

WHITEHAVEN COAL MINING PTY LTD

(A.B.N. 65 086 426 253)

BLASTING MONITORING PROGRAMME

for the

WHITEHAVEN COAL MINE

December 2005



Blasting Monitoring Programme
for the
Whitehaven Coal Mine

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1.0 INTRODUCTION

This Blasting Monitoring Programme for the Whitehaven Coal Mine has been prepared:

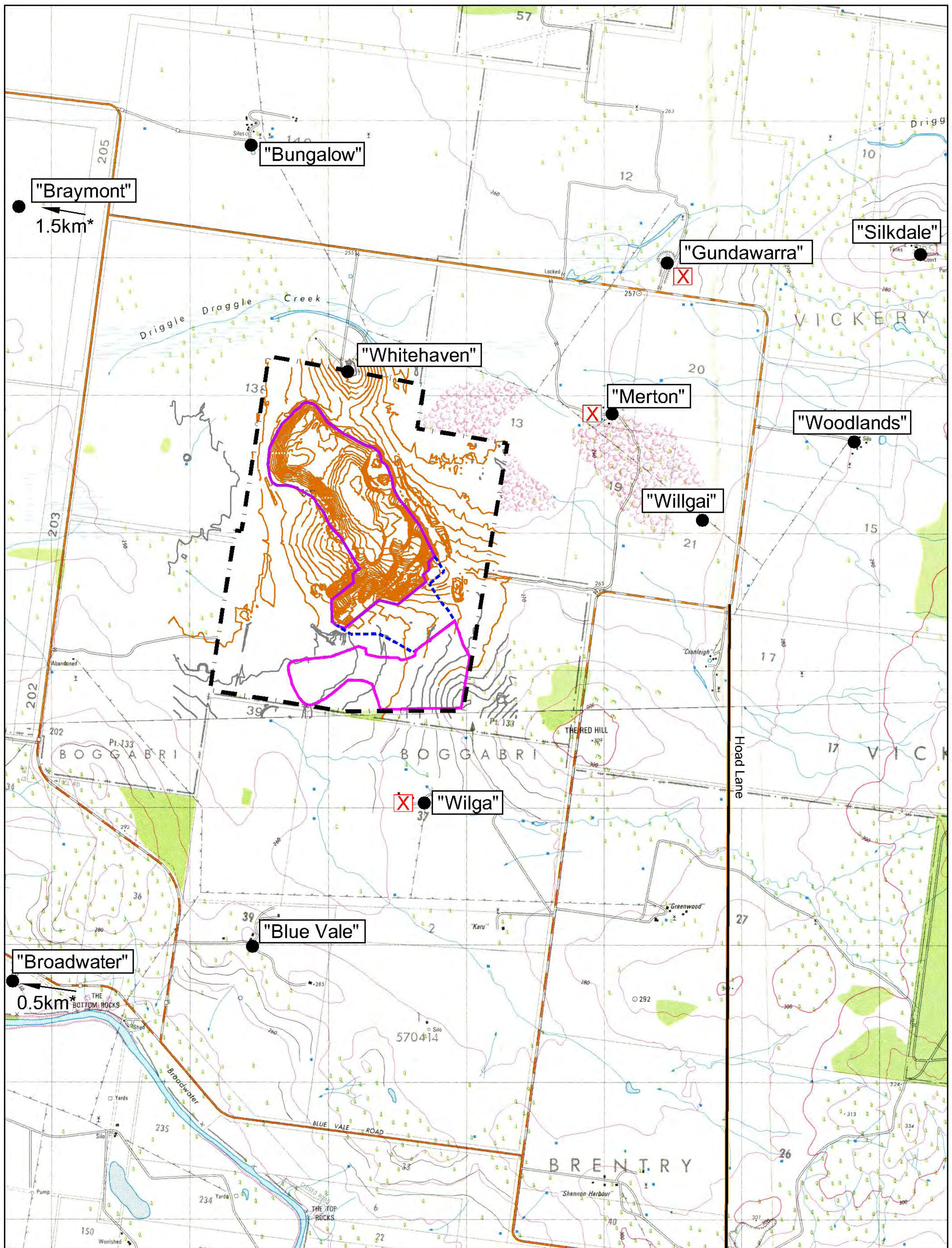
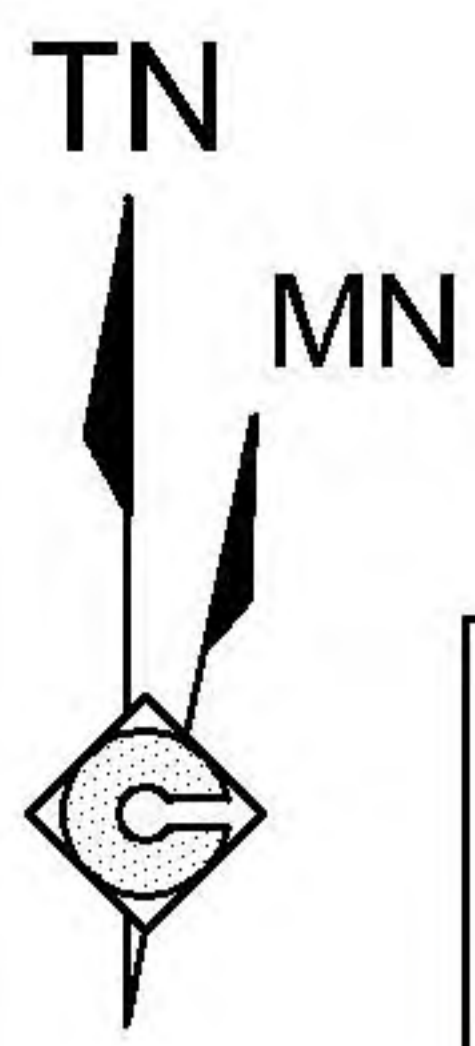
- in accordance with Condition 16 (Schedule 3) of DA 8-1-2005;
- in consultation with DEC (EPA) Armidale;
- in conjunction with Roche Blasting Services (RBS), the specialist blasting company contracted to undertake all blasting activities, ie design, loading, firing and monitoring, at the Whitehaven Coal Mine; and
- represents a continuation of the existing programme and procedures which have been implemented, or progressively introduced, over the life of the mine to-date and which have been effective in monitoring blasting impacts.

