50-8	mg/kg	5		17	9	8	42	10	12	<5	20
Lead	7439-92-1	mg/kg	5		20	11	6	22	6	34	5	18
Nickel	7440-02-0	mg/kg	2		6	9	5	28	8	16	5	11
Zinc	7440-66-6	mg/kg	5		37	13	13	97	9	16	6	50
EG035T: Total Recoverable Mercury by FIMS												
Mercury	7439-97-6	mg/kg	0.1		0.2	0.2	0.1	0.1	<0.1	<0.1	<0.1	0.2

QC - Matri	SOIL			Sample Typ	MB	LCS	DUP	MS
Workgroup	EB1009892			ALS Sample	1597886-002	1597886-003	1597886-006	1597886-012
				Sample dat	9/06/2010	9/06/2010	5/06/2010	5/06/2010
Analyte grc	CAS Numb	Units	LOR					
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	mg/kg	5		<5	114	<5	89
Cadmium	7440-43-9	mg/kg	1		<1	108	<1	101
Chromium	7440-47-3	mg/kg	2		<2	112	<2	96.7
Copper	7440-50-8	mg/kg	5		<5	112	16	101
Lead	7439-92-1	mg/kg	5		<5	108	21	95.7
Nickel	7440-02-0	mg/kg	2		<2	112	4	96.6
Zinc	7440-66-6	mg/kg	5		<5	108	41	95.6
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	mg/kg	0.1		<0.1	97	0.2	94.1

4.3 Bridge Oil Data

A considerable amount of geotechnical and geochemical work has previously been completed on the Waratah tenements by Bridge Oil Limited (1994). These investigations concluded that the overburden is benign and typical of standard coal seam overburden.

4.4 Future Program and Testing

Future investigation work may be required during operations to refine and optimise management strategies for PAF materials, including:

- Continued testing of overburden/interburden during infill drilling to further define the continuity and variation of PAF materials and higher ANC NAF materials.
- Geochemical characterisation of CHPP washery waste materials to define variable and overall acid potential, which will highlight opportunities for alternative management options such as blending with NAF overburden/interburden.
- Leach column testing of representative CHPP washery waste materials including blends in various ratios with limestone and high ANC NAF material to help optimise blending ratios.
- Field trials of operationally placed and other blended ROM overburden/interburden and CHPP washery waste materials to assess the effectiveness of operational blending and opportunities for reducing the need for selective handling of PAF materials.
- Assessment of the hydrological and oxidation processes occurring in spoil dumps during construction to identify options to optimise long term ARD controls.

5.0 Rehabilitation and Closure Strategy of Facility

5.1 Objectives

The objectives of rehabilitating disturbed land from the construction and operation of the mine and associated infrastructure are as follows:

- **Achievement of acceptable post-disturbance land use suitability** – Mining and rehabilitation will aim to create a stable landform with land use capability and/or suitability similar to that prior to disturbance, unless other alternative beneficial land uses are pre-determined and agreed. This will be achieved through the establishment of clear rehabilitation success criteria and outlining the monitoring requirements necessary to establish the extent to which each criterion is being achieved.
- **Creation of stable post-disturbance landform** - Mine wastes and disturbed land will be rehabilitated to a condition that is safe to humans and native fauna / domestic livestock, self-sustaining, or alternatively to a condition where maintenance requirements are consistent with an agreed post-mining land use.
- **Preservation of downstream water quality** – Surface and groundwaters that leave the mining lease should not be degraded to a significant extent. Current and future water quality should be maintained at levels that are acceptable for users downstream of the site.

5.2 Rehabilitation Strategy

All areas which are significantly disturbed by mining activities will be rehabilitated to a safe and stable landform with a self-sustaining vegetation cover. Rehabilitation of disturbed land will typically proceed within two years of the areas becoming available for rehabilitation. In some situations however, the commencement of progressive rehabilitation activities may not be possible because the area may be effectively integrated with areas nearby that are unavailable for rehabilitation. To achieve the objectives above, rehabilitation will be conducted so that:

- Suitable species of vegetation are planted and established to achieve a matrix of pasture, grassland and bushland post-mine land uses.
- Landscaping and rehabilitation works will, where practicable, include endemic native species of local provenance, and where suitable will also make use of conservation of significant flora species or species that can provide habitat opportunities for conservation of significant fauna.

