



**WERRIS CREEK COAL PTY LTD**

**QUARTERLY ENVIRONMENTAL MONITORING  
REPORT**

**May, June & July 2011**

This Environmental Monitoring Report covers the period 1<sup>st</sup> May 2011 to 31<sup>st</sup> July 2011 for the Werris Creek No.2 Coal Mine Community Consultative Committee.

The report includes environmental monitoring results from the on-site Weather Station, Air Quality, Noise, Blasting, Surface Water, Groundwater and Discharge Water Quality together with any community complaints received and general details on site environmental matters.

**Note:** Monitoring results with any non compliance of monitoring criteria are highlighted in **yellow**.

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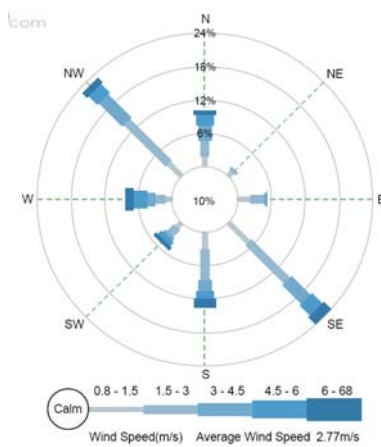
## 1.0 METEOROLOGY

### 1.1 WEATHER STATION

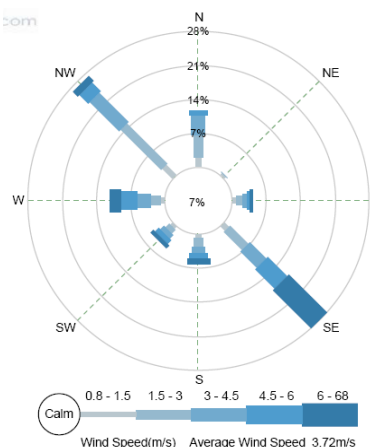
WCC collects meteorological data from the onsite weather station located on top level of the overburden emplacement and from the continuous noise monitoring trailer located in the Quipolly Valley during the period. The following table summarises temperature, inversion and rainfall data for May, June and July and wind data is presented below in windroses.

Month	Temp (°C) Trailer			Temp (°C) 10m Onsite			Lapse Rate (°C/100m)		Rainfall (mm)		
	Min	Avg	Max	Min	Avg	Max	Avg	90%	Onsite	Trailer	Annual*
May	-1.4	11.5	23.1	2.4	12.6	22.0	+1.3	+5.7	68.6	57.2	108.0
June	-4.9	8.5	18.8	0	10.6	17.9	+2.1	+7.5	10.6	10.0	118.6
July	-6.1	7.5	18.2	-0.1	9.8	17.9	+2.4	+8.6	4.8	5.6	123.4

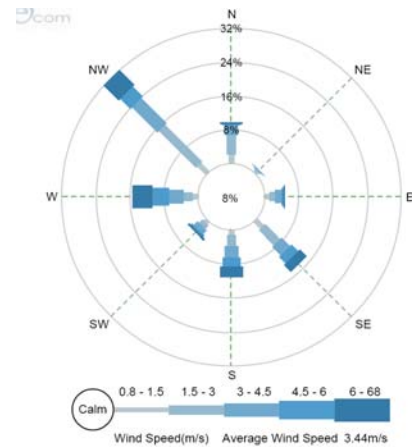
\* Annual cumulative total since April 2011 for onsite Weather Station



May 2011



June 2011



July 2011

The onsite weather station was fully available during the period.

## 2.0 AIR QUALITY

### 2.1 HVAS (PM10)

High Volume Air Sample (HVAS) monitoring for particulate matter less than 10 micron in size (PM10) and total suspended particulate (TSP) matter is conducted at five sites listed below.

- WCHV1 – “Cintra” PM10
- WCHV2 – “Tonsley Park” PM10
- WCHV3 – “Railway View” PM10
- WCHV4 – “Eurunderee” PM10
- WCHV5 – “Railway View” TSP

Sampling is scheduled for 24 hours every 6 days in accordance with Department of Environment, Climate Change and Water (DECCW) guidelines and results are reported as micro grams per cubic metre ( $\mu\text{g}/\text{m}^3$ ) of air sampled.

#### 2.1.1 Monitoring Data Results

The monthly average results for the last three months are provided in the table below; however see HVAS monitoring data under **Appendix 1** for individual results.

Monitor Location	May ( $\mu\text{g}/\text{m}^3$ )	June ( $\mu\text{g}/\text{m}^3$ )	July ( $\mu\text{g}/\text{m}^3$ )	Annual ( $\mu\text{g}/\text{m}^3$ )	Criteria ( $\mu\text{g}/\text{m}^3$ )
WCHV1	23.1	38.7	10.3	24.3	30
WCHV2	20.3	35.2	7.8	19.3	30
WCHV3	27.7	39.5	16.3	27.0	30
WCHV4	27.6	8.1	11.5	11.9	30
WCHV5	63.7	132.5	44.8	71.8	90

### 2.1.2 Discussion - Compliance / Non Compliance

While the monthly averages for May and July were below the compliance limit, there were a couple of elevated results for the 20<sup>th</sup> May at Cintra PM10  $34 \mu\text{g}/\text{m}^3$ , Tonsley Park PM10  $34 \mu\text{g}/\text{m}^3$ , Railway View PM10  $50 \mu\text{g}/\text{m}^3$ , Railway View TSP  $100 \mu\text{g}/\text{m}^3$  and for the 7<sup>th</sup> July at Railway View PM10  $35 \mu\text{g}/\text{m}^3$  and Railway View TSP on  $105 \mu\text{g}/\text{m}^3$  but all results were below the PM10 24 hour limit ( $50 \mu\text{g}/\text{m}^3$ ).

Twice during June, on 1<sup>st</sup> and 7<sup>th</sup> the PM10 24 hour limit ( $50 \mu\text{g}/\text{m}^3$ ) was exceeded at Tonsley Park potentially due to WCC dust emissions, while on the 13<sup>th</sup> was marginally below the  $50 \mu\text{g}/\text{m}^3$  limit. Both Cintra and Railway View on the 1<sup>st</sup> and 7<sup>th</sup> recorded elevated 24 hour results however both locations are mine owned. The PM10 and TSP results at Railway View recorded high levels on 1<sup>st</sup> and 13<sup>th</sup> when the winds were blowing away from the mine, indicating that the levels were from another source of dust (horses in same paddock).

The annual PM10 sites averages are below the long term impact annual criteria of  $30 \mu\text{g}/\text{m}^3$ .

The TSP site is below the long term impact annual criteria of  $90 \mu\text{g}/\text{m}^3$ .

The Railway View TSP did not run on 13<sup>th</sup> and run short on 1<sup>st</sup>, 7<sup>th</sup> and 19<sup>th</sup> recording excessive levels that maybe due to a technical fault with the unit. ACIRL have been asked to investigate hire options so the unit can be fixed.

## 2.2 DEPOSITED DUST

Deposited dust monitoring is for particulate matter generally greater than 30 micron in size which readily settles out of the air and is monitored at seven locations.

- WC2 – “Cintra”
- WC5 – “Railway View”
- WC7 – “Tonsley Park”
- WC8 – “Plain View”
- WC9 – “Marengo”
- WC10 – “Mountain View”
- WC11 – “Glenara”

Sampling is scheduled monthly in accordance with DECCW guidelines and results are reported as grams per metre squared per month ( $\text{g}/\text{m}^2/\text{month}$ ).

### 2.2.1 Monitoring Data Results

The results for the last three months are provided in the table below; however **Appendix 2** has more information on Deposited Dust Monitoring Results.

Monitor Location	May ( $\text{g}/\text{m}^2/\text{month}$ )	June ( $\text{g}/\text{m}^2/\text{month}$ )	July ( $\text{g}/\text{m}^2/\text{month}$ )	Annual ( $\text{g}/\text{m}^2/\text{month}$ )	Criteria ( $\text{g}/\text{m}^2/\text{month}$ )
WC2	0.6*	3.0	0.5	1.7	3.6
WC5	0.6	2.4	0.5	1.2	3.6
WC7	0.1	0.9	0.3	0.5	3.6
WC8	0.2	1.3	0.8	0.9	3.6
WC9	0.1	0.8	0.2	0.4	3.6
WC10	5.9*	0.8	0.9	0.9	3.6
WC11	0.2	1.4	0.6	0.7	3.6

\* - sample contaminated with excessive organic matter (>50%) from non-mining source (i.e bird droppings and insects) and is excluded from the average

## 2.2.2 Discussion - Compliance / Non Compliance

All dust deposition gauge results were below the monthly amenity criteria of 3.6g/m<sup>2</sup>/month. There was one sample each for “Cintra” (WC2) and “Mountain View” (WC9) that has been excluded due to excessive organic matter contamination.

## 2.3 AIR QUALITY COMPLAINTS

There were two dust related complaints for the period. The first complaint was a general complaint regarding the increase in dust from the mine over time viewed by the residents from the Barnes Subdivision south of Quipolly. From the investigation, it was decided that the perceived increase in dust could be due to the time of year resulting in more frequent temperature inversions in the mornings that concentrate dust so that it becomes visible but the overall daily dust emissions are at the same level and monitoring results confirm levels are still in compliance. However a review of water cart dust suppression usage (litres per cubic meter of material moved) had fallen compared to previous year even though the number and size of water carts had increased but WCC will keep a focus on this. The second dust complaint was for the 20<sup>th</sup> May when a motorist on Werris Creek Road alleged to have seen dust going across the road. An inspection did not identify significant dust however a drill and scrappers operating close to road. All drills operators confirmed that sprays were being utilised and a water cart was in use on the scrappers circuit. Specific actions taken in relation to these complaints are outlined in **Section 6**.

## 3.0 NOISE

### 3.1 OPERATIONAL NOISE

Monthly attended noise monitoring undertaken at the following locations:

- “Almawillee” (private agreement);
- “Glenara” (private agreement);
- “Tonsley Park” (private agreement);
- “Railway Cottage”;
- “Greenslopes”;
- “Kyooma” (private agreement);
- Punyarra St, Werris Creek; and
- Kurrara St, Werris Creek.

Three sets of measurements are made at each location; one during the day time period (before 6pm); one during the evening period (from 6pm – 10pm) and one at night (after 10pm).

The noise emission criterion for WCC is 35dB(A) unless otherwise subject to a current, legally binding agreement between WCC and the occupant of the affected residential property.

WCC environmental protection licence (EPL) conditions indicate that compliance with noise emission criteria is not applicable under atmospheric conditions where wind speeds are greater than 3m/s and/or there is a temperature inversion greater than +3°C/100m.

#### 3.1.1 Monitoring Data Results

The results for the last three months attended noise monitoring are outlined below for noise levels from Werris Creek Coal operations only (not ambient noise); however see Monthly Noise Monitoring Reports under **Appendix 3** for more detail.

Friday 20<sup>th</sup> & Saturday 21<sup>st</sup> May 2011

Location	Day	Evening	Night	Criteria
“Almawillee”*	Inaudible*#	35*#	32*#	35 dB(A) L <sub>eq</sub> 15min
“Glenara”*	Inaudible*#	38*#	32*#	35 dB(A) L <sub>eq</sub> 15min
“Railway Cottage”	Inaudible#	Inaudible#	25#	35 dB(A) L <sub>eq</sub> 15min
“Tonsley Park”*	28*	Inaudible*#	Inaudible*#	35 dB(A) L <sub>eq</sub> 15min
“Greenslopes”	<25	28#	Inaudible#	35 dB(A) L <sub>eq</sub> 15min
“Kyooma”*	31*	Inaudible*#	Inaudible*#	35 dB(A) L <sub>eq</sub> 15min
Kurrara St	Inaudible	Inaudible#	Inaudible#	35 dB(A) L <sub>eq</sub> 15min
Punyarra St	Inaudible	Inaudible#	Inaudible#	35 dB(A) L <sub>eq</sub> 15min

Rail Spur	26	55 dB(A) $L_{eq}$ 24hr
	65	80 dB(A) $L_{MAX}$

\* - Project Related Property or Private Agreement; Yellow Bold – Elevated noise above criteria; # - Temperature Inversion >3°C/100m or Wind Speed >3m/s

### Friday 24<sup>th</sup> & Saturday 25<sup>th</sup> June 2011

Location	Day	Evening	Night	Criteria
“Almawillee”*	<20*	<b>37</b> *#	<b>38</b> *#	35 dB(A) $L_{eq}$ 15min
“Glenara”*	<b>37</b> *#	33*#	<b>38</b> *#	35 dB(A) $L_{eq}$ 15min
“Railway Cottage”	Barely audible	<30#	32#	35 dB(A) $L_{eq}$ 15min
“Tonsley Park”*	Inaudible*	35*#	<b>38</b> *#	35 dB(A) $L_{eq}$ 15min
“Greenslopes”	Inaudible	<b>40</b> #	<b>45</b> #	35 dB(A) $L_{eq}$ 15min
“Kyooma”*	27*	<b>36</b> *#	35*#	35 dB(A) $L_{eq}$ 15min
Kurrara St	Inaudible	<30#	35#	35 dB(A) $L_{eq}$ 15min
Punyarra St	Inaudible	33#	34#	35 dB(A) $L_{eq}$ 15min
Rail Spur	Not Monitored			55 dB(A) $L_{eq}$ 24hr
	Not Monitored			80 dB(A) $L_{MAX}$

\* - Project Related Property or Private Agreement; Yellow Bold – Elevated noise above criteria; # - Temperature Inversion >3°C/100m or Wind Speed >3m/s

### Monday 25<sup>th</sup> & Tuesday 26<sup>th</sup> July 2011

Location	Day	Evening	Night	Criteria
“Almawillee”*	<20*#	32*#	33*#	35 dB(A) $L_{eq}$ 15min
“Glenara”*	34*#	30*#	34*#	35 dB(A) $L_{eq}$ 15min
“Railway Cottage”	32#	34#	34#	35 dB(A) $L_{eq}$ 15min
“Tonsley Park”*	Inaudible*#	Inaudible*#	Inaudible*#	35 dB(A) $L_{eq}$ 15min
“Greenslopes”	Inaudible#	31#	<b>36</b> #	35 dB(A) $L_{eq}$ 15min
“Kyooma”*	Inaudible*#	<b>37</b> *#	35*#	35 dB(A) $L_{eq}$ 15min
Kurrara St	Inaudible#	Inaudible#	Inaudible#	35 dB(A) $L_{eq}$ 15min
Punyarra St	Inaudible#	Inaudible#	Inaudible#	35 dB(A) $L_{eq}$ 15min
Rail Spur	NM			
	NM			

\* - Project Related Property or Private Agreement; Yellow Bold – Elevated noise above criteria; # - Temperature Inversion >3°C/100m or Wind Speed >3m/s

### 3.1.2 Discussion - Compliance / Non Compliance

There were no noise exceedances during May, June and July.