The programme supersedes a similar document prepared in accordance with DA 72-03-2000 and approved by the Director-General, Department of Urban Affairs and Planning, on 13 August 2000.

The following sub-sections identify the monitoring locations and blast notification procedures; the nature of the monitoring equipment to be used; equipment set-up and post-blasting procedures, and blast information analysis and reporting procedures. For completeness, and to ensure that this document represents an effective on-site management tool, blast complaint management procedures are also identified.

2.0 MONITORING LOCATIONS

Table 1 and **Figure 1** identify the proposed routine blast monitoring locations and the range of distances between each nominated monitoring point and the blasts to be initiated over the remaining life of the mine. Over the life of the mine to-date, blast monitoring locations have been amended to ensure that for all blasts, monitoring has, as a minimum, been undertaken at the two closest residences to the initiation site. Blast monitoring at additional sites, eg at “Braymont”, “Bungalow” and “Silkdale”, has been and will continue to be undertaken on an irregular basis if so requested by the landowners.



REFERENCE
 - - - - - Mining Lease Boundary - ML 1471
 X Routine Blast Monitoring Site

SCALE 1:50 000

0.5 0 0.5 1.0 1.5 2.0 2.5 km

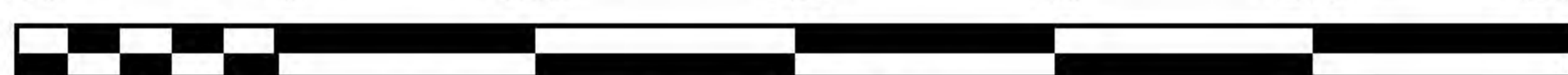


Figure Compiled by R.W. Corkery & Co.

Figure 1
BLAST MONITORING
LOCATIONS

In addition to the airblast and ground vibration monitoring nominated sites, WCM also:

- monitors flyrock / blast rock distribution as an indicator of inadequate blast stemming or burden for each blast; and
- videos each blast to assist in the interpretation of results.

TABLE 1
Routine Blast Monitoring Locations

Residence	Distance to (km)	
	Closest Blast	Most Distant Blast
“Wilga”	0.7	1.2
“Merton”	1.9	3.0
“Gundawarra”	3.0	4.1

Each blast is designed to comply with the blasting criteria (**Table 2**) at the closest residence. The criteria identified in **Table 2** are consistent with those identified in Conditions 12 and 13 of DA 8-1-2005 and Conditions L8.2 and L8.3 of EPL 10094.