- Potential for erosion is minimised, including likelihood of environmental impacts being caused by the release of dust.
- The quality of surface water and seepage released from the site is such that releases of contaminants are unlikely to result in environmental harm and impacts to beneficial users of the resource.
- The water quality of any residual water bodies meets criteria for subsequent uses and does not have the potential to cause environmental harm.
- The final landform is safe to humans and native fauna / domestic stock, stable and not subject to slumping or erosion which will result in the agreed post-mining landform being maintained.

A Rehabilitation Management Plan will be developed to incorporate the control strategies and monitoring programs identified in the EM Plan.

5.3 Landform Design and Planning

Rehabilitation planning will ensure the total area of disturbance at any one time is minimised to reduce the potential for wind-blown dust, visual impacts and increased sediment-laden run off.

Rehabilitation will be designed to achieve a safe and stable final landform compatible where practicable and possible with the surrounding environment. This will involve the reshaping of the majority of overburden emplacement slopes to $<10^{o}$. Where slopes are $>10^{o}$, additional drainage and revegetation works will be carried out to achieve the necessary erosion / sediment control and groundcover establishment.

The use of natural re-contouring will be incorporated in rehabilitation design and construction and treed vegetation will be retained where possible along the toe of rehabilitation areas. Where ever possible, vegetation will be retained unless an unacceptable safety or erosion risk remains.

Waterways and diversions on the Project site will be rehabilitated to a pre-determined post-mining standard. This will include the use of endemic native trees, shrubs and grasses where suitable.

The conceptual final landform for the entire site will be determined through consultation with relevant Government agencies and the local community. Once a conceptual design is finalised, a detailed Landscape Rehabilitation Plan, based on the desired post-mining landform will be developed and submitted to Government for consideration.

5.4 Rehabilitation Methods

5.4.1 Progressive Rehabilitation

Rehabilitation will typically be undertaken on areas that cease to be used for mining or mine-related activities within two years of becoming available. This will reduce the amount of disturbed land at any one time. Results of progressive rehabilitation and vegetation trials (if appropriate) will be used to refine rehabilitation methods for future application such as the selection of appropriate drainage measures and plant species for re-establishment. Areas available for progressive rehabilitation and the types of disturbance at those sites will be detailed in the Plan of Operations.

5.4.2 Revegetation

Revegetation activities will typically commence at the completion of reshaping, re-topsoiling and drainage works. The timing of these works will ideally be scheduled to enable a preferred seasonal sowing of pasture and tree seed. Where surfaces have been prepared, selected tree, shrub and pasture species will be sown using seed stock and/or planted depending on the species, slope gradients and area to be revegetated. Rehabilitation will utilise tree and shrub species at a density and richness consistent with the desired post-mine landform.

Plant selection for areas to be returned to a bushland landform will be based on the following criteria:

- The species will successfully establish on the available growth medium
- The species will bind the soil
- The species diversity will result in a variety of structure and food / habitat resources

Native flora used for rehabilitation will ideally be locally endemic and will be established through a combination of direct seeding or planting of tube stock / nursery-raised stock from local propagules. Seed will be collected from site where possible and treated if necessary to ensure it is adapted to environmental conditions in the area. Tree and shrub establishment on site will be dominated by the direct seeding method, currently being used at the majority of coal mines in the Bowen Basin. An initial tree and shrub mix, based on the species list from the terrestrial ecology assessment is provided in Table 12, and will be reviewed periodically depending on changes in best practice, technology and rehabilitation monitoring results.