Elevated noise levels were recorded at “Glenara” for the May evening monitoring period. The elevated noise levels did not result in an exceedance because of the adverse (noise enhancing) weather conditions at the time of monitoring. WCC has a private agreement in place with “Glenara” for noise impacts.

Elevated noise levels were recorded at “Glenara” for day time period; “Almawillee”, “Greenslopes” and “Kyooma” for the evening period; and “Almawillee”, “Glenara”, “Tonsley Park” and “Greenslopes” for the night time period. The elevated noise levels did not result in an exceedance because of the adverse (noise enhancing) weather conditions at the time of monitoring. WCC has a private agreement in place with “Almawillee”, “Glenara”, “Tonsley Park” and “Kyooma” for noise impacts.

Elevated noise levels were recorded at “Kyooma” for the evening period; and “Greenslopes” for the night time period. The elevated noise levels did not result in an exceedance because of the adverse (noise enhancing) weather conditions at the time of monitoring. WCC has a private agreement in place with “Kyooma” for noise impacts.

WCC has a private agreement in place with “Almawillee”, “Glenara”, “Tonsley Park” and “Kyooma” for mining noise related impacts at those properties and the noise criteria does not apply.

### 3.2 NOISE COMPLAINTS

There were 8 complaints for noise impacts from Werris Creek Coal operations, with 7 complaints from the one Werris Creek resident and one complaint from a Quipolly resident. The majority of the complaints occurred during adverse weather conditions (temperature inversions or high wind speeds) that could potentially enhancing noise levels experience by the complainant. No exceedance of noise criteria was identified because noise levels measured under “enhancing” adverse weather conditions cannot be compared against the noise criteria. Each complaint was thoroughly investigated with meteorological conditions analysed, continuous noise monitoring data and audio reviewed and any mining (and other activities) documented. In addition, WCC

has been undertaking specific attended monitoring from Kurrara St, Werris Creek to determine noise levels from operations at the Rail Load-out Facility that have been the source of a number of noise complaints. To date, monitoring has found noise levels to be in compliance below 35dB(A). Specific actions taken in relation to these complaints are outlined in **Section 6**.

## 4.0 BLAST

Blast monitoring is undertaken at “Glenala”, “Talavera”, “Werris Creek”, “Tonsley Park”, “Greenslopes” and “Cintra”. Compliance limits for blasting overpressure is 115dB(L) (and up to 120dB(L) for only 5% of blasts) and vibration is 5mm/s (and up to 10mm/s for only 5% of blasts). During the period a total of 21 blasts were fired by the blasting contractor, Orica Mining Services.

### 4.1 BLAST MONITORING

#### 4.1.1 Monitoring Data Results

The summary tables of blasting results from May, June and July are provided below; however see blasting results database under **Appendix 4** for more detail.

May	Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Talavera	
	mm/s	dB(L)	mm/s	dB(L)	mm/s	mm/s	dB(L)	dB(L)	mm/s	dB(L)	mm/s	dB(L)
Monthly Average	NM	NM	0.42	108.2	0.67	99.0	0.67	107.3	<0.20	<109.9	NM	NM
Monthly Maximum	NM	NM	0.42	108.2	0.95	102.5	0.97	110.1	<0.20	<109.9	NM	NM
Annual Average	<0.37	<109.9	0.36	109.5	0.58	103.6	0.63	108.5	<0.20	<109.9	<0.37	<109.9
Criteria	5	115	5	115	5	115	5	115	5	115	5	115
% >115dB(L) or 5mm/s	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
# Triggered this Month	0/0		2/6		4/6		6/6		0/6		0/0	

June	Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Werris Creek	
	mm/s	dB(L)	mm/s	dB(L)	mm/s	mm/s	dB(L)	dB(L)	mm/s	dB(L)	mm/s	dB(L)
Monthly Average	NM	NM	0.66	109.2	0.79	104.1	0.90	110.9	0.31	105.1	NM	NM
Monthly Maximum	NM	NM	1.05	115.8	1.12	113.1	1.92	117.4	0.42	111.7	NM	NM
Annual Average	<0.37	<109.9	0.54	108.7	0.73	101.5	0.78	109.1	0.31	105.1	<0.37	<109.9
Criteria	5	115	5	115	5	115	5	115	5	115	5	115
% >115dB(L) or 5mm/s	0%	0%	0%	8.0%	0%	0%	0%	9.5%	0%	0%	0%	0%
# Triggered this Month	0/0		7/10		7/10		9/10		5/10		0/10	

July	Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Werris Creek	
	mm/s	dB(L)	mm/s	dB(L)	mm/s	mm/s	dB(L)	dB(L)	mm/s	dB(L)	mm/s	dB(L)
Monthly Average	NM	NM	0.53	99.6	0.58	97.0	1.10	105.5	<0.20	<109.9	<0.37	<109.9
Monthly Maximum	NM	NM	0.65	110.6	0.72	106.9	1.25	114.0	<0.20	<109.9	<0.37	<109.9
Annual Average	<0.37	<109.9	0.48	106.9	0.63	102.1	0.82	108.3	0.31	105.1	<0.37	<109.9
Criteria	5	115	5	115	5	115	5	115	5	115	5	115
% >115dB(L) or 5mm/s	0%	0%	0%	6.7%	0%	0%	0%	7.1%	0%	0%	0%	0%
# Triggered this Month	0/0		5/5		6/7		6/7		0/7		0/2	

\* Indicates project related properties not subject to blasting criteria

#### 4.1.2 Discussion - Compliance / Non Compliance

“Greenslopes” is averaging 6.7% of blasts (since April 2011) over 115dB(L) and is currently exceeding the 5% limit due to two blasts in June. The blasts on the 3<sup>rd</sup> June 2011 and 16<sup>th</sup> June 2011 both recorded elevated overpressure levels above 115dB(L) at Greenslopes and Cintra but less than the maximum blast overpressure limit of 120dB(L). Investigation into both blasts found that the wet weather during May had contaminated the stemming material resulting in “rifling” causing the high (loud) overpressure readings. WCC and the blasting contractor have implemented corrective actions to improve practices to minimise future elevated overpressure results due to contaminated stemming material. All blasts over the period complied with maximum license limits with no blasts overpressure level above 120dB(L) and no blast vibration levels greater than 10mm/s.

A number of blast monitors did not trigger during the period due to the overpressure and/or vibration levels from the blast being below the trigger level of the monitor. No blasts were missed.

## 4.2 BLAST COMPLAINTS

There were 35 complaints from six different blasts undertaken by Werris Creek Coal, with the blast on the 3<sup>rd</sup> June 2011 receiving 9 complaints and the blast on 16<sup>th</sup> June 2011 receiving 20 complaints. As described above, both these two blasts generated higher than normal overpressures levels however all results including the Werris Creek monitor were in compliance. Action taken for these two blasts to minimise recurrence of elevated overpressure were to change the stemming gravel supplier and improve management of stemming material during wet weather. Specific actions taken for all blasting complaints are outlined in **Section 6**.

## 5.0 WATER

The quarterly groundwater quality monitoring was undertaken on 17<sup>th</sup> and 18<sup>th</sup> May 2011. Surface Quarterly surface water monitoring was undertaken on 12<sup>th</sup> May 2011. There were four surface water discharge events during the period.

### 5.1 GROUND WATER

Groundwater monitoring is undertaken to monitor if there are any impacts on groundwater quality and levels as a result of the mining operations. Werris Creek Coal monitor 41 groundwater bores and piezometers in the vicinity of the mine, with the key aquifers being Quipolly Creek Alluvium (MW12 upstream and MW7 downstream) and Werrie Basalt (MW5 south and MW14 north).

#### 5.1.1 Monitoring Data Results

Brief summary of groundwater monitoring results is provided below with detailed monitoring data outlined in **Appendix 5**.

Site	pH	EC	Dip	Change from Previous Quarter
<b>Quipolly Creek Alluvium</b>				
MW7				Not sampled as no permission was given for access.
MW12	7.52	468	6.13	Groundwater level dropped 0.62m, pH rose 0.17 and EC rose 50.
<b>Werrie Basalt</b>				
MW5	7.11	2690	7.28	Groundwater level dropped 0.09m, pH rose 0.11 and EC rose 300.
MW14	7.21	1340	15.60	Groundwater level dropped 0.31m, pH rose 0.23 and EC rose 320.

#### 5.1.2 Discussion - Compliance / Non Compliance

All groundwater levels decreased and both the pH and electrical conductivity (EC) increased during the period due to the drier prevailing conditions since the start of the year. Groundwater levels at the start of the year were at record levels due to 2010 being a wet year. Mining continues not to impact on groundwater aquifers.

## 5.2 SURFACE WATER

Surface water monitoring is undertaken at key dirty and void water dams to monitor for potential contamination issues due to mining while the water is still onsite.

#### 5.2.1 Monitoring Data Results

Summary of surface water quality monitoring results is provided below with detailed monitoring data outlined in **Appendix 6**.

Site	pH	EC	TSS	O&G	Change
<b>ONSITE</b>					
SB2	8.12	545	36	<5	pH rose 0.06, EC rose 157, TSS & O&G negligible change.
SB9	7.95	634	28	<5	pH dropped 0.05, EC rose 485, TSS & O&G negligible change.
SB10	7.67	457	17	<5	pH dropped 0.32, EC rose 281, TSS dropped 146, O&G no change.
<b>OFFSITE</b>					
QCU	7.20	376	11	<5	pH dropped 0.13, EC dropped 117, TSS & O&G negligible change.
QCD	7.60	894	6	<5	pH rose 0.15, EC rose 165, TSS & O&G negligible change.
WCU	7.42	1500	6	<5	pH dropped 0.2, EC rose 330, TSS & O&G negligible change.
WCD	8.23	1400	24	<5	pH dropped 0.23, EC rose 350, TSS & O&G negligible change.

### 5.2.2 Discussion - Compliance / Non Compliance

Surface water monitoring results were within the trigger levels of the Site Water Management Plan response plan.

## 5.3 SURFACE WATER DISCHARGES

### 5.3.1 Monitoring Data Results

There were no wet weather discharge events and four controlled discharge events during the period. A summary of discharge monitoring results is provided below with detailed monitoring data outlined in **Appendix 7**.

Date	Site	pH	EC	TSS	O&G	Type	Compliance
1/6/2011	SB2	8.09	493	20	<5	Controlled	Compliant – water quality within limits
7/6/2011	SB9	7.72	666	8	<5	Controlled	Compliant – water quality within limits
16/6/2011	SB2	8.17	510	28	<5	Controlled	Compliant – water quality within limits
16/6/2011	SB9	8.05	712	<5	<5	Controlled	Compliant – water quality within limits
<b>Criteria</b>		<b>8.5</b>	<b>N/A</b>	<b>50</b>	<b>10</b>		

### 5.3.2 Discussion - Compliance / Non Compliance

All surface water discharge results were within WCC Environmental Protection Licence 12290 criteria and there were no impacts on water quality monitored in Quipolly and Werris Creeks' catchments as a result of the discharge events.

## 5.3 WATER COMPLAINTS

There were no water related complaints during the period.

## 6.0 COMPLAINTS SUMMARY

There were 46 complaints received during the period with the details summarized below. In total there were 35 complaints related to blasting; 8 complaints related to noise, two complaints related to dust and one complaint related to lighting. There were 26 different complainants during the period with 12 individual complaints originating from one complainant in Werris Creek.

#	Date	Location	Complaint	Investigation	Action Taken
111	10/5/11	Werris Creek (Complainant A)	Noise from loader, dozers and train shunting on 13 <sup>th</sup> , 14 <sup>th</sup> and 26 <sup>th</sup> April 2011 and 8 <sup>th</sup> May 2011.	13/4 & 14/4 & 8/5 Adverse met conditions could have enhanced RLO noise levels towards Werris Creek but not applicable against compliance criteria. 26/4 No activities onsite. Attended noise monitoring indicates levels within compliance.	Undertook attended noise monitoring in April 2011. Continuous noise monitor nearby at "Greenslopes". Written response to OEH and complainant provided.
112	11/5/11	"Hazeldene"	Terrible noise from mine on 10 <sup>th</sup> & 11 <sup>th</sup> May 2011.	Mining locations were elevated because no overburden inventory input. Adverse met conditions could have enhanced mining noise levels towards Werris Creek but not applicable against compliance criteria.	Continuous noise monitor to be relocated to "Hazeldene". Written response to complainant provided.
113	17/5/11	Barnes Subdivision South of Quirindi	Four individuals from the Barnes sub-division adjacent to golf course concerned at the amount of dust from mine in early mornings.	Temperature inversions in mornings concentrate dust so it is visible but overall daily dust emissions at same rate and monitoring result are still within compliance. Review of water cart dust suppression L/bcm fallen 17% compared to previous year even though water cart capacity (number and size) has increased over the past year.	Written response to complainant provided.
114	19/5/11	"Greenslopes"	Mine blast on 6 <sup>th</sup> May caused grayish dust cloud to blow over his property.	WCC did not blast on that date. Council quarry had been in use during that period.	Written response to complainant provided.
115	20/5/11	Anonymous	Werris Creek Road passerby had never seen dust so bad across the road coming from a drill.	Inspection by EO and Superintendent did not identify significant dust. Drill and scrappers located close to road. All drills were using dust sprays and wind was easterly blowing away from the road.	Written response to OEH provided.
116	19/5/11	Werris Creek	Complainant impacted by blast on 19 <sup>th</sup> May 2011 at 1:25pm.	Blast results were in compliance. Wind was a light SW towards Werris Creek.	Written response to OEH and complainant provided.