TABLE 2
Blasting Criteria

Air Blast Overpressure		Ground Vibration	
Level (dBL)	Allowable Exceedance (%)	Level (mm/s ppv)	Allowable Exceedance (%)
115	5% of total blasts in 12 months period	5	5% of total blasts in 12 month period
120	0%	10	0%

3.0 NOTIFICATION PROCEDURES

For each blast undertaken at the Whitehaven Coal Mine, the following approved notification procedures will be employed for residents within 4 km of the blast.

- (i) Provision of advance notification by letter drop of the expected date and time of each blast.
- (ii) Telephone confirmation with each of the residents on the morning of the blast (unless advised that no notice is required).
- (iii) Re-notification in the event that a blast is delayed.

4.0 BLAST MONITORS

Texcel μ Mx or Texcel Compact Monitors will be used at each monitoring site to monitor airblast overpressure (dBL) and peak particle velocity in a radial, vertical and transverse direction (mm/s), ie ground vibration. All equipment for the measurement of airblast overpressure will have a lower cut-off frequency of 2Hz, and a frequency bandwidth of 2 Hz to 500 Hz.

Only calibrated monitors will be used for blast monitoring at the Whitehaven Coal Mine, with copies of calibration certificates or other means of verification available on site. The date of last calibration is automatically printed on each monitor print-out.

5.0 PROCEDURES

5.1 Standards

All aspects of blast monitoring will be undertaken by RBS and in accordance with AS 2187.2-1993- Storage, Transport and Use – Use of Explosives, a copy of which is retained at the mine office.

5.2 Pre-check

Prior to monitors being placed in the field, the following aspects will be verified for each instrument.

- (i) Battery is charged. Note: batteries will be placed on charge immediately following data downloading from each blast.
- (ii) Date and time are correct.
- (iii) Location (Site) for each monitor is marked on the carry case.
- (iv) Instrument “fields” are correctly set to reflect the distance from the blast site to identified monitor location. The instrument fields, ie near, medium and far, determine the period of recording for airblast once the monitor is triggered on either ground vibration or airblast itself.

Table 3 identifies the distance range between the blast site and the monitor, the appropriate “field” setting and the duration of airblast (air pressure wave) recording. A review of **Tables 2** and **3** shows that for the majority of blasts to be initiated over the remaining life of the mine, the monitors will be set for the “far field”.

TABLE 3
Monitor Settings and Airblast Recording Times

Setting	Near Field	Mid Field	Far Field
Distance (Monitor to Blast) (m)	<300	300 - 1000	>1000
Recording Time (sec)	4	10	20

Ground vibration is recorded for a period of 4 seconds following triggering.

- (v) Instrument trigger levels are set to minimize the potential for false initiation of the recording sequence by, for example, wind, but to record airblast and/or ground vibration events approaching or greater than the standard vibration criteria of 115 dBL and 5 mm/s respectively. For the Whitehaven Coal Mine, triggers would typically be set at between 0.3 mm/s and 0.4 mm/s (for ground vibration) and 111.7 dBL to 111.9 dBL (for airblast overpressure). Adoption of these triggers is a consequence of the following factors.

- (a) The ground vibration trigger is low and lies below the level of human perception of 0.5 mm/s.
 - (b) The blast monitors may trigger off ground vibration or airblast, with the monitors, once triggered, moving into a recording cycle of varying durations depending on the “field” setting identified in **Table 2**.
 - (c) As ground vibration waves travel substantially faster than the airblast waves and the ground vibration trigger is set low, the airblast overpressure resulting from the blast will be recorded once the blast monitor is triggered by ground vibration, even if overpressure is less than the airblast trigger level, ie less than 111.7 to 111.9 dBL.
 - (d) Only in the event that a blast does not trigger off ground vibration would triggering off airblast potentially occur, ie once the 111.7 dBL or 111.9 dBL trigger level was reached.
- (vi) Setting adjustment as necessary.
- (vii) Print-off a confirmation of settings from the logger.

To ensure consistency, a sheet identifying the monitor settings for each blast monitoring site is retained at the site office and adjusted as necessary to reflect, for example, increasing or decreasing distances to the blast site and monitoring results, eg false trigger frequency.

5.3 Field Set-up

On the day of each blast the instrument will be set up at the pre-selected location at each monitoring point, between 3.5 m and 30 m from the residence or building to be monitored.

The instrument set-up procedures involves the following steps.