Table 12: Tree and Shrub Species

Common Name	Scientific Name	Woodland	Grassland	Riparian Zone
Acacia cambagei	Gidgee	X		
Acacia coriacea sub sp. *Seriocophylla*	Desert Oak	X		
Acacia excels	Ironwood	X		
Acacia harpophylla	Brigalow	X		
Acacia holosericea	Soap Bush	X		
Acacia Lazaridis	Lazarides Wattle	X		
Acacia oswaldii	Milijee	X		
Acacia salicina	Sally Wattle	X		
Acacia shirleyi	Lancewood	X		
Aeschynomene indica	Budda Pea	X		
Alphitonia excels	Red Ash	X		
Aristida bigandulosa	Dark Wiregrass	X		
Aristida calycina	Dark Wiregrass	X		
Aristida inaequiglumis	Feathertop Three-awn			X
Artistida latfolia	Feathertop Wiregrass	X		X
Astrebla elymoides	Hoop Mitchell Grass		X	
Astrebla pectinata	Barley Mitchell Grass		X	
Astrebla squarrosa	Bull Mitchell Grass		X	
Atalaya hemiglauca	Whitewood	X		X
Bothriochloa ewartiana	Desert Bluegrass	X		
Brachychiton populneus	Kurrajong	X		X
Callitris glaucophylla	White Cypress Pine	X		
Carissa ovate	Currant Bush	X		
Calytrix microcoma	Desert Star Flower	X		
Chloris divaricate	Slender Chloris	X		X
Chyrsopogon fallax	Golden Beard Grass	X		
Corymbia dallachiana	Dallachy's Gum	X		X
Corymbia setosa	Rough-leaved Bloodwood	X		
Dactyloctenium radulans	Button Grass	X		
Dichanthium sericeum sub sp. *Sericeum*	Bluegrass	X	X	
Digitaria brownii	Cotton Panic Grass	X		
Dodonaea lanceolata var. lanceolata	Hopbush	X		
Enchylaena tomentosa	Ruby Saltbush	X		X
Eragrostis elongate	Clustered Lovegrass	X		X
Eragrostis lacunaria	Purple Lovegrass			X
Eragrostis parviflora	Weeping Lovegrass	X		X
Eremophila latrobei	Crimson Turkey Bush	X		
Eremophila mitchelli	False Sandalwood	X		
Erythrina vespertilio	Bat's Wing Coral Tree	X		
Eucalyptus brownie	Reid River Box	X		
Eucalyptus camaldulensis	Red River Gum	X		X
Eucalytpus cambageana	Dawson Gum	X		X
Eucalyptus coolabah	Coolabah	X		X
Eucalyptus melanophloia	Silver-leaved ironbark	X		X
Eucalyptus populnea	Poplar Box	X		
Eucalyptus similis	Queensland Yellowjacket	X		
Eucalyptus tessellaris	Moreton Bay Ash	X		X
Eucalyptus thozetiana	Thozet's Box	X		
Heteropogon contortus	Black Speargrass	X		X
Lysiphyllum carronii	Red Bauhinia	X		X
Melaleuca tamariscina	Weeping Bottlebrush	X		
Panicum decompositum	Native Millet	X	X	

Common Name	Scientific Name	Woodland	Grassland	Riparian Zone
Paspalidium caespitosum	Brigalow Grass	X		X
Pennisetum cillare	Buffel Grass	X		
Petalostigma pubescens	Quinine Bush	X		
Setaria surgens	Annual Pigeon Grass	X		
Sporobolus caroli	Fairy Grass		X	X
Themeda triandra	Kangaroo Grass	X	X	X
Triodia mitchelli	Soft Spinifex	X	X	
Triodia pungens	Soft Spinifex	X	X	

A combination of native and introduced pasture species will be used to ensure the establishment of a groundcover and thereby, reduce the likelihood of erosion. Legumes may also be selected to assist in the supply of bio-available nitrogen to the soil. If the use of introduced grasses and / or legumes is deemed necessary for erosion control in the bushland areas, pasture seed and fertiliser will be applied at a lower rate than for pasture outcomes to reduce competition with tree seed and / or seedlings.

Native and exotic pasture species will be sown where the risk of erosion is less and on the more protected aspects of landforms. Introduced grass species such as Rhodes Grass (*Chloris gayana*) and Indian Couch (*Bothriochloa pertusa*) will be used on the steeper slopes (>10°) as their growth habit provides more extensive coverage in a shorter time. Aerial sowing and ground broadcasting will be conducted for pasture seed as the preferred sowing methods and grazing will be restricted whilst the vegetation is establishing.

Weed species have the potential to have a major impact during rehabilitation activities. Weed management will be a critical component of mine rehabilitation with the use of a combination of control measures including:

- Herbicide spraying or scalping of weeds off soil dumps
- Washdown and cleaning of high risk equipment prior to entering the site
- Monitoring and control of existing weed populations and weed populations over the mine life

All weed control will be undertaken in a manner which minimises soil disturbance. Declared weeds will be controlled in accordance with the *Land Protection Pest and Stock Route Management Act 2002* (LP Act). A detailed Weed Management Plan will be developed for the Project to ensure management of weeds in accordance with the requirements of the LP Act.

5.4.3 Rehabilitation and Decommissioning

Rehabilitation will be monitored regularly in accordance with the monitoring program identified below. Monitoring results will be compared against the nominated success criteria to track the progress of rehabilitation towards the objective of a self-sustaining ecosystem. Rehabilitation techniques will be continually developed and refined over the life of mine through an ongoing process of monitoring at the site and recognition of other industry experiences.