#	Date	Location	Complaint	Investigation	Action Taken
117 & 118	1/6/2011 5:36pm	Werris Creek (Complainant A)	Noise from rail load out on the evenings of Friday 27 <sup>th</sup> and Monday 30 <sup>th</sup> May 2011.	One train on each evening was loaded. Temperature inversion present on 27/5 and high winds 30/5 however weather conditions would have limited noise propagation from RLO to Werris Creek. Noise levels not an exceedance of noise criteria due to adverse weather conditions.	Complainant's residence apart of attended noise monitoring program. Written response to OEHL and complainant provided.
119 to 127	3/6/2011 Various	Werris Creek	Blast #32 (32 S10-9-11-385) was fired at 13:07 on 3rd June 2011 in Strip 10 near to the natural surface on the western side of the pit resulted in loud noise and house shaking experienced.	Video confirmed that a hole "rifled"/stemming ejection due to stemming contamination from muddy bench conditions causing elevated overpressure. South westerly wind blowing towards Werris Creek could have enhanced overpressure effects of the blast. Blast monitoring results were in compliance at all community monitors albeit with two locations recording elevated results over 115dB.	Written response to OEHL and complainant provided. EO to inspect alleged house defects.
128	14/6/2011 1:16pm	Werris Creek	Blast #37 (37 S9-9-GCoal) was fired at 13:19 on 14th June 2011 in Strip 9 right in the bottom of the pit resulted in shaking his house, the worst blast yet. Complainant noticing new cracks in gyprock.	The blast was small and in pit, Blast Engineer would not of thought that it could cause any community issues. South easterly wind could have enhanced overpressure effects. Blast monitoring results were in compliance at all community monitors with none of the community monitors triggering a result.	Written response to OEHL and complainant provided. EO to inspect alleged house defects.
129	15/6/2011 9am	Werris Creek (Complainant A)	Lights from the mine were shining brightly at her property all night.	Light monitoring camera set up on southern edge of Werris Creek capture a bright light shining towards Werris Creek. Lighting plant was positioned on RL445m orientated north (Werris Creek is north-north east) and was relocated before next night shift.	Written response to complainant provided.
130	16/6/2011 11:21am	Werris Creek (Complainant A)	Noise from rail load out on the evenings of Thursday 9 <sup>th</sup> , Friday 10 <sup>th</sup> , Monday 13 <sup>th</sup> and Wednesday 15 <sup>th</sup> June 2011.	No trains during the evenings, however two trains finished being loaded late afternoon 13/6 & 15/6. Adverse weather conditions present on each day potentially influence noise propagation from RLO to Werris Creek. Noise levels not an exceedance of noise criteria due to adverse weather conditions.	OEHL requested specific attended monitoring during Train Loading from Kurrara St. Written response to OEHL and complainant provided.
131 to 148, 150 & 151	16/6/2011 Various	Werris Creek	Blast #36 (36 S12-13-385) was fired at 13:13 on 16 <sup>th</sup> June 2011 in Strip 12 near to the natural surface on the western side of the pit resulted in loud noise and house shaking experienced.	Video confirmed that a hole "rifled"/stemming ejection due to stemming contamination from muddy bench conditions causing elevated overpressure. Southerly wind blowing towards Werris Creek could have enhanced overpressure effects of the blast. Blast monitoring results were in compliance at all community monitors albeit with two locations recording elevated results over 115dB.	Written response to OEHL and complainant provided. Several investigations into blasting practices launched by Orica and Whitehaven Coal. EO to inspect alleged house defects.
149	20/6/2011 1:20pm	Werris Creek	Blast #35 (35 S12_3-4_385) was fired at 13:15 on 20th June 2011 in Strip 12 near to the natural surface on the very western edge of the open cut and shook the complainants house.	Given the rifling issues with the two previous (#36 on 16th June and #32 on 3rd June), this shot was loaded with an extra metre of stemming loaded into each hole. Also the shotfirers checked each hole with a pole to confirm that no holes have been under loaded with stemming due to slumping or hang ups within each hole and the blast initiation direction was changed orientated to the west. Blast monitoring results were in compliance at all community monitors around 6dB(L) less than previous blasts.	Written response to OEHL and complainant provided.
152	22/6/2011 2:15pm	Werris Creek	Blast #39 (S12_8-9_385) was fired at 13:17 on 22nd June 2011 in Strip 12 near to the natural surface towards the centre of the pit and shook the complainants house.	Blast monitoring results were in compliance at all community monitors. South westerly wind could have enhanced overpressure effects.	EO to inspect alleged house defects. Written response to complainant provided.
153	4/7/2011 10:30am	Werris Creek (Complainant A)	Noise from the coal loader 2 <sup>nd</sup> July from 7:12pm to 10:30pm was loud and pretty ordinary. However noise from the coal loader 3 <sup>rd</sup> July from 7:24pm until 2:20am was audible but at an acceptable level.	One train loaded each evening with dozers working until 4:30am and 5:30am respectively. Adverse weather conditions present on each day potentially influence noise propagation from RLO to Werris Creek. Noise levels not an exceedance of noise criteria due to adverse weather conditions.	OEHL requested additional specific attended monitoring during Train Loading from Kurrara St. Written response to OEHL and complainant provided.
154	4/7/2011 6:44pm	"Hazeldene"	Mine is very noisy on 4 <sup>th</sup> July 2011 as well as the week beginning 20 <sup>th</sup> June 2011.	Dump location was on the exposed eastern side of RL410m dump. Adverse weathers conditions could have enhanced mining noise levels towards Quipolly but not applicable against compliance criteria. Continuous noise monitor recorded elevated noise levels with mining noise a major component.	OCE relocated the dump back to protected centre of RL410m dump. The continuous noise monitor is stationed at complainant's residence "Hazeldene". Written response to complainant provided.

#	Date	Location	Complaint	Investigation	Action Taken
155	22/7/2011 10:30am	Werris Creek (Complainant A)	No issues with noise from the coal loader on 16 <sup>th</sup> and 18 <sup>th</sup> July however noise from the coal loader 17 <sup>th</sup> July from 11pm onwards was very loud.	One train loaded each evening with dozers working until 12am, 4am and 3:30am respectively. Adverse weather conditions present on 17 <sup>th</sup> and 18 <sup>th</sup> July only that could potentially influence noise propagation from RLO to Werris Creek. Noise levels not an exceedance of noise criteria due to adverse weather conditions.	OEH requested additional specific attended monitoring during Train Loading from Kurrara St. Written response to OEH and complainant provided.
156	26/7/2011 2:17pm	Werris Creek (Complainant A)	Complainant alleges WCC blasted at 2:03pm outside time advertised and WCC is not allowed to do that.	Blast #49 (S11_5-6_365 TSB9) fired at 1:44pm. Not sure of difference in time. Advertised blast times in Werris Creek Flyer are indicative while approved blasting hours are 9am to 5pm.	Written response to OEH, DoP and complainant provided.

## 7.0 GENERAL

Please feel free to ask any questions in relation to the information contained within this document during Item 7 of the meeting agenda.

Regards  
Andrew Wright  
Environmental Officer

**Appendix 1 – PM10 Dust Monitoring Data.**

Werris Creek Coal  
 HVAS Dust Monitoring  
 2011-2012

Site Date	WCHV1 Cintra	Monthly Average	Rolling Annual Average	WCHV2 Tonsley Park	Monthly Average	Rolling Annual Average	WCHV3 Railway View	Monthly Average	Rolling Annual Average	WCHV4 Eurunder ee	Monthly Average	Rolling Annual Average	WCTSP Railway View	Monthly Average	Rolling Annual Average	PM10 24hr Limit	PM10 Annual Average	TSP Annual Average
02-Apr-11	11		11.2	15		15.4	11		10.8	13		13.3	19		18.8	50	30	90
08-Apr-11	25		18.2	11		13.1			10.8	9		11.1			18.8	50	30	90
14-Apr-11	24		20.2	20		15.3	39		24.7	15		12.2	97		57.8	50	30	90
20-Apr-11	51		27.8	21		16.6	50		33.1	18		13.6	114		76.5	50	30	90
26-Apr-11	11	24.5	24.5	7	14.7	14.7	12	27.8	27.8	7	12.2	12.2	28	64.3	64.3	50	30	90
02-May-11	38		26.7	26		16.6	35		29.1	16		12.9	85		68.4	50	30	90
08-May-11	13		24.8	16		16.5	12		26.2	12		12.8	20		60.4	50	30	90
14-May-11	7		22.5	5		15.1	14		24.5	7		12.1	50		58.9	50	30	90
20-May-11	34		23.9	34		17.2	50		27.8	28		13.8	100		64.0	50	30	90
26-May-11	27	23.9	24.2	17	19.6	17.1	13	24.7	26.1	16.1	15.9	14.0	25.7	56.1	59.8	50	30	90
01-Jun-11	58		27.2	52		20.3	50		28.4	7.7		13.5	95		63.2	50	30	90
07-Jun-11	62		30.2	56		23.2	80		33.1	9		13.1	256		80.8	50	30	90
13-Jun-11	49		31.6	48		25.1	47		34.3	5.4		12.5			80.8	50	30	90
19-Jun-11	7		29.8	8		23.9	7		32.2	5.5		12.0	155		87.0	50	30	90
25-Jun-11	18	38.7	29.0	13	35.2	23.2	14	39.5	30.9	13.1	8.1	12.1	25	132.5	82.1	50	30	90
01-Jul-11	11		27.9	8		22.2	4		29.1	4		11.6	10.1		77.0	50	30	90
07-Jul-11	10		26.8	4		21.1	35		29.5	5		11.2	105		78.9	50	30	90
13-Jul-11	15		26.2	15		20.8	19		28.8	25		12.0	47.5		76.9	50	30	90
19-Jul-11	8		25.2	4		19.9	14		28.0	4		11.6	44.3		75.0	50	30	90
25-Jul-11	8	10.3	24.3	8	7.8	19.3	10	16.3	27.0	19	11.5	11.9	16.9	44.8	71.8	50	30	90
30-Jul-10			24.3			19.3			27.0	All		11.9			71.8	50	30	90
05-Aug-10			24.3			19.3			27.0			11.9			71.8	50	30	90
11-Aug-10			24.3			19.3			27.0			11.9			71.8	50	30	90
17-Aug-10			24.3			19.3			27.0			11.9			71.8	50	30	90
23-Aug-10		#DIV/0!	24.3		#DIV/0!	19.3		#DIV/0!	27.0		#DIV/0!	11.9		#DIV/0!	71.8	50	30	90
29-Aug-10			24.3			19.3			27.0			11.9			71.8	50	30	90
04-Sep-10			24.3			19.3			27.0			11.9			71.8	50	30	90
10-Sep-10			24.3			19.3			27.0			11.9			71.8	50	30	90
16-Sep-10			24.3			19.3			27.0			11.9			71.8	50	30	90
22-Sep-10		#DIV/0!	24.3		#DIV/0!	19.3		#DIV/0!	27.0		#DIV/0!	11.9		#DIV/0!	71.8	50	30	90
28-Sep-10			24.3			19.3			27.0			11.9			71.8	50	30	90
04-Oct-10			24.3			19.3			27.0			11.9			71.8	50	30	90
10-Oct-10			24.3			19.3			27.0			11.9			71.8	50	30	90
16-Oct-10			24.3			19.3			27.0			11.9			71.8	50	30	90
22-Oct-10		#DIV/0!	24.3		#DIV/0!	19.3		#DIV/0!	27.0		#DIV/0!	11.9		#DIV/0!	71.8	50	30	90
28-Oct-10			24.3			19.3			27.0			11.9			71.8	50	30	90
03-Nov-10			24.3			19.3			27.0			11.9			71.8	50	30	90
09-Nov-10			24.3			19.3			27.0			11.9			71.8	50	30	90
15-Nov-10			24.3			19.3			27.0			11.9			71.8	50	30	90
21-Nov-10		#DIV/0!	24.3		#DIV/0!	19.3		#DIV/0!	27.0		#DIV/0!	11.9		#DIV/0!	71.8	50	30	90
27-Nov-10			24.3			19.3			27.0			11.9			71.8	50	30	90
03-Dec-10			24.3			19.3			27.0			11.9			71.8	50	30	90
09-Dec-10			24.3			19.3			27.0			11.9			71.8	50	30	90
15-Dec-10			24.3			19.3			27.0			11.9			71.8	50	30	90
21-Dec-10		#DIV/0!	24.3		#DIV/0!	19.3		#DIV/0!	27.0		#DIV/0!	11.9		#DIV/0!	71.8	50	30	90
27-Dec-10			24.3			19.3			27.0			11.9			71.8	50	30	90
02-Jan-11			24.3			19.3			27.0			11.9			71.8	50	30	90
08-Jan-11			24.3			19.3			27.0			11.9			71.8	50	30	90
14-Jan-11			24.3			19.3			27.0			11.9			71.8	50	30	90
20-Jan-11		#DIV/0!	24.3		#DIV/0!	19.3		#DIV/0!	27.0		#DIV/0!	11.9		#DIV/0!	71.8	50	30	90
26-Jan-11			24.3			19.3			27.0			11.9			71.8	50	30	90
01-Feb-11			24.3			19.3			27.0			11.9			71.8	50	30	90
07-Feb-11			24.3			19.3			27.0			11.9			71.8	50	30	90
13-Feb-11			24.3			19.3			27.0			11.9			71.8	50	30	90
19-Feb-11		#DIV/0!	24.3		#DIV/0!	19.3		#DIV/0!	27.0		#DIV/0!	11.9		#DIV/0!	71.8	50	30	90
25-Feb-11			24.3			19.3			27.0			11.9			71.8	50	30	90
03-Mar-11			24.3			19.3			27.0			11.9			71.8	50	30	90
09-Mar-11			24.3			19.3			27.0			11.9			71.8	50	30	90
15-Mar-11			24.3			19.3			27.0			11.9			71.8	50	30	90
21-Mar-11			24.3			19.3			27.0			11.9			71.8	50	30	90
27-Mar-11		#DIV/0!	24.3		#DIV/0!	19.3		#DIV/0!	27.0		#DIV/0!	11.9		#DIV/0!	71.8	50	30	90
Min	6.8			3.8			4.2			4.1			10.1					
Max	62.2			55.9			80.4			27.6			256.0					
Capture	33%			33%			31%			33%			30%					