A corrective action program will be implemented to address areas of failed rehabilitation and periodic and final rehabilitation reports will be submitted to the DEHP as detailed in the Rehabilitation Management Plan.

5.5 Success Criteria

Preliminary success criteria (or closure criteria) for the rehabilitation of the main mine areas have been proposed in Table 14. The success criteria are performance objectives or standards against which rehabilitation success in achieving a sustainable system for the proposed post-mine land use is demonstrated. Satisfaction and maintenance of the success criteria (as indicated by monitoring results) will demonstrate that the rehabilitated landscape is ready to be relinquished from the mine's financial assurance and handed back to stakeholders in a productive and sustainable condition.

The success criteria have been developed to comprise indicators for vegetation, fauna, soil, stability, land use and safety on a landform-type basis that reflects the nominated post-mine land use of bushland and grassland. For each element, standards that define rehabilitation success at mine closure are provided.

Based on the generic indicators in Table 13, each criterion will be further developed to be specific, measurable, achievable, realistic and outcome based, and to reflect the principle of sustainable development. The further development of each criterion will be based on results of research, monitoring of progressive rehabilitation areas and risk assessments. The success criteria will be reviewed every three to five years with stakeholder participation to ensure the criteria remain realistic and achievable.

5.6 Commitments

- At closure, the mine will achieve the agreed rehabilitation success criteria
- Progressive rehabilitation of the disturbed areas will be undertaken on an availability basis
- An ongoing rehabilitation monitoring program will be undertaken against the agreed criteria
- Prior to closure information to support final void configuration will be developed
- The final voids will be designed to render them safe, stable and sustainable.

Table 13: Success Criteria

Rehabilitation element	Indicator	Criteria
1. In-pit and out-of-pit spoil dumps and dragline spoil areas		
Landform stability	Slope gradient	No less than 75% of the area has slopes <10° and up to 25% of the area has slopes >10°. Where reject layers are present and exposed, the landform is capped.
	Erosion control	Erosion control structures are installed commensurate with the slope of the landform.
	Surface water drainage	Use of contour banks and diversion drains to direct water into stable areas or sediment control basins.
Water quality		Ensure receiving waters affected by surface water runoff have contaminant limits of electrical conductivity maximum of 1,500 µS/cm and pH range of 5.5 to 9.5, or as determined to be sustainable subject to future investigations and setting water quality objectives
Water Storages, Creek Diversions		Clean water storages and diversions to be stabilised and left as required. Dirty water storages to be cleaned out and rehabilitated to a stable non-polluting condition.
Topsoil	Salinity (electrical conductivity)	Soil salinity content is <0.6 dS/m.
	pH	Soil pH is between 5.5 and 8.5.
	Sodium content	Soil Exchange Sodium Percentage (ESP) is <15%.
	Nutrient cycling	Nutrient accumulation and recycling processes are occurring as evidenced by the presence of a litter layer, mycorrhizae and/or other microsymbionts. Adequate macro and micro-nutrients are present.
Vegetation	Land use	Area accomplishes and remains as a healthy working bushland ecosystem.
	Surface cover	Minimum of 70% vegetative cover is present (or 50% if rocks, logs or other features of cover are present). No bare surfaces >20 m^2 in area or >10m in length down slope.
	Species composition	Comprise a mixture of native trees, shrubs and grasses representative of regionally occurring woodland to open forest where possible.
	Community Structure	Groundcover, understorey and overstorey structure similar to that of appropriate reference site(s)*.
	Resilience to disturbance	Established species survive and/or regenerate after disturbance. Weeds do not dominate native species after disturbance or after rain. Pests do not occur in substantial numbers or visibly affect the development of native plant species.
	Sustainability	Species are capable of setting viable seed, flowering or otherwise reproducing. Evidence of second generation of tree/shrub species. Vegetation develops and maintains a litter layer evidenced by a consistent mass and depth of litter over subsequent seasons. More than 75% of shrubs and/or trees are healthy when ranked healthy, sick or dead.
Fauna	Vertebrate species	Representation of a range of species characteristics (e.g. activity pattern, habitat usage, diet, dispersal character etc. from each faunal assemblage group (e.g. reptiles, birds, mammals), present in the ecosystem type, based on pre-mine

Rehabilitation element	Indicator	Criteria
		fauna lists and sighted within the three-year period preceding mine closure. Sighting of species of conservation significance or indicators of the presence of species of conservation significance (e.g. tracks) likely to be present in the established ecosystem type within the three-year period preceding mine closure (assuming non-mine related disturbance has not eliminated local populations thereby removing the colonising source). The number of vertebrate species does not decrease by more than 25% in the successive seasons prior to mine closure or by more than 40% over the two successive seasons prior to mine closure.
	Invertebrate species	Presence of representatives of a broad range of functional indicator groups involved in different ecological processes (including termites for soil structure, Collembola for decomposition, Hemiptera for herbivory and predatory groups such as arachnids, centipedes, earwigs, cockroaches and ants as indicators of a range of other processes.
	Habitat structure	Typical food, shelter and water sources required by the majority of vertebrate and invertebrate inhabitants of that ecosystem type are present, including: a variety of food plants; evidence of active use of habitat provided during rehabilitation such as nest boxes, stags and logs and signs of natural generation of shelter sources including leaf litter.
Safety		Risk assessment has been undertaken in accordance with relevant guidelines and Australian Standards and risks reduced to levels agreed with the stakeholders.
2. Final Voids (including Ramps)		
Landform stability	Slope gradient	Highwall faces exhibit long-term geotechnical stability and a geotechnical report has been completed. Competent rock Highwall to have slope of <65°. Incompetent rock highwall to have slope of <17°. Low wall to have slope of <17°. Ramp walls not backfilled exhibit long-term geotechnical stability and a geotechnical report has been completed. In-pit rejects and spoil slope gradients can exceed 15%.
	Erosion control	Erosion mitigation measures have been applied to ensure slope stability
	Surface water drainage	Use of contour banks and diversion drains to direct water into stable areas or sediment control basins.
Water quality		Electrical conductivity of any void water may exceed 1,500 µS/cm if an ecological assessment shows the long-term ecological stability and groundwater quality is not adversely affected.
Water Storages, Creek Diversions		As for 1.
Topsoil		As for 1.
Vegetation	Land use	Where ramps and in-pit spoil design allow, area accomplishes and remains as a healthy working bushland ecosystem (although naturalised grasses may be used).
	Surface cover	Minimum of 70% vegetative cover is present (or 50% if rocks, logs or other features of cover are present). No bare surfaces >20 m^2 in area or >10m in length down slope.
	Species composition	Comprise a mixture grasses, shrubs and trees (where possible) suitable for establishment on steeper slopes.
	Community Structure	Groundcover and understorey structure to that of appropriate reference site(s)*.
	Resilience to disturbance	Established species survive and/or regenerate after disturbance. Weeds do not dominate native species after disturbance or after rain. Pests do not occur in substantial numbers or visibly affect the development of native plant

Rehabilitation element	Indicator	Criteria
		species.
	Sustainability	More than 75% of individual grasses and shrubs are healthy when ranked healthy, sick or dead.
Safety		Risk assessment has been completed and risk mitigation measures have been implemented. Where risk mitigation measures include bunds, safety fences and warning signs, these have been erected generally in accordance with relevant guidelines and Australian Standards.
3. Reject dumps		
Landform stability	Slope gradient	Final slope of 1V:6H (9.5°).
	Erosion control	Reject emplacements have been capped to a depth of 1.5m of inert material. Erosion mitigation measures have been applied.
	Surface water drainage	Drainage control measures are installed.
Landform stability	Slope gradient	No less than 75% of the area has slopes <10° and up to 25% of the area has slopes >10°. Where reject layers are present and exposed, the landform is capped.
	Erosion control	Erosion control structures are installed commensurate with the slope of the landform.
	Surface water drainage	Use of contour banks and diversion drains to direct water into stable areas or sediment control basins.
Water quality		Ensure receiving waters affected by surface water runoff have contaminant limits of electrical conductivity maximum of 1,500 µS/cm and pH range of 5.5 to 9.5, or as determined to be sustainable subject to future investigations and setting water quality objectives
Water Storages, Creek Diversions		Clean water storages and diversions to be stabilised and left as required. Dirty water storages to be cleaned out and rehabilitated to a stable non-polluting condition.
Topsoil	Salinity (electrical conductivity)	Soil salinity content is <0.6 dS/m.
	pH	Soil pH is between 5.5 and 8.5.
	Sodium content	Soil Exchange Sodium Percentage (ESP) is <15%.
	Nutrient cycling	Nutrient accumulation and recycling processes are occurring as evidenced by the presence of a litter layer, mycorrhizae and/or other microsymbionts. Adequate macro and micro-nutrients are present.
Vegetation	Land use	Area accomplishes and remains as a healthy working bushland ecosystem.
	Surface cover	Minimum of 70% vegetative cover is present (or 50% if rocks, logs or other features of cover are present). No bare surfaces >20 m^2 in area or >10m in length down slope.
	Species composition	Comprise a mixture of native trees, shrubs and grasses representative of regionally occurring woodland to open forest where possible.
	Community Structure	Groundcover, understorey and overstorey structure similar to that of appropriate reference site(s)*.
	Resilience to disturbance	Established species survive and/or regenerate after disturbance. Weeds do not dominate native species after disturbance or after rain. Pests do not occur in substantial numbers or visibly affect the development of native plant species.