**Appendix 2 – Deposited Dust Monitoring Data.**

## Deposited Dust - Werris Creek Coal Mine 2011-2012

MONTH (g/m2/month)	EPL #7		EPL #4		EPL #1		EPL #8		-		-		-		ANNUAL AVERAGE LIMIT
	WC-2 Cintra		WC-5 Railway View		WC-7 Tonsley Park		WC-8 Plain View		WC-9 Marengo		WC-10 Mountain View		WC-11 Glenara		
	Total Matter	Ash Content	Total Matter	Ash Content	Total Matter	Ash Content	Total Matter	Ash Content	Total Matter	Ash Content	Total Matter	Ash Content	Total Matter	Ash Content	
April 2011	1.5	1.0	1.1	0.7	0.6	0.5	1.1	0.9	0.5	0.4	c2.3	1.6	0.6	0.6	3.6
May 2011	0.6*	0.2	0.6	0.3	0.1	0.1	0.2	0.2	0.1	0.1	5.9*	2.0	0.2	0.2	3.6
June 2011	3.0	1.8	2.4	1.5	0.9	0.5	1.3	0.8	0.8	0.5	0.8	0.4	1.4	0.8	3.6
July 2011	0.5	0.3	0.5	0.4	0.3	0.2	0.8	0.5	0.2	0.2	0.9	0.5	0.6	0.5	3.6
August 2011															3.6
September 2011															3.6
October 2011															3.6
November 2011															3.6
December 2011															3.6
January 2012															3.6
February 2012															3.6
March 2012															3.6
<b>ANNUAL AVERAGE</b>	<b>1.7</b>		<b>1.2</b>		<b>0.5</b>		<b>0.9</b>		<b>0.4</b>		<b>0.9</b>		<b>0.7</b>		<b>3.6</b>
<b>MINIMUM</b>	<b>0.5</b>		<b>0.5</b>		<b>0.1</b>		<b>0.2</b>		<b>0.1</b>		<b>0.8</b>		<b>0.2</b>		<b>3.6</b>
<b>MAXIMUM</b>	<b>3.0</b>		<b>2.4</b>		<b>0.9</b>		<b>1.3</b>		<b>0.8</b>		<b>0.9</b>		<b>1.4</b>		<b>3.6</b>

Note: All results are in the form of Insoluble Matter (g/m2/month)

c - indicates sample is contaminated from a Non-Werris Creek Coal dust source and is not counted in the average

\* - sample contaminated with excessive organic matter (>50%) from non-mining source (i.e bird droppings and insects) and is excluded from the average

**Appendix 3 – Noise Monitoring Results.**



24 May 2011

Ref: 04035/3980

Werris Creek Coal  
1435 Werris Creek – Quirindi Road  
Werris Creek NSW 2341

## RE: MAY 2011 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Friday 20 and Saturday 21 May 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Mine's Noise Management Plan (revised November 2010). The locations are listed below and attached in **Figure 1**:

- "Almawillee"
- "Glenara"
- "Railway Cottage" (previously denoted as "Fletcher")
- "Tonsley Park"
- "Greenslopes/Banool"
- "Kyooma"

Additional measurements were also made on the road side near residential locations in Punyarra Street and Kurrara Street, Werris Creek. These locations are shown in **Figure 2**.

Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data shows that at the beginning of the survey on May 20 winds were light from the south west. Throughout the survey the winds varied to be generally from each of south westerly, south easterly, easterly and northerly directions.

The data showed that there was a strong temperature inversion from early evening which persisted throughout the night survey.

The total measured Leq noise level is shown in the tables below. Where the noise from WCC was audible the Bruel & Kjaer “*Evaluator*” analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall.

The noise criterion for the operational phase of the WCC project is **35 dB(A) L<sub>eq</sub> (15 min)** for all operating times. Mine noise from WCC is shown in bold type. Where noise from WCC is listed as inaudible, this means the noise levels from the mine were at least 10 dB below the background level during the measurement and not measurable.

Table 1 WCC Noise Monitoring Results – 20 May 2011 (Day)					
Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	5:45 pm	37	n/a	3.2/134	Birds (37), <b>WCC inaudible</b>
Glenara	5:28 pm	38	n/a	3.1/141	Traffic (37), birds (30), <b>WCC inaudible</b>
Railway Cottage	5:12 pm	48	n/a	3.3/148	Traffic (48), <b>WCC inaudible</b>
Tonsley Park	3:25 pm	38	n/a	1.4/213	Traffic (37), birds & insects (30), <b>WCC (28)</b>
Greenslopes	3:45 pm	59	n/a	1.0/218	Traffic (58), birds & insects (50) <b>WCC (&lt;25)</b>
Kyooma	4:52 pm	39	n/a	2.8/190	Birds & insects (38), <b>WCC (31)</b>
Kurrara St	4:04 pm	45	n/a	0.7/239	Traffic (45), birds & insects (33), <b>WCC inaudible</b>
Punyarra St	4:21 pm	39	n/a	1.6/209	Traffic (39), birds (30), <b>WCC inaudible</b>

Table 2 WCC Noise Monitoring Results – 20 May 2011 (Evening)					
Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	9:04 pm	36	+9	1.5/94	<b>WCC (35)</b> , insects (27)
Glenara	9:25 pm	40	+9	2.2/64	<b>WCC (38)</b> , insects (36)
Railway Cottage	8:46 pm	45	+9	1.9/102	Traffic (45), <b>WCC inaudible</b>
Tonsley Park	7:25 pm	46	+8	2.8/96	Train on spur (46*), <b>WCC inaudible</b> , insects (30)
Greenslopes	7:00 pm	49	+7	2.9/100	Birds (47), traffic (45), <b>WCC (28)</b>
Kyooma	8:23 pm	35	+9	2.0/94	Insects (35), <b>WCC inaudible</b>
Kurrara St	7:45 pm	40	+8	2.6/104	Train in town (40), insects (25), <b>WCC inaudible</b>
Punyarra St	8:02 pm	40	+9	2.3/91	Train in town (37), traffic (37), insects (30), <b>WCC inaudible</b>

\*see text below tables in relation to rail noise

Table 3 WCC Noise Monitoring Results – 20/21 May 2011 (Night)					
Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	12:32 am	32	+10	1.5/304	<b>WCC (32)</b> , insects (21)
Glenara	12:15 am	36	+10	1.2/267	Traffic (34), <b>WCC (32)</b>
Railway Cottage	12:55 am	34	+10	1.7/314	Traffic (33), insects (25), <b>WCC (25)</b>
Tonsley Park	10:00 pm	43	+10	1.8/23	Train in town (42), traffic (36), <b>WCC inaudible</b>
Greenslopes	10:18 pm	44	+10	0.9/352	Insects (43), traffic (37), <b>WCC inaudible</b>
Kyooma	11:10 pm	36	+10	2.1/38	Insects (36), <b>WCC inaudible</b>
Kurrara St	10:35 pm	43	+10	1.3/298	Train in town (43), insects (32), <b>WCC inaudible</b>
Punyarra St	10:52 pm	35	+10	1.4/319	Train in town (35), domestic noise (25), <b>WCC inaudible</b>

The results shown in **Tables 1-3** indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC exceeded the criterion of 35 dB(A) Leq at the Glenara monitoring location during the evening monitoring period.

WCC environmental licence conditions indicate that compliance with noise emission criteria is not applicable under atmospheric conditions where winds speeds are higher than 3m/s and/or there is a temperature inversion of greater than +3° C/100m. Data from the mine operated weather station indicated that all of the elevated noise levels were measured whilst there was a strong temperature inversion in place.

The train noise at Tonsley Park was measured whilst a train was on the Werris Creek mine rail spur and moving towards the main line. Coal loading was not being carried out during the course of the measurement.

The development consent for the mine has the following noise assessment criteria in relation to noise generated by shunting operations, 55 dB(A) Leq (24 hour) and 80 dB(A) Lmax. The measured train noise of 46 dB(A) Leq (15 min) equates to 26 dB(A) Leq (24 hour) which is significantly lower than the acceptable level from the development consent. The measured Lmax noise was 65 dB(A) from the train horn. This is also significantly lower than the acceptable level from the development consent.

Data from those times where WCC operations were audible were analysed using the “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) Lmax** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine.

During the night time measurement circuit Lmax noise from WCC did not exceed the Lmax criterion at any monitoring location.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,  
SPECTRUM ACOUSTICS PTY LIMITED

Author:



Ross Hodge  
Acoustical Consultant

Review:



Neil Pennington  
Acoustical Consultant

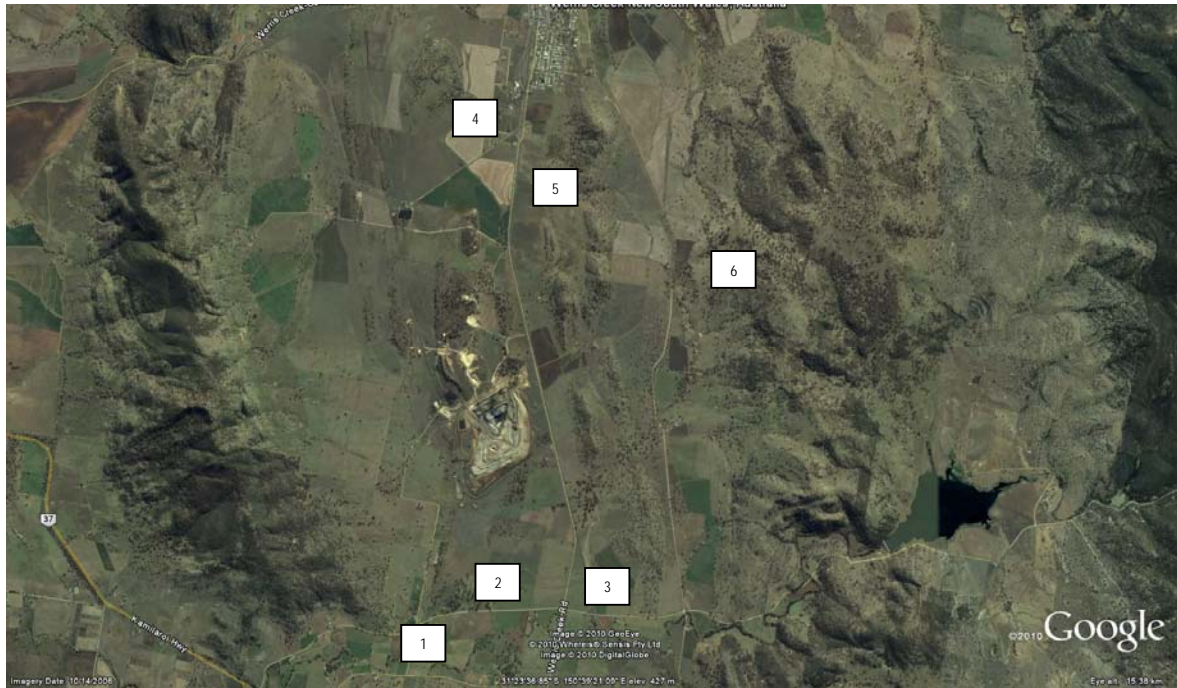


Figure 1 – Noise Monitoring Locations

Key

- 1 Alkawillee
- 2 Glenara
- 3 Railway Cottage
- 4 Tonsley Park
- 5 Greenslopes/Banool
- 6 Kyooma



Figure 2 – Additional Noise Monitoring Locations

Key

- 7 Kurarra Street
- 8 Punyarra Street



27 June 2011

Ref: 04035/4020

Werris Creek Coal  
1435 Werris Creek – Quirindi Road  
Werris Creek NSW 2341

## RE: JUNE 2011 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Friday 24 and Saturday 25 June 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Mine's Noise Management Plan (revised November 2010). The locations are listed below and attached in **Figure 1**:

- “Almawillee”
- “Glenara”
- “Railway Cottage” (previously denoted as “Fletcher”)
- “Tonsley Park”
- “Greenslopes/Banool”
- “Kyooma”

Additional measurements were also made on the road side near residential locations in Punyarra Street and Kurrara Street, Werris Creek. These locations are shown in **Figure 2**.

Three sets of measurements were made over the “circuit”, one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data shows that at the beginning of the survey on June 24 winds were light from the north north west. During the evening and night periods winds were calm.

The data showed that there was a strong temperature inversion from late afternoon which persisted throughout the night survey.