Rehabilitation element	Indicator	Criteria
	Sustainability	Species are capable of setting viable seed, flowering or otherwise reproducing. Evidence of second generation of tree/shrub species. Vegetation develops and maintains a litter layer evidenced by a consistent mass and depth of litter over subsequent seasons. More than 75% of shrubs and/or trees are healthy when ranked healthy, sick or dead.
Fauna	Vertebrate species	Where capping allows for tree establishment, representation of a range of species characteristics (e.g. activity pattern, habitat usage, diet, dispersal character etc from each faunal assemblage group (e.g. reptiles, birds, mammals), present in the ecosystem type, based on pre-mine fauna lists and sighted within the three-year period preceding mine closure. Sighting of species of conservation significance or indicators of the presence of species of conservation significance (e.g. tracks) likely to be present in the established ecosystem type within the three-year period preceding mine closure (assuming non-mine related disturbance has not eliminated local populations thereby removing the colonising source). The number of vertebrate species does not decrease by more than 25% in the successive seasons prior to mine closure or by more than 40% over the two successive seasons prior to mine closure.
	Invertebrate species	Presence of representatives of a broad range of functional indicator groups involved in different ecological processes (including termites for soil structure, Collembola for decomposition, Hemiptera for herbivory and predatory groups such as arachnids, centipedes, earwigs, cockroaches and ants as indicators of a range of other processes.
	Habitat structure	Typical food, shelter and water sources required by the majority of vertebrate and invertebrate inhabitants of that ecosystem type are present, including: a variety of food plants; evidence of active use of habitat provided during rehabilitation such as nest boxes, stags and logs and signs of natural generation of shelter sources including leaf litter.
Safety		Risk assessment has been undertaken in accordance with relevant guidelines and Australian Standards and risks reduced to levels agreed with the stakeholders.
4. Mine Plant/Industrial Areas		
Landform stability	Slope gradient	Area has gradient of <2°.
	Erosion control	Erosion mitigation measures have been applied.
	Surface water drainage	Use of contour banks and diversion drains to direct water into stable areas or sediment control basins.
Water quality		Ensure receiving waters affected by surface water runoff have contaminant limits of electrical conductivity maximum of 1,500 µS/cm and pH range of 5.5 to 9.5, or as determined to be sustainable subject to future investigations and setting water quality objectives
Water Storages, Creek Diversions		Clean water storages and diversions to be stabilised and left as required. Dirty water storages to be cleaned out and rehabilitated to a stable non-polluting condition.
Topsoil	Salinity (electrical conductivity)	Soil salinity content is <0.6 dS/m.
	pH	Soil pH is between 5.5 and 8.5.
	Sodium content	Soil Exchange Sodium Percentage (ESP) is <15%.
	Nutrient cycling	Nutrient accumulation and recycling processes are occurring as evidenced by the presence of a litter layer, mycorrhizae

Rehabilitation element	Indicator	Criteria
		and/or other microsymbionts. Adequate macro and micro-nutrients are present.
Vegetation	Land use	Buildings, water storage, roads (except those used by the public) and other infrastructure have been removed unless stakeholders have entered into formal written agreements for their retention. Areas are readily accessible and conducive to safe cattle management activities. Predicted economics and /or benefits have been defined and agreed by the stakeholders.
	Surface cover	Minimum of 70% vegetative cover is present (or 50% if rocks, logs or other features of cover are present). No bare surfaces >20 m^2 in area or >10m in length down slope.
	Species composition	Palatable, nutritious pasture grass species are present.
	Community Structure	Desirable grass species comprise at least 60% of total grass cover. Tree density and height of >25 stems per 5 ha each being >2m in height.
	Resilience to disturbance	Established species survive and/or regenerate after disturbance. Weeds do not dominate native species after disturbance or after rain. Pests do not occur in substantial numbers or visibly affect the development of native plant species.
	Sustainability	Nitrogen fixing grass species present. More than 75% of shrubs and/or trees are healthy when ranked healthy, sick or dead.
Fauna	Vertebrate species	Representation of a range of species characteristics (e.g. activity pattern, habitat usage, diet, dispersal character etc) from each faunal assemblage group (e.g. reptiles, birds, mammals), present in the grassland ecosystem type, based on pre-mine fauna lists and sighted within the three-year period preceding mine closure. The number of vertebrate species does not decrease by more than 25% in the successive seasons prior to mine closure or by more than 40% over the two successive seasons prior to mine closure.
	Invertebrate species	Presence of representatives of a broad range of functional indicator groups involved in different pastoral ecological processes (including termites for soil structure, Collembola for decomposition, Hemiptera for herbivory and predatory groups such as arachnids, centipedes, earwigs, cockroaches and ants as indicators of a range of other processes.
	Habitat structure	Typical food, shelter and water sources required by the majority of vertebrate and invertebrate inhabitants of pastoral ecosystem type are present, including: a variety of food plants and signs of natural generation of shelter sources including leaf litter.
Safety		Risk assessment has been undertaken in accordance with relevant guidelines and Australian Standards and risks reduced to levels agreed with the stakeholders. Closure documentation includes the contaminated sites register which identifies contaminated sites and the treatment applied.

Note: * Reference sites are still to be confirmed.

5.7 Monitoring Program

Regular monitoring of the rehabilitation will be required during the vegetation establishment period, to demonstrate whether the objectives of the rehabilitation strategy are being achieved and whether a sustainable landform has been provided. In addition to rehabilitated areas, reference sites will be identified and monitored to allow a comparison of the development and success of the rehabilitation against a control.

Reference sites indicate the condition of surrounding un-mined areas, or areas successfully rehabilitated, that the mine sites must replicate. In the absence of any currently operating Galilee Basin Mines, the rehabilitation at the Peak Downs Mine in the Bowen Basin will be reviewed to determine if any areas would provide suitable reference sites for the Project.

Monitoring will be conducted periodically by independent, suitably skilled and qualified persons at locations which will be representative of the range of conditions on the rehabilitating areas. Annual reviews will be conducted of monitoring data to assess trends and monitoring program effectiveness. Monitoring of the rehabilitated areas will broadly involve the following:

- Ongoing chemical analysis of topsoil
- Comparison of soil erosion rates and rill and gully dimensions with measurements taken from reference sites
- Comparison of vegetation measurements with measurements taken from reference sites
- Ongoing analysis of water quality parameters in accordance with the development consent and environmental protection licence conditions from data collected monthly at water storages, ramps and pits, sediment basins and sewage effluent outfalls on-site, and from creeks (upstream and downstream of mine)
- Visual surveillance including the use of digital photogrammetry / low level oblique or vertical aerial photography to monitor changes over time in the rehabilitation (e.g. changes in vegetation structure, erosion rates and landform drainage)

More specifically, monitoring of the elements in Table 14 will be undertaken to determine the level of achievement of success criteria.