The total measured Leq noise level is shown in the tables below. Where the noise from WCC was audible the Bruel & Kjaer “*Evaluator*” analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall. The noise criterion for the operational phase of the WCC project is **35 dB(A) L<sub>eq</sub> (15 min)** for all operating times. Mine noise from WCC is shown in bold type. Where noise from WCC is listed as inaudible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	3:14 pm	33	n/a	1.9/265	Birds (33), WCC (<20)
Glenara	5:23 pm	38	+5.6	1.3/329	<b>WCC (37)</b> , traffic (33)
Railway Cottage	2:55 pm	39	n/a	2.7/283	Traffic (39), birds (30), insects (24), <b>WCC barely audible</b>
Tonsley Park	1:35 pm	35	n/a	2.1/301	Train in Werris Ck (34), birds (26), <b>WCC inaudible</b>
Greenslopes	1:54 pm	42	n/a	1.7/279	Traffic (42), birds (32) <b>WCC inaudible</b>
Kyooma	2:33 pm	38	n/a	2.3/304	Birds (38), <b>WCC (27)</b>
Kurrara St	2:12 pm	40	n/a	2.4/323	Train in Werris Ck (38), traffic (34), birds (33), <b>WCC inaudible</b>
Punyarra St	1:15 pm	40	n/a	2.7/298	Traffic (36), train in Werris Ck (36), domestic noise (35), <b>WCC inaudible</b>

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	7:03 pm	38	+8.7	Calm	<b>WCC (37)</b> , traffic (31)
Glenara	7:20 pm	39	+8.8	Calm	Traffic (38), <b>WCC (33)</b>
Railway Cottage	7:43 pm	46	+8.5	Calm	Traffic (46), <b>WCC (&lt;30)</b>
Tonsley Park	9:25 pm	36	+8.8	0.1/324	<b>WCC (35)</b> , traffic (28)
Greenslopes	9:05 pm	42	+8.2	0.1/324	<b>WCC (40)</b> , traffic (37)
Kyooma	8:05 pm	36	+8.5	Calm	<b>WCC (36)</b>
Kurrara St	8:47 pm	41	+8.2	Calm	Train in Werris Ck (38), traffic (37), <b>WCC (&lt;30)</b>
Punyarra St	8:29 pm	43	+8.4	Calm	Trains in Werris Ck (42), traffic (36), <b>WCC (33)</b>

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	10:02 pm	40	+7.5	Calm	<b>WCC (38)</b> , traffic (34)
Glenara	10:19 pm	40	+7.5	0.1/324	<b>WCC (38)</b> , traffic (34)
Railway Cottage	10:44 pm	32	+7.7	0.1/178	<b>WCC (32)</b>
Tonsley Park	12:33 am	43	+7.4	0.1/62	Train loading (41), <b>WCC (38)</b>
Greenslopes	12:52 am	47	+8.5	Calm	<b>WCC (45)</b> , traffic (40), train on main line (35)
Kyooma	11:05 pm	35	+7.9	Calm	<b>WCC (35)</b>
Kurrara St	1.10 am	44	+8.5	Calm	Train in Werris Ck (44), <b>WCC (35)</b>
Punyarra St	11.33 pm	36	+9.2	Calm	<b>WCC (34)</b> , train in Werris Ck (32)

The results shown in **Tables 1 - 3** indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC exceeded the criterion of 35 dB(A) Leq at the Glenara monitoring location during the afternoon and night monitoring period, at Almawillee and Greenslopes during the evening and night, at Kyooma during the evening and Tonsley park during the night.

WCC environmental licence conditions indicate that compliance with noise emission criteria is not applicable under atmospheric conditions where winds speeds are higher than 3m/s and/or there is a temperature inversion of greater than +3° C/100m. Data from the mine operated weather station indicated that all of the elevated noise levels were measured whilst there was a strong temperature inversion in place (i.e. >+3° C/100m) and, therefore, under non-compliant atmospheric conditions.

A train was being loaded at the mine loading facility from approximately 12.30 am on Saturday 25<sup>th</sup>. The noise from the train loading was measureable at Tonsley Park. At Kurrara Street the noise from train loading at the mine was not audible or measureable above noise from three locos at idle in the rail yards at Werris Creek which is part of the main rail line. Noise from the train loading was not audible at Greenslopes.

Data from those times where WCC operations were audible were analysed using the “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) Lmax** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine.

During the night time measurement circuit Lmax noise from WCC exceeded the Lmax criterion at the Greenslopes monitoring location. A noise level of 51 Lmax was attributable to an impact noise.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,  
SPECTRUM ACOUSTICS PTY LIMITED

Author:



Ross Hodge  
Acoustical Consultant

Review:



Neil Pennington  
Acoustical Consultant

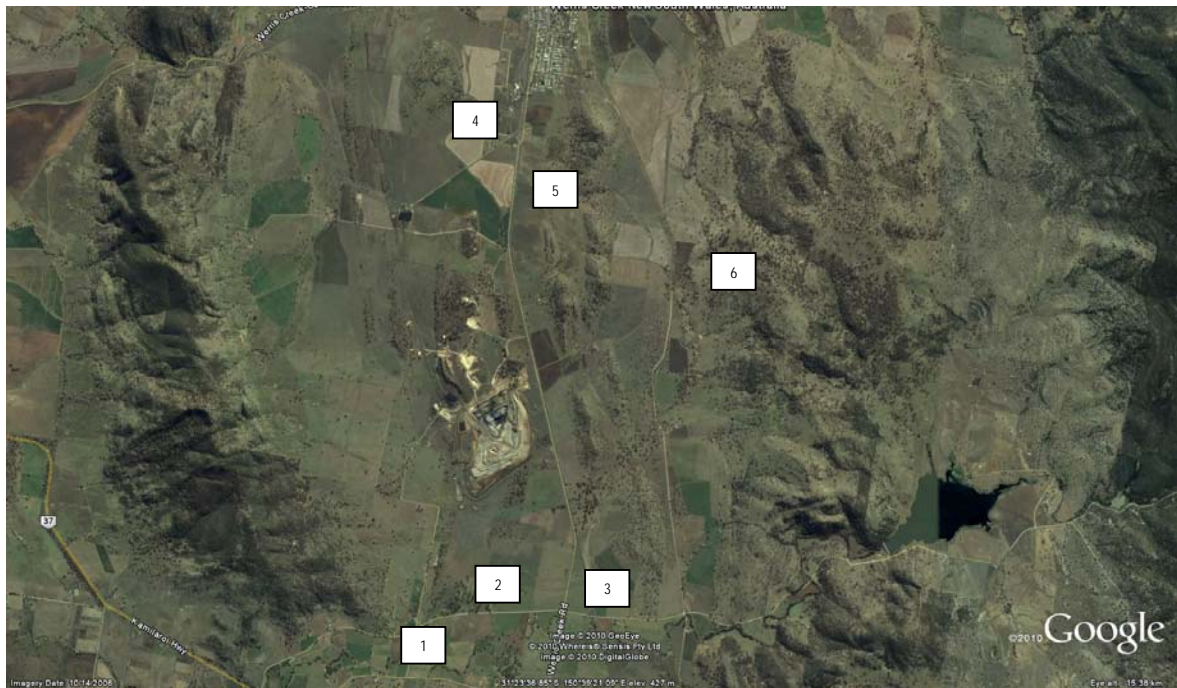


Figure 1 – Noise Monitoring Locations

Key

- 1 Alkawillee
- 2 Glenara
- 3 Railway Cottage
- 4 Tonsley Park
- 5 Greenslopes/Banool
- 6 Kyooma



Figure 2 – Additional Noise Monitoring Locations

Key

- 7 Kurarra Street
- 8 Punyarra Street



28 July 2011

Ref: 04035/4059

Werris Creek Coal  
1435 Werris Creek – Quirindi Road  
Werris Creek NSW 2341

## RE: JULY 2011 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Monday 25 and Tuesday 26 July 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Mine's Noise Management Plan (revised November 2010). The locations are listed below and attached in **Figure 1**:

- “Almawillee”
- “Glenara”
- “Railway Cottage” (previously denoted as “Fletcher”)
- “Tonsley Park”
- “Greenslopes/Banool”
- “Kyooma”

Additional measurements were also made on the road side near residential locations in Punyarra Street and Kurrara Street, Werris Creek. These locations are shown in **Figure 2**.

Three sets of measurements were made over the “circuit”, one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data shows that at the beginning of the survey on July 25 winds were moderate from the north west. During the evening and night periods winds persisted from the north west, dropping in intensity after midnight.

The data showed that there was a mild temperature inversion from early evening which persisted throughout the night survey.

The total measured Leq noise level is shown in the tables below. Where the noise from WCC was audible the Bruel & Kjaer “Evaluator” analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall. The noise criterion for the operational phase of the WCC project is **35 dB(A) L<sub>eq</sub> (15 min)** for all operating times. Mine noise from WCC is shown in bold type. Where noise from WCC is listed as inaudible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	4:15 pm	44	n/a	6.9/313	Wind in trees (43), birds (38), WCC (<20)
Glenara	4:32 pm	45	n/a	5.8/320	Birds & insects (44), <b>WCC (34)</b> , traffic (30)
Railway Cottage	3:56 pm	47	n/a	7.1/311	Traffic (47), birds & insects (35), <b>WCC (32)</b>
Tonsley Park	2:10 pm	38	n/a	5.5/333	Birds & insects (36), traffic (30), domestic noise (30), <b>WCC inaudible</b>
Greenslopes	2:30 pm	48	n/a	6.7/320	Traffic (47), wind (40), birds (35) <b>WCC inaudible</b>
Kyooma	3:31 pm	46	n/a	6.6/314	Wind (45), birds (41), <b>WCC inaudible</b>
Kurrara St	2:50 pm	46	n/a	8.3/308	Trains in Werris Ck (43), traffic (43), dog (35), <b>WCC inaudible</b>
Punyarra St	3:07 pm	44	n/a	6.5/314	Trains in Werris Ck (40), domestic noise (38), dogs (38), traffic (38), <b>WCC inaudible</b>

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	9:18 pm	33	+1.6	3.8/334	<b>WCC (32)</b> , plane (25)
Glenara	9:35 pm	34	+1.3	3.9/330	Traffic (32), <b>WCC (30)</b>
Railway Cottage	9:00 pm	48	+2.0	4.2/318	Traffic (48), <b>WCC (34)</b>
Tonsley Park	7:00 pm	38	+1.5	5.9/307	Traffic (37), train (30), <b>WCC inaudible</b>
Greenslopes	7:25 pm	47	+1.5	4.5/303	Traffic (47), <b>WCC (31)</b>
Kyooma	8:30 pm	37	+3.9	5.0/306	<b>WCC (37)</b> , insects (25)
Kurrara St	7:48 pm	47	+1.5	4.4/306	Train in Werris Ck (46), traffic (40), <b>WCC inaudible</b>
Punyarra St	8:05 pm	43	+3.4	4.8/307	Trains in Werris Ck (43), traffic (30), <b>WCC inaudible</b>

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	12:50 am	33	+4.5	3.1/313	<b>WCC (33)</b>
Glenara	01:07 am	34	+4.2	3.1/329	<b>WCC (34)</b>
Railway Cottage	12:32 am	46	+4.4	3.5/313	Traffic (46), <b>WCC (34)</b>
Tonsley Park	10:00 pm	41	+1.3	3.8/321	Trains in Werris Ck (40), traffic (35), <b>WCC inaudible</b>
Greenslopes	10:20 pm	42	+1.8	3.4/323	Traffic (41), <b>WCC (36)</b>
Kyooma	11:17 pm	38	+2.8	1.9/324	Trains (36), <b>WCC (35)</b> ,
Kurrara St	10:57 pm	42	+1.8	3.0/315	Trains in Werris Ck (42), <b>WCC inaudible</b>
Punyarra St	10:57 pm	32	+2.5	3.0/315	Trains in Werris Ck (32), <b>WCC inaudible</b>

The results shown in **Tables 1 - 3** indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC exceeded the criterion of 35 dB(A) Leq at the Kyooma monitoring location during the evening monitoring period and Greenslopes during the night.

WCC environmental licence conditions indicate that compliance with noise emission criteria is not applicable under atmospheric conditions where winds speeds are higher than 3m/s and/or there is a temperature inversion of greater than +3° C/100m. Data from the mine operated weather station indicated that all of the elevated noise levels were measured whilst there was a strong temperature inversion in place (i.e. >+3° C/100m) (Kyooma evening) and/or high winds (Kyooma evening and Greenslopes night). The elevated noise levels were, therefore, measured under non-compliant atmospheric conditions.

Data from those times where WCC operations were audible were analysed using the “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) Lmax** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine.

During the night time measurement circuit Lmax noise from WCC did not exceed the Lmax criterion at any monitoring location.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,  
SPECTRUM ACOUSTICS PTY LIMITED

Author:



Ross Hodge  
Acoustical Consultant

Review:



Neil Pennington  
Acoustical Consultant

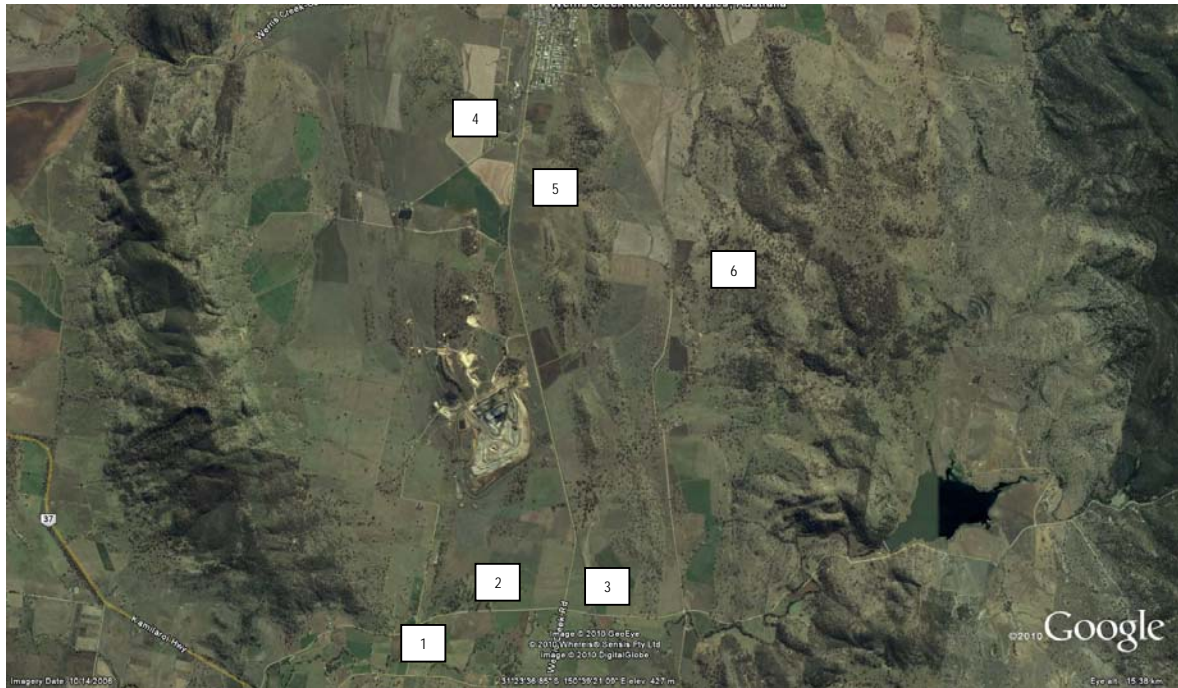


Figure 1 – Noise Monitoring Locations

Key

- 1 Alkawillee
- 2 Glenara
- 3 Railway Cottage
- 4 Tonsley Park
- 5 Greenslopes/Banool
- 6 Kyooma



Figure 2 – Additional Noise Monitoring Locations

Key

7 Kurarra Street

8 Punyarra Street



22 July 2011

Ref: 04035/4049

Werris Creek Coal  
1435 Werris Creek – Quirindi Road  
Werris Creek NSW 2341

## RE: JULY 2011 TRAIN NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise monitoring conducted adjacent to Kurrara Street residences, Werris Creek, on the evening of 13 July 2011 during train loading activities at the Werris Creek Coal Mine (WCC).