Table 14: Monitoring Elements

Rehabilitation aspect	Element to be monitored
Ecosystem establishment	
Groundcover	Percentage of ground covered by vegetation, rocks, logs and other obstructions. Obstruction lengths and widths (indicates the amount of ground cover that is present to collect, hold and disseminate available resources necessary for ecosystem function) for use in Landscape Function Analysis (LFA). Fetch lengths (measure of distances of soil surface that is bare of matter that could slow water velocity) for use in LFA.
Community structure and composition	Species composition. Number and form of ground cover and understorey species per plot. Density, height, canopy cover and DBH of tree and large shrub species. Numbers, heights and species identity (where able to be determined) of any seedlings. Evidence of reproduction/regeneration (e.g. flower heads, fruits/seeds, germination of seedlings etc). Assessment of individual plant health (healthy, sick or dead).
Habitat	Availability and variety of food sources (e.g. flowering/fruiting trees, presence of invertebrates etc). Availability and variety of shelter (e.g. depth of leaf litter, presence of logs, hollows etc). Presence/absence of free water.
Fauna	Presence and approximate abundance and distribution of functional indicator invertebrate species. General observations of vertebrate species (including species of conservation significance). Detailed fauna surveys including presence and approximate abundance and distribution of vertebrate species (focussing on species of conservation significance).
Weeds and pests	Species identity. Approximate numbers/level of infestation. Observations of impact on rehabilitation (if any).
Erosion Monitoring and Soil Characteristics	
Soil	Stability, infiltration and nutrient cycling undertaken according to LFA procedure. Electrical Conductivity, as a measure of salinity. pH. Soil exchangeable Na potential.
Erosion	Location and extent of sheet wash. Location and extent of rill and gully erosion including measurements of depth, width and length. Extent of bare areas with potential to erode. Sediment movement and runoff.
Geotechnical Stability	
	Stability of batter and surface settlements, in particular where these features could impact on the performance of any surface water management system. Surface integrity of landform cover/capping (measurement of extent of integrity failure). Landform slumping (distance of material movement and extent).
Surface and Groundwater	
	Groundwater quality and depth. Efficiency of landform surface water drainage systems. Presence and quality of any surface water and seepage at selected locations at the lower part of potentially acid producing landforms such as reject dumps. Water quality including pH, EC and total suspended solids of water in water storages, ramps and pits, sediment basins and sewage effluent outfalls onsite. Water quality including pH, salinity and turbidity of water entering creek/river systems on site.
Creeks and Diversions	
	Vegetation density, diversity and vigour. Structural stability of channel. Water quality including pH, salinity and turbidity of water entering creek/river systems on site.

5.8 Maintenance

Maintenance of rehabilitated areas will be undertaken where necessary and in response to results of the monitoring program, to ensure success criteria are met, or in the case of progressive rehabilitation, are projected to be met at the time of mine closure. Depending on the criteria to be achieved, examples of maintenance works include re-seeding or planting of tube stock of tree and / or shrub species to meet required revegetation parameters and implementation of erosion protection measures to reduce erosion rates.

Responsibility for the maintenance of rehabilitation will lie with Waratah Coal, as owner / operator of the Project. As extensive areas of disturbed land will not be available for progressive rehabilitation, much of the rehabilitation work will be required to be carried out at the end of mine life. Post-mining surveys of the rehabilitation will be undertaken across the site to determine whether the site meets the success criteria and whether this result is being maintained over time. Once this occurs and the site is relinquished, the land will be returned to the relevant stakeholders and maintenance of the rehabilitation will no longer be required.

6.0 Conclusions

1. The China First coal Mining Project will produce 56Mtpa of ROM coal. Waste from this volume will include 10.7Mtpa of coarse rejects and 5.3Mtpa of tailings paste.
2. Tailings paste and rejects will be trucked to properly designed containment cells in the box cut and other spoil areas. The cells will be clay lined to be effectively impermeable. Cells will be raised in stages.
3. Coarse rejects and tailings will be dumped in cells, spread by dozer and track compacted, which will reduce permeability, minimise seepage and prevent oxidisation.
4. To date assays have found the majority of spoil materials to be geochemically benign. Any potential saline material will be placed within the central areas of spoil piles.
5. Geochemical tests which have been completed on overburden drill cores include pH and electrical conductivity, acid base account, net acid generation (NAG), acid neutralising capacity (ANC), net acid producing potential (NAP) and determination of trace element quantities. Total sulphur ranged from 0.03% to 0.42%. The pH variation was 5.2% to 8.5% and the net acid production potential ranged from non-acid forming to uncertain acid forming. Concentrations of trace elements are standard for coal seam overburden. The above results confirm results previously obtained by Bridge Oil Limited.
6. The objectives of the rehabilitation and closure strategy are to achieve acceptable post-disturbance land use suitability, create a stable post-disturbance landform and preservation of downstream water quality. This will be achieved by implementing proper rehabilitation procedures including re-shaping and topsoiling, selection of suitable species of vegetation and ongoing monitoring. Progressive rehabilitation will proceed conjunctively with mining.
7. Success criteria have been developed to comprise indicators for vegetation, fauna, soil, stability, land use and safety. The success criteria will be reviewed every three to five years.
8. Maintenance of rehabilitated areas will be undertaken and necessary will include re-seeding or planting of tube stock and implementation of erosion protection measures.

7.0 References

AMEC (2000). Australian Mining Engineering Consultants, 2000. *The Influence of Subsidence Cracking on Longwall Extraction Beneath Water Courses, Aquifers, Open-cut Voids and Spoil Piles.* ACARP Report Project Number C5016.

Bridge Oil Limited, 1994. Exploration Permit, Coal, No. 484, *Queensland Final Report on Exploration* 1978 – 1993.