The noise monitoring was conducted at two locations shown in **Figure 1**. Location 1 is in a public reserve behind residences at the eastern end of Kurrara Street. Location 2 is closer to WCC and was used as a control point. A total of three fifteen-minute measurements was taken over a period of one hour with a Bruel & Kjaer 2260C (IEC Type 1) integrating sound level meter in accordance with relevance Australian Standards and guidelines.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over each monitoring period. The data shows that winds were in the range 3-4 m/s from the NW during the monitoring. Although WCC noise criteria do not apply for wind speeds greater than 3 m/s, measurement of environmental noise is valid up to wind speeds of 5 m/s. The measured noise sources and levels during the three measurements are summarised below.

### **Measurement 1 (Location 1, 6:43 pm)**

Total noise level was 42 dB(A), $L_{eq(15min)}$ . Contributing sources were local traffic (39 dB(A)), a train idling in Werris Creek (37 dB(A)) and WCC (32 dB(A)). Contributing sources at WCC included general hum<sup>1</sup>, including the dozers on the stockpile (31 dB(A)) and coal loading activities including the train (27 dB(A)). The total noise contribution from WCC was below the night time criterion of 35 dB(A), $L_{eq(15min)}$ . Impact noises from the initial contact of coal with empty wagons reached up to 41 dB(A), $L_{max}$  at the monitoring location, which is below the sleep disturbance criterion of 45 dB(A). Due to management practices at the coal stockpile, dozer track noise was minimal and barely audible at the monitoring location.

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<sup>1</sup> General hum from primarily the dozers working the coal stockpile. Mine hum from further south in the active open-cut area was not discernible but may have contributed at a level below 30 dB(A).



Figure 1 – Train Loading Noise Monitoring Location

**Measurement 2 (Location 2, 7:08 pm)**

Due to the influence of train noise from within Werris Creek, a measurement was taken at the southern end of West Street (to the west of Tonsley Park) in order to gain a clear measurement of site noise. The noise contribution from WCC at this location, which is much closer to the train loading point than the monitoring point in Werris Creek, was 33 dB(A), $L_{eq(15min)}$  which appeared to be dominated by dozers on the stockpile.

**Measurement 3 (Location 1, 7:41 pm)**

Total noise level was 41 dB(A), $L_{eq(15min)}$ . Contributing sources were local traffic (40 dB(A)), a train (different train to first measurement) idling in Werris Creek (32 dB(A)) and WCC (32 dB(A)). Contributing sources at WCC included general hum (open cut mining not discernible), including the dozers on the stockpile (31 dB(A)) and coal loading activities including the train (28 dB(A)). The noise contribution from WCC was below the night time criterion of 35 dB(A), $L_{eq(15min)}$ . Impact noises from the initial contact of coal with empty wagons again reached up to 41 dB(A), $L_{max}$  at the monitoring location, which is below the sleep disturbance criterion of 45 dB(A).

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,  
SPECTRUM ACOUSTICS PTY LIMITED



Neil Pennington  
B.Sc., B.Math.(Hons), MAAS MASA  
Principal / Director

**Appendix 4 – Blasting Monitoring Data.**

WERRIS CREEK COAL  
BLASTING DATABASE

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Talavera		COMPLIANCE	
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-27	4/05/2011	13.12	S12_5-7_385	OB	NM	NM	0.42	108.2	0.38	102.5	0.54	110.1	<0.20	<109.9	NM	NM	10.00	120.0
11-28	13/05/2011	13.21	S10_slip_340	IB	NM	NM	0.42	108.2	0.38	102.5	0.54	110.1	<0.20	<109.9	NM	NM	10.00	120.0
11-29	13/05/2011	13.21	S10_4-7_320TSB6	TS	NM	NM	<0.37	<109.9	0.95	95.5	0.97	108.6	<0.20	<109.9	NM	NM	10.00	120.0
11-30	19/05/2011	13.22	S9_8-9_300	IB	NM	NM	<0.37	<109.9	0.95	95.5	0.97	108.6	<0.20	<109.9	NM	NM	10.00	120.0
11-31	23/05/2011	10.15	S10_8-12_Fcoal	IB	NM	NM	<0.37	<109.9	<0.37	<109.9	0.52	100.8	<0.20	<109.9	NM	NM	10.00	120.0
11-33	30/05/2011	13.35	S10_12_13_Fcoal pt2	IB	NM	NM	<0.37	<109.9	<0.37	<109.9	0.45	105.4	<0.20	<109.9	NM	NM	10.00	120.0
<b>TOTALS</b>	<b>MAY</b>	<b># BLAST</b>	<b>6</b>	<b>AVERAGE</b>	<b>NM</b>	<b>NM</b>	<b>0.42</b>	<b>108.2</b>	<b>0.67</b>	<b>99.0</b>	<b>0.67</b>	<b>107.3</b>	<b>&lt;0.20</b>	<b>&lt;109.9</b>	<b>NM</b>	<b>NM</b>	<b>5.00</b>	<b>115.0</b>
<b>TOTALS</b>	<b>MAY</b>	<b># BLAST</b>	<b>6</b>	<b>HIGHEST</b>	<b>NM</b>	<b>NM</b>	<b>0.42</b>	<b>108.2</b>	<b>0.95</b>	<b>102.5</b>	<b>0.97</b>	<b>110.1</b>	<b>&lt;0.20</b>	<b>&lt;109.9</b>	<b>NM</b>	<b>NM</b>	<b>10.00</b>	<b>120.0</b>
<b>TOTALS</b>	<b>ANNUAL</b>	<b># BLAST</b>	<b>15</b>	<b>AVERAGE</b>	<b>&lt;0.37</b>	<b>&lt;109.9</b>	<b>0.36</b>	<b>109.5</b>	<b>0.58</b>	<b>103.6</b>	<b>0.63</b>	<b>108.5</b>	<b>&lt;0.20</b>	<b>&lt;109.9</b>	<b>&lt;0.37</b>	<b>&lt;109.9</b>	<b>5.00</b>	<b>115.0</b>

WERRIS CREEK COAL  
BLASTING DATABASE

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Talavera		COMPLIANCE	
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-32	3/06/2011	13:06	S11_8-11_385	OB	NM	NM	0.52	115.8	0.48	112.7	0.55	117.4	0.21	109.8	NM	NM	10.00	120.0
11-34	10/06/2011	13:10	S9_98-9_300	IB	NM	NM	<0.37	<109.9	0.45	99.9	0.60	107.0	<0.20	<109.9	NM	NM	10.00	120.0
11-35	16/06/2011	13:13	S12_11_385	OB	NM	NM	0.68	115.7	0.55	113.1	0.72	116.9	0.10	111.7	NM	NM	10.00	120.0
11-36	20/06/2011	13:15	S12_3-4_385	OB	NM	NM	1.05	110.1	1.12	103.1	NM	NM	0.42	105.6	<0.37	<109.9	10.00	120.0
11-37	14/06/2011	13:19	S9_9_300	IB	NM	NM	<0.37	<109.9	<0.37	<109.9	<0.37	<109.9	<0.20	<109.9	NM	NM	10.00	120.0
11-38	20/06/2011	13:15	S11_4-5_350Presplit	PS	NM	NM	1.05	110.1	1.12	103.1	NM	NM	0.42	105.6	<0.37	<109.9	10.00	120.0
11-39	22/06/2011	13:17	S12_8-9_385	OB	NM	NM	0.65	107.4	0.72	104.8	NM	NM	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-40	29/06/2011	13:14	S13_5-7_385	OB	NM	NM	0.07	110.1	<0.37	<109.9	0.70	114.0	<0.20	<109.9	NM	NM	10.00	120.0
11-41	24/06/2011	13:12	S11_3-5_385 Pt1	PS	NM	NM	0.57	95.0	1.07	91.9	1.92	99.1	0.42	92.9	NM	NM	10.00	120.0
11-42	30/06/2011	13:40	S10-9-10-Fcoal	IB	NM	NM	<0.37	<109.9	<0.37	<109.9	NM	NM	<0.20	<109.9	<0.37	<109.9	10.00	120.0
<b>TOTALS</b>	<b>JUNE</b>	<b># BLAST</b>	<b>10</b>	<b>AVERAGE</b>	<b>NM</b>	<b>NM</b>	<b>0.66</b>	<b>109.2</b>	<b>0.79</b>	<b>104.1</b>	<b>0.90</b>	<b>110.9</b>	<b>0.31</b>	<b>105.1</b>	<b>&lt;0.37</b>	<b>&lt;109.9</b>	<b>5.00</b>	<b>115.0</b>
<b>TOTALS</b>	<b>JUNE</b>	<b># BLAST</b>	<b>10</b>	<b>HIGHEST</b>	<b>NM</b>	<b>NM</b>	<b>1.05</b>	<b>115.8</b>	<b>1.12</b>	<b>113.1</b>	<b>1.92</b>	<b>117.4</b>	<b>0.42</b>	<b>111.7</b>	<b>&lt;0.37</b>	<b>&lt;109.9</b>	<b>10.00</b>	<b>120.0</b>
<b>TOTALS</b>	<b>ANNUAL</b>	<b># BLAST</b>	<b>25</b>	<b>AVERAGE</b>	<b>&lt;0.37</b>	<b>&lt;109.9</b>	<b>0.46</b>	<b>109.4</b>	<b>0.65</b>	<b>103.8</b>	<b>0.72</b>	<b>109.3</b>	<b>0.31</b>	<b>105.1</b>	<b>&lt;0.37</b>	<b>&lt;109.9</b>	<b>5.00</b>	<b>115.0</b>
<b>TOTALS</b>	<b>ANNUAL</b>	<b>%</b>	<b>&gt;115dB(L) or 5mm/s</b>	<b>25</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>8.0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>9.5%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>5%</b>	<b>5%</b>

WERRIS CREEK COAL  
BLASTING DATABASE

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Talavera		COMPLIANCE	
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-43	1/07/2011	13:08	S11_2-4_350 W/R PS	PS	NM	NM	0.47	95.0	0.45	96.2	1.17	101.3	<0.20	<109.9	NM	NM	10.00	120.0
11-44	8/07/2011	13:25	S12_9-13_385	OB	NM	NM	NM	NM	0.52	106.9	1.22	114.0	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-45	6/07/2011	15:22	S10_9-11_Fseam Pt2	IB	NM	NM	NM	NM	<0.37	<109.9	<0.37	<109.9	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-46	13/07/2011	13:54	S10_6-8_300 TSB7	TS	NM	NM	0.50	99.0	0.57	94.7	0.8	102.2	<0.20	<109.9	NM	NM	10.00	120.0
11-47	14/07/2011	13:08	S11_7-9_350 PS	PS	NM	NM	0.37	93.4	0.67	94.7	0.9	101.3	<0.20	<109.9	NM	NM	10.00	120.0
11-48	19/07/2011	13:25	S11_7-8_365 TSB8	TS	NM	NM	0.65	110.6	0.72	106.3	1.25	106.3	<0.20	<109.9	NM	NM	10.00	120.0
11-49	26/07/2011	13:44	S11_5-6_365 TSB9	TS	NM	NM	0.65	99.9	0.57	83.0	1.25	107.8	<0.20	<109.9	NM	NM	10.00	120.0
<b>TOTALS</b>	<b>JULY</b>	<b># BLAST</b>	<b>7</b>	<b>AVERAGE</b>	<b>NM</b>	<b>NM</b>	<b>0.53</b>	<b>99.6</b>	<b>0.58</b>	<b>97.0</b>	<b>1.10</b>	<b>105.5</b>	<b>&lt;0.20</b>	<b>&lt;109.9</b>	<b>&lt;0.37</b>	<b>&lt;109.9</b>	<b>5.00</b>	<b>115.0</b>
<b>TOTALS</b>	<b>JULY</b>	<b># BLAST</b>	<b>7</b>	<b>HIGHEST</b>	<b>NM</b>	<b>NM</b>	<b>0.65</b>	<b>110.6</b>	<b>0.72</b>	<b>106.9</b>	<b>1.25</b>	<b>114.0</b>	<b>&lt;0.20</b>	<b>&lt;109.9</b>	<b>&lt;0.37</b>	<b>&lt;109.9</b>	<b>10.00</b>	<b>120.0</b>
<b>TOTALS</b>	<b>ANNUAL</b>	<b># BLAST</b>	<b>32</b>	<b>AVERAGE</b>	<b>&lt;0.37</b>	<b>&lt;109.9</b>	<b>0.48</b>	<b>106.9</b>	<b>0.63</b>	<b>102.1</b>	<b>0.82</b>	<b>108.3</b>	<b>0.31</b>	<b>105.1</b>	<b>&lt;0.37</b>	<b>&lt;109.9</b>	<b>5.00</b>	<b>115.0</b>
<b>TOTALS</b>	<b>ANNUAL</b>	<b>%</b>	<b>&gt;115dB(L) or 5mm/s</b>	<b>32</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>6.7%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>7.1%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>5%</b>	<b>5%</b>

**Appendix 5 – Groundwater Monitoring Data.**



Environmental Division

**CERTIFICATE OF ANALYSIS**

<b>Work Order</b>	<b>: ES1110417</b>	Page	: 1 of 6
Client	: ACIRL PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: A WRIGHT	Contact	: Client Services
Address	: 5-7 TALBOT RD GUNNEDAH NSW 2380	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awright@whitehavencoal.com.au	E-mail	: sydney@alsglobal.com
Telephone	: 02 6742 0058	Telephone	: +61-2-8784 8555
Facsimile	: 02 6742 0068	Facsimile	: +61-2-8784 8500
Project	: WERRIS CREEK GROUNDWATER	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 1954	Date Samples Received	: 19-MAY-2011
C-O-C number	: ----	Issue Date	: 26-MAY-2011
Sampler	: BP	No. of samples received	: 11
Site	: ----	No. of samples analysed	: 11
Quote number	: SY/261/10		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

**Signatories**

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
James Thompson	Client Services Officer	ACIRL Sampling
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics

**Environmental Division Sydney**  
Part of the **ALS Laboratory Group**

277-289 Woodpark Road Smithfield NSW Australia 2164  
Tel. +61-2-8784 8555 Fax. +61-2-8784 8500 [www.alsglobal.com](http://www.alsglobal.com)

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## General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

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

- **Field Tests, Field Observations and Flow Observations supplied by ALS ACIRL - Lithgow or Muswellbrook. NATA Accreditation No.15784.**



## Analytical Results

Sub-Matrix: WATER

				Client sample ID	MW1	MW6	MW8	MW10	MW11
				Client sampling date / time	18-MAY-2011 10:50	18-MAY-2011 11:30	18-MAY-2011 12:00	18-MAY-2011 09:30	18-MAY-2011 10:00
Compound	CAS Number	LOR	Unit	ES1110417-001	ES1110417-002	ES1110417-003	ES1110417-004	ES1110417-005	
<b>AC01: Bore Data</b>									
Standing Water Level	----	0.01	m	50.6	11.2	12.7	17.1	<0.01	
<b>AC02: Sampling Data</b>									
Purge Type	----	-	-	Bail	Bail	Tap	Tap	Tap	
<b>AC03: Field Tests</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	1130	1730	1050	1080	1150	
pH	----	0.01	pH Unit	6.95	7.20	7.25	7.30	7.45	
Temperature	----	0.1	°C	20.1	20.0	20.2	16.0	19.1	
<b>EA005: pH</b>									
pH Value	----	0.01	pH Unit	7.42	7.64	7.61	7.93	7.91	
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	1300	2060	1320	1310	1350	
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	----	0.01	mg/L	0.02	<0.01	<0.01	<0.01	<0.01	
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
^ Nitrate as N	14797-55-8	0.01	mg/L	0.90	3.03	3.72	6.41	7.17	
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
^ Total Nitrogen as N	----	0.1	mg/L	2.2	4.2	4.5	8.6	8.7	
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L	0.25	0.14	0.03	0.13	0.18	
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphorus as P	----	0.01	mg/L	0.21	0.05	0.02	0.02	0.03	



## Analytical Results

Sub-Matrix: WATER

				Client sample ID				
				MW12	MW13	MW15	MW16	MW17A
				18-MAY-2011 14:10	18-MAY-2011 13:00	18-MAY-2011 12:30	18-MAY-2011 14:00	18-MAY-2011 13:20
				Client sampling date / time				
Compound	CAS Number	LOR	Unit	ES1110417-006	ES1110417-007	ES1110417-008	ES1110417-009	ES1110417-010
<b>AC01: Bore Data</b>								
Standing Water Level	----	0.01	m	6.75	5.03	3.81	3.99	3.04
<b>AC02: Sampling Data</b>								
Purge Type	----	-	-	Tap	Bail	Bail	Tap	Tap
<b>AC03: Field Tests</b>								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	413	783	990	661	776
pH	----	0.01	pH Unit	7.20	7.10	7.20	7.15	7.30
Temperature	----	0.1	°C	20.7	21.5	20.1	19.7	21.0
<b>EA005: pH</b>								
pH Value	----	0.01	pH Unit	7.52	7.40	7.66	7.57	7.65
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	468	968	1190	799	942
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N	14797-55-8	0.01	mg/L	0.97	1.53	1.03	3.18	0.42
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>								
^ Total Nitrogen as N	----	0.1	mg/L	1.7	2.6	1.4	5.3	1.0
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	0.01	mg/L	0.10	0.17	0.22	0.15	0.32
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.01	mg/L	0.05	0.06	0.07	0.06	0.08



## Analytical Results

Sub-Matrix: **WATER**

			Client sample ID	MW17B	---	---	---	---
			Client sampling date / time	18-MAY-2011 13:40	---	---	---	---
Compound	CAS Number	LOR	Unit	ES1110417-011	---	---	---	---
<b>AC01: Bore Data</b>								
Standing Water Level	----	0.01	m	8.83	---	---	---	---
<b>AC02: Sampling Data</b>								
Purge Type	----	-	-	0	---	---	---	---
<b>AC03: Field Tests</b>								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	1890	---	---	---	---
pH	----	0.01	pH Unit	8.25	---	---	---	---
Temperature	----	0.1	°C	17.1	---	---	---	---
<b>EA005: pH</b>								
pH Value	----	0.01	pH Unit	8.46	---	---	---	---
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	2350	---	---	---	---
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N	----	0.01	mg/L	<0.01	---	---	---	---
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N	14797-55-8	0.01	mg/L	0.04	---	---	---	---
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>								
^ Total Nitrogen as N	----	0.1	mg/L	0.8	---	---	---	---
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	0.01	mg/L	0.08	---	---	---	---
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.01	mg/L	<0.01	---	---	---	---



## Analytical Results

### Descriptive Results

Sub-Matrix: **WATER**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
<b>AC04: Field Observations</b>		
AC04: Appearance	MW1 - 18-MAY-2011 10:50	Clear
AC04: Appearance	MW6 - 18-MAY-2011 11:30	Clear
AC04: Appearance	MW8 - 18-MAY-2011 12:00	Clear
AC04: Appearance	MW10 - 18-MAY-2011 09:30	Clear
AC04: Appearance	MW11 - 18-MAY-2011 10:00	Clear
AC04: Appearance	MW12 - 18-MAY-2011 14:10	Clear
AC04: Appearance	MW13 - 18-MAY-2011 13:00	Clear
AC04: Appearance	MW15 - 18-MAY-2011 12:30	Clear
AC04: Appearance	MW16 - 18-MAY-2011 14:00	Clear
AC04: Appearance	MW17A - 18-MAY-2011 13:20	Clear
AC04: Appearance	MW17B - 18-MAY-2011 13:40	Clear
AC04: Odour	MW1 - 18-MAY-2011 10:50	Nil
AC04: Odour	MW6 - 18-MAY-2011 11:30	Nil
AC04: Odour	MW8 - 18-MAY-2011 12:00	Nil
AC04: Odour	MW10 - 18-MAY-2011 09:30	Nil
AC04: Odour	MW11 - 18-MAY-2011 10:00	Nil
AC04: Odour	MW12 - 18-MAY-2011 14:10	Nil
AC04: Odour	MW13 - 18-MAY-2011 13:00	Nil
AC04: Odour	MW15 - 18-MAY-2011 12:30	Nil
AC04: Odour	MW16 - 18-MAY-2011 14:00	Nil
AC04: Odour	MW17A - 18-MAY-2011 13:20	Nil
AC04: Odour	MW17B - 18-MAY-2011 13:40	Nil
AC04: Colour	MW1 - 18-MAY-2011 10:50	Clear
AC04: Colour	MW6 - 18-MAY-2011 11:30	Clear
AC04: Colour	MW8 - 18-MAY-2011 12:00	Clear
AC04: Colour	MW10 - 18-MAY-2011 09:30	Clear
AC04: Colour	MW11 - 18-MAY-2011 10:00	Clear
AC04: Colour	MW12 - 18-MAY-2011 14:10	Clear
AC04: Colour	MW13 - 18-MAY-2011 13:00	Clear
AC04: Colour	MW15 - 18-MAY-2011 12:30	Clear
AC04: Colour	MW16 - 18-MAY-2011 14:00	Clear
AC04: Colour	MW17A - 18-MAY-2011 13:20	Clear
AC04: Colour	MW17B - 18-MAY-2011 13:40	Clear



Environmental Division

**CERTIFICATE OF ANALYSIS**

<b>Work Order</b>	<b>: ES1110289</b>	Page	: 1 of 5
Client	: ACIRL PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: A WRIGHT	Contact	: Client Services
Address	: 5-7 TALBOT RD GUNNEDAH NSW 2380	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awright@whitehavencoal.com.au	E-mail	: sydney@alsglobal.com
Telephone	: 02 6742 0058	Telephone	: +61-2-8784 8555
Facsimile	: 02 6742 0068	Facsimile	: +61-2-8784 8500
Project	: WERRIS CREEK GROUNDWATER	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 1954	Date Samples Received	: 18-MAY-2011
C-O-C number	: ----	Issue Date	: 26-MAY-2011
Sampler	: BP	No. of samples received	: 7
Site	: ----	No. of samples analysed	: 7
Quote number	: SY/261/10		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

**Signatories**

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
James Thompson	Client Services Officer	ACIRL Sampling

**Environmental Division Sydney**  
Part of the **ALS Laboratory Group**

277-289 Woodpark Road Smithfield NSW Australia 2164  
Tel. +61-2-8784 8555 Fax. +61-2-8784 8500 [www.alsglobal.com](http://www.alsglobal.com)

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

- **Field Tests, Field Observations and Flow Observations supplied by ALS ACIRL - Lithgow or Muswellbrook. NATA Accreditation No.15784.**



## Analytical Results

Sub-Matrix: WATER

Client sample ID  
 Client sampling date / time

Compound	CAS Number	LOR	Unit	MW3	MW4	MW5	MW9	MW14
				17-MAY-2011 12:40	17-MAY-2011 14:00	17-MAY-2011 13:30	17-MAY-2011 11:40	17-MAY-2011 11:15
				ES1110289-001	ES1110289-002	ES1110289-003	ES1110289-004	ES1110289-005
<b>AC01: Bore Data</b>								
Standing Water Level	----	0.01	m	----	9.42	7.28	14.1	15.6
Stick up	----	0.01	m	----	----	1.15	1.07	1.07
<b>AC02: Sampling Data</b>								
Purge Type	----	-	-	Tap	Bail	Pump	Pump	Pump
Purge Volume	----	0.01	L	----	----	100	100	100
<b>AC03: Field Tests</b>								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	37	944	2230	781	1080
pH	----	0.01	pH Unit	6.85	7.60	7.05	7.35	7.10
Temperature	----	0.1	°C	20.1	19.0	20.7	21.0	21.0
<b>EA005: pH</b>								
pH Value	----	0.01	pH Unit	7.15	7.60	7.11	7.45	7.21
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	70	1130	2690	952	1340
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N	14797-55-8	0.01	mg/L	0.18	0.95	2.06	3.21	11.0
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>								
Nitrite + Nitrate as N	----	0.01	mg/L	0.18	0.95	2.06	3.21	11.0
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.3	0.3	1.0	1.7
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>								
^ Total Nitrogen as N	----	0.1	mg/L	0.3	1.2	2.4	4.2	12.7
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	0.01	mg/L	0.10	0.28	0.01	0.06	0.05
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.02



## Analytical Results

Sub-Matrix: **WATER**

				Client sample ID					
				P1	P2	---	---	---	
				17-MAY-2011 12:20	17-MAY-2011 13:00	---	---	---	
Client sampling date / time				ES1110289-006	ES1110289-007	---	---	---	
Compound	CAS Number	LOR	Unit						
<b>AC01: Bore Data</b>									
Standing Water Level	----	0.01	m	22.7	20.0	----	----	----	
Stick up	----	0.01	m	0.92	1.01	----	----	----	
<b>AC02: Sampling Data</b>									
Purge Type	----	-	-	Pump	Bail	----	----	----	
Purge Volume	----	0.01	L	100	----	----	----	----	
<b>AC03: Field Tests</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	1430	970	----	----	----	
pH	----	0.01	pH Unit	6.60	7.30	----	----	----	
Temperature	----	0.1	°C	22.3	21.0	----	----	----	
<b>EA005: pH</b>									
pH Value	----	0.01	pH Unit	6.81	7.43	----	----	----	
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	1790	1210	----	----	----	
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	----	----	----	
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
^ Nitrate as N	14797-55-8	0.01	mg/L	0.01	3.19	----	----	----	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	0.01	3.19	----	----	----	
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1.1	----	----	----	
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
^ Total Nitrogen as N	----	0.1	mg/L	<0.1	4.3	----	----	----	
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L	<0.01	0.09	----	----	----	
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.01	----	----	----	



## Analytical Results

### Descriptive Results

Sub-Matrix: **WATER**

<i>Method: Compound</i>	<i>Client sample ID - Client sampling date / time</i>	<i>Analytical Results</i>
<b>AC04: Field Observations</b>		
AC04: Appearance	MW3 - 17-MAY-2011 12:40	Clear
AC04: Appearance	MW4 - 17-MAY-2011 14:00	Clear
AC04: Appearance	MW5 - 17-MAY-2011 13:30	Clear
AC04: Appearance	MW9 - 17-MAY-2011 11:40	Clear
AC04: Appearance	MW14 - 17-MAY-2011 11:15	Clear
AC04: Appearance	P1 - 17-MAY-2011 12:20	Clear
AC04: Appearance	P2 - 17-MAY-2011 13:00	Clear
AC04: Odour	MW3 - 17-MAY-2011 12:40	Nil
AC04: Odour	MW4 - 17-MAY-2011 14:00	Nil
AC04: Odour	MW5 - 17-MAY-2011 13:30	Nil
AC04: Odour	MW9 - 17-MAY-2011 11:40	Nil
AC04: Odour	MW14 - 17-MAY-2011 11:15	Nil
AC04: Odour	P1 - 17-MAY-2011 12:20	Nil
AC04: Odour	P2 - 17-MAY-2011 13:00	Nil
AC04: Colour	MW3 - 17-MAY-2011 12:40	Clear
AC04: Colour	MW4 - 17-MAY-2011 14:00	Clear
AC04: Colour	MW5 - 17-MAY-2011 13:30	Clear
AC04: Colour	MW9 - 17-MAY-2011 11:40	Clear
AC04: Colour	MW14 - 17-MAY-2011 11:15	Clear
AC04: Colour	P1 - 17-MAY-2011 12:20	Clear
AC04: Colour	P2 - 17-MAY-2011 13:00	Clear

**Appendix 6 – Surface Water Monitoring Data.**



Environmental Division

**CERTIFICATE OF ANALYSIS**

<b>Work Order</b>	<b>: ES1109992</b>	Page	: 1 of 5
Client	: <b>ACIRL PTY LTD</b>	Laboratory	: Environmental Division Sydney
Contact	: A WRIGHT	Contact	: Client Services
Address	: PO BOX 600 GUNNEDAH NSW, AUSTRALIA 2380	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awright@whitehavencoal.com.au	E-mail	: sydney@alsglobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: WERRIS CREEK SURFACE-WATER	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 1935	Date Samples Received	: 13-MAY-2011
C-O-C number	: ----	Issue Date	: 20-MAY-2011
Sampler	: BP	No. of samples received	: 12
Site	: ----	No. of samples analysed	: 12
Quote number	: SY/261/10		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

**Signatories**

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics

**Environmental Division Sydney**  
Part of the **ALS Laboratory Group**

277-289 Woodpark Road Smithfield NSW Australia 2164  
Tel. +61-2-8784 8555 Fax. +61-2-8784 8500 [www.alsglobal.com](http://www.alsglobal.com)

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## General Comments

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

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

- It has been noted that Reactive P is greater than Total P for SB10, however this difference is within the limits of experimental variation.



## Analytical Results

Sub-Matrix: WATER

				Client sample ID	SB2	SB9	SB10	SD4	SD5
				Client sampling date / time	12-MAY-2011 11:20	12-MAY-2011 10:40	12-MAY-2011 10:20	12-MAY-2011 12:30	12-MAY-2011 12:10
Compound	CAS Number	LOR	Unit		ES1109992-001	ES1109992-002	ES1109992-003	ES1109992-004	ES1109992-005
<b>EA005: pH</b>									
pH Value	----	0.01	pH Unit		8.12	7.95	7.67	7.82	8.21
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm		545	634	457	281	316
<b>EA025: Suspended Solids</b>									
^ Suspended Solids (SS)	----	5	mg/L		36	28	17	20	69
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	----	0.01	mg/L		<0.01	0.21	<0.01	<0.01	<0.01
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
^ Nitrate as N	14797-55-8	0.01	mg/L		0.04	4.13	<0.01	<0.01	<0.01
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L		0.04	4.34	<0.01	<0.01	<0.01
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		1.0	2.3	0.2	1.2	2.2
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
^ Total Nitrogen as N	----	0.1	mg/L		1.0	6.6	0.2	1.2	2.2
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	<0.01	0.64	0.12
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	0.02	0.60	0.07
<b>EP020: Oil and Grease (O&amp;G)</b>									
Oil & Grease	----	5	mg/L		<5	<5	<5	<5	<5



## Analytical Results

Sub-Matrix: WATER

				Client sample ID	VWD1	VWD2	200MLD	QCU	QCD
				Client sampling date / time	12-MAY-2011 11:50	12-MAY-2011 11:00	12-MAY-2011 11:40	12-MAY-2011 13:30	12-MAY-2011 13:50
Compound	CAS Number	LOR	Unit		ES1109992-006	ES1109992-007	ES1109992-008	ES1109992-009	ES1109992-010
<b>EA005: pH</b>									
pH Value	----	0.01	pH Unit		7.90	7.64	7.81	7.20	7.60
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm		1150	1220	1190	376	894
<b>EA025: Suspended Solids</b>									
^ Suspended Solids (SS)	----	5	mg/L		8	14	28	11	6
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	----	0.01	mg/L		0.04	0.36	0.22	<0.01	<0.01
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
^ Nitrate as N	14797-55-8	0.01	mg/L		5.62	15.9	6.35	0.48	0.12
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L		5.65	16.3	6.57	0.48	0.12
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		2.1	5.5	3.5	0.3	0.2
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
^ Total Nitrogen as N	----	0.1	mg/L		7.8	21.8	10.1	0.8	0.3
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
<b>EP020: Oil and Grease (O&amp;G)</b>									
Oil & Grease	----	5	mg/L		<5	<5	<5	<5	<5



## Analytical Results

Sub-Matrix: **WATER**

			Client sample ID	WCU	WCD			
			Client sampling date / time	12-MAY-2011 09:50	12-MAY-2011 09:30	----	----	----
Compound	CAS Number	LOR	Unit	ES1109992-011	ES1109992-012	----	----	----
<b>EA005: pH</b>								
pH Value	----	0.01	pH Unit	7.42	8.00	----	----	----
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	1500	1400	----	----	----
<b>EA025: Suspended Solids</b>								
^ Suspended Solids (SS)	----	5	mg/L	6	24	----	----	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	----	----	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N	14797-55-8	0.01	mg/L	4.44	0.61	----	----	----
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>								
Nitrite + Nitrate as N	----	0.01	mg/L	4.44	0.61	----	----	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.5	0.4	----	----	----
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>								
^ Total Nitrogen as N	----	0.1	mg/L	5.9	1.0	----	----	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	----	----	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	----	----	----
<b>EP020: Oil and Grease (O&amp;G)</b>								
Oil & Grease	----	5	mg/L	<5	<5	----	----	----

## **Appendix 7 – Surface Water Discharge Monitoring Data**



Environmental Division

**CERTIFICATE OF ANALYSIS**

<b>Work Order</b>	<b>: ES1111539</b>	Page	: 1 of 3
Client	: <b>ACIRL PTY LTD</b>	Laboratory	: Environmental Division Sydney
Contact	: A WRIGHT	Contact	: Client Services
Address	: 5-7 TALBOT RD GUNNEDAH NSW 2380	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awright@whitehavencoal.com.au	E-mail	: sydney@alsglobal.com
Telephone	: 02 6742 0058	Telephone	: +61-2-8784 8555
Facsimile	: 02 6742 0068	Facsimile	: +61-2-8784 8500
Project	: WERRIS CREEK GROUNDWATER	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 2032	Date Samples Received	: 02-JUN-2011
C-O-C number	: ----	Issue Date	: 06-JUN-2011
Sampler	: ----	No. of samples received	: 4
Site	: ----	No. of samples analysed	: 4
Quote number	: SY/261/10		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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Accredited for compliance with ISO/IEC 17025.

**Signatories**

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics



## General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

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



## Analytical Results

Sub-Matrix: WATER

		Client sample ID		SB2	QCU	QCD	ORICA DAM	----
		Client sampling date / time		01-JUN-2011 07:00	01-JUN-2011 07:30	01-JUN-2011 07:45	01-JUN-2011 09:50	----
Compound	CAS Number	LOR	Unit	ES1111539-001	ES1111539-002	ES1111539-003	ES1111539-004	----
<b>EA005: pH</b>								
pH Value	----	0.01	pH Unit	8.09	7.37	7.98	7.46	----
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	493	465	830	198	----
<b>EA025: Suspended Solids</b>								
^ Suspended Solids (SS)	----	5	mg/L	20	8	16	494	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	0.42	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N	14797-55-8	0.01	mg/L	0.04	0.56	0.18	9.20	----
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>								
Nitrite + Nitrate as N	----	0.01	mg/L	0.04	0.56	0.18	9.62	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.1	0.7	0.6	5.7	----
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>								
^ Total Nitrogen as N	----	0.1	mg/L	1.1	1.3	0.8	15.3	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	0.01	mg/L	0.07	0.10	0.17	0.15	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.04	0.04	<0.01	----
<b>EP020: Oil and Grease (O&amp;G)</b>								
Oil & Grease	----	5	mg/L	<5	<5	<5	<5	----



Environmental Division

**CERTIFICATE OF ANALYSIS**

<b>Work Order</b>	<b>: ES1112086</b>	<b>Page</b>	: 1 of 3
<b>Client</b>	<b>: ACIRL PTY LTD</b>	<b>Laboratory</b>	: Environmental Division Sydney
<b>Contact</b>	<b>: A WRIGHT</b>	<b>Contact</b>	: Client Services
<b>Address</b>	<b>: PO BOX 600</b>	<b>Address</b>	: 277-289 Woodpark Road Smithfield NSW Australia 2164
	<b>  GUNNEDAH NSW, AUSTRALIA 2380</b>		
<b>E-mail</b>	<b>: awright@whitehavencoal.com.au</b>	<b>E-mail</b>	: sydney@alsglobal.com
<b>Telephone</b>	: ----	<b>Telephone</b>	: +61-2-8784 8555
<b>Facsimile</b>	: ----	<b>Facsimile</b>	: +61-2-8784 8500
<b>Project</b>	<b>: WERRIS CREEK DISCHARGE SAMPLES</b>	<b>QC Level</b>	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
<b>Order number</b>	<b>: 2072</b>		
<b>C-O-C number</b>	: ----	<b>Date Samples Received</b>	: 08-JUN-2011
<b>Sampler</b>	<b>: BP</b>	<b>Issue Date</b>	: 10-JUN-2011
<b>Site</b>	: ----		
<b>Quote number</b>	<b>: SY/261/10</b>	<b>No. of samples received</b>	: 3
		<b>No. of samples analysed</b>	: 3

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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**Signatories**

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<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Nanthini Coilparampil	Senior Inorganic Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics

**Environmental Division Sydney**  
Part of the **ALS Laboratory Group**

277-289 Woodpark Road Smithfield NSW Australia 2164  
Tel. +61-2-8784 8555 Fax. +61-2-8784 8500 [www.alsglobal.com](http://www.alsglobal.com)

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

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

- Spike failed for Total P due to matrix interference



## Analytical Results

Sub-Matrix: **WATER**

				Client sample ID	SB9	QCU	QCD		
				Client sampling date / time	07-JUN-2011 15:00	07-JUN-2011 10:00	07-JUN-2011 10:30	----	----
Compound	CAS Number	LOR	Unit		ES1112086-001	ES1112086-002	ES1112086-003	----	----
<b>EA005: pH</b>									
pH Value	----	0.01	pH Unit		7.72	7.46	8.02	----	----
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm		666	461	860	----	----
<b>EA025: Suspended Solids</b>									
^ Suspended Solids (SS)	----	5	mg/L		8	12	12	----	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	----	0.01	mg/L		0.15	<0.01	<0.01	----	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
^ Nitrate as N	14797-55-8	0.01	mg/L		6.88	0.50	0.13	----	----
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L		7.04	0.50	0.13	----	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		2.9	0.6	0.4	----	----
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
^ Total Nitrogen as N	----	0.1	mg/L		9.9	1.1	0.5	----	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L		0.09	0.10	0.08	----	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphorus as P	----	0.01	mg/L		<0.01	0.05	0.05	----	----
<b>EP020: Oil and Grease (O&amp;G)</b>									
Oil & Grease	----	5	mg/L		<5	<5	<5	----	----



Environmental Division

**CERTIFICATE OF ANALYSIS**

<b>Work Order</b>	<b>: ES1112878</b>	Page	: 1 of 3
Client	: <b>ACIRL PTY LTD</b>	Laboratory	: Environmental Division Sydney
Contact	: A WRIGHT	Contact	: Client Services
Address	: 5-7 TALBOT RD GUNNEDAH NSW 2380	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awright@whitehavencoal.com.au	E-mail	: sydney@alsglobal.com
Telephone	: 02 6742 0058	Telephone	: +61-2-8784 8555
Facsimile	: 02 6742 0068	Facsimile	: +61-2-8784 8500
Project	: WERRIS CREEK DISCHARGE SAMPLES	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 2117	Date Samples Received	: 17-JUN-2011
C-O-C number	: ----	Issue Date	: 24-JUN-2011
Sampler	: BP	No. of samples received	: 4
Site	: ----	No. of samples analysed	: 4
Quote number	: SY/261/10		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

**Signatories**

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics



## General Comments

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

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

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

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

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

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LOR = Limit of reporting

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

- **EK071G: It has been noted that Reactive P is greater than Total P on sample ID (QCU), however this difference is within the limits of experimental variation.**



## Analytical Results

Sub-Matrix: WATER

				Client sample ID	SB2	SB9	QCD	QCU	----
				Client sampling date / time	16-JUN-2011 10:15	16-JUN-2011 10:00	16-JUN-2011 11:15	16-JUN-2011 11:45	----
Compound	CAS Number	LOR	Unit		ES1112878-001	ES1112878-002	ES1112878-003	ES1112878-004	----
<b>EA005: pH</b>									
pH Value	----	0.01	pH Unit		8.17	8.05	8.04	7.44	----
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm		510	712	915	479	----
<b>EA025: Suspended Solids</b>									
^ Suspended Solids (SS)	----	5	mg/L		28	<5	18	12	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	----	0.01	mg/L		<0.01	0.13	<0.01	<0.01	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
^ Nitrate as N	14797-55-8	0.01	mg/L		0.06	7.26	0.15	0.64	----
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L		0.06	7.39	0.15	0.64	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.7	1.4	0.5	0.3	----
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
^ Total Nitrogen as N	----	0.1	mg/L		0.8	8.8	0.6	0.9	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L		0.09	<0.01	0.07	0.03	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	0.03	0.04	----
<b>EP020: Oil and Grease (O&amp;G)</b>									
Oil & Grease	----	5	mg/L		<5	<5	<5	<5	----