- (i) Insert the soil spike into the ground and level the geophone.
- (ii) Set up microphone.
- (iii) Connect microphone and geophone to the monitor.
- (iv) Turn power on. Powering up the monitor initiates a self check culminating in a VDU advice that the instrument is functioning properly.
- (v) Press “start”. Following a countdown sequence, the monitor moves into a “standby mode” awaiting triggering.

Prior to initiation a Whitehaven Coal Mine Site Blast Check List form which includes verification that the monitors are in place and records salient weather data, eg wind direction and cloud cover, is completed and signed by the shotfirer.

5.4 Post-blast (in the Field)

Following the completion of the blast, the following activities are undertaken prior to the monitor being returned to the office for data downloading.

- (i) Press “stop” button.
- (ii) Turn power off.
- (iii) Disconnect microphone and geophone
- (iv) Remove soil spike.
- (v) Pack instrument up.

5.5 Post-blast (at the Office)

On the return of each monitor to the site office, RBS staff:

- (i) retrieve / download the data to the office computer;
- (ii) review the data and delete any data pertaining to false triggers, ie triggers before the blast initiation time;
- (iii) generate a results print-out sheet (in Microsoft Word) and insert relevant data relating to the blast, eg blast pattern, hole spacing, number of rows, number of holes, blasthole diameter, stemming, MIC, explosives type and weight, delay type (interval and duration (ms)) and any relevant comments or observations. An example of a typical results sheet from the Whitehaven Coal Mine is attached as **Appendix 1**;
- (iv) print-off and distribute the results to the nominated recipients. Routine recipients of blasting results external to the RBS personnel currently include Roche Mining’s Site Manager and Blasting Engineer; WCM’s Mine Manager, Area Manager and Environmental Officer, and the owners of “Gundawarra” residence. Result distribution may be by email, fax or in hardcopy as appropriate or requested.

Copies of the printouts, the Mine Site blast checklist and details such as blast design, charging and tie in pattern are retained on the mine site files;

- (v) transfer the data for the blast to an Excel spreadsheet; and
- (vi) place monitor battery on charge to await the next blast.

6.0 BLAST CRITERIA EXCEEDANCE MANAGEMENT AND REPORTING

In the event that the results of a blast identify an exceedance of:

- peak vector sum velocity (ground vibration) – 5 mm/s (ppv); and/or
- peak overpressure – 115 dBL,

WCM, as Licencee under the Protection of the Environment Operations Act 1997, automatically reports the incident to EPA Armidale (67737000) and initiate investigations as to the cause. A written report is then provided to the EPA.

A similar reporting / notification procedure occurs where geological conditions encountered during drilling indicates a potential for an exceedance despite the implementation of all practicable control measures.

7.0 BLAST COMPLAINT MANAGEMENT PROCEDURES

Any general complaint received relating to any blast will be managed in accordance with the existing complaints receipt and response procedure as presented in the Whitehaven Coal Mine Environmental Management Strategy (Section 6.2) and summarized below.

- (i) Details of the complainant and complaint will be recorded in the complaints log.
- (ii) WCM representatives will liaise with the complainant to ascertain all details, to identify the nature and source of the complaint and provide supplementary information for the log.
- (iii) Investigations will be initiated to verify or otherwise the basis for the complaint.

- (iv) Results of the investigation will be provided to the complainant together with advice as to any changed blast management practices to be implemented as a consequence of the investigation.

Complaints pertaining to blast-related damage will be managed in accordance with Condition 3(18) of DA 8-1-2005, viz:

“If any landowner within a 2 km of the development, or any other landowner nominated by the Director-General, claims that his/her property, including vibration-sensitive infrastructure such as water supply or underground irrigation mains, has been damaged as a result of blasting at the development, the Applicant [WCM] will, within 3 months of receiving this request:

- commission a suitably qualified person whose appointment has been approved by the Director-General to investigate the claim; and*
- give the landowner a copy of the property investigation report.*

If this independent investigation confirms the landowner’s claim, and the complainant and WCM agree with the findings, then WCM will repair the damage to the satisfaction of the Director-General.”

In the event of a disagreement by WCM or the complainant as to the findings of the independent property investigation, the matter may be referred to the Director-General. If the matter still cannot be resolved, the Director-General will initiate the Independent Dispute Resolution Process identified in DA 172-7-2004.

8.0 ROUTINE REPORTING

In addition to the reporting procedures in the event of a non-compliance as identified in Section 6.0, the results of all blasts will be presented in the AEMR and the results of any non-compliant blasts will be provided with the Annual Return for EPL10094.

Blast monitoring results will also be provided to the residents of those premises monitored, if requested.

Appendix 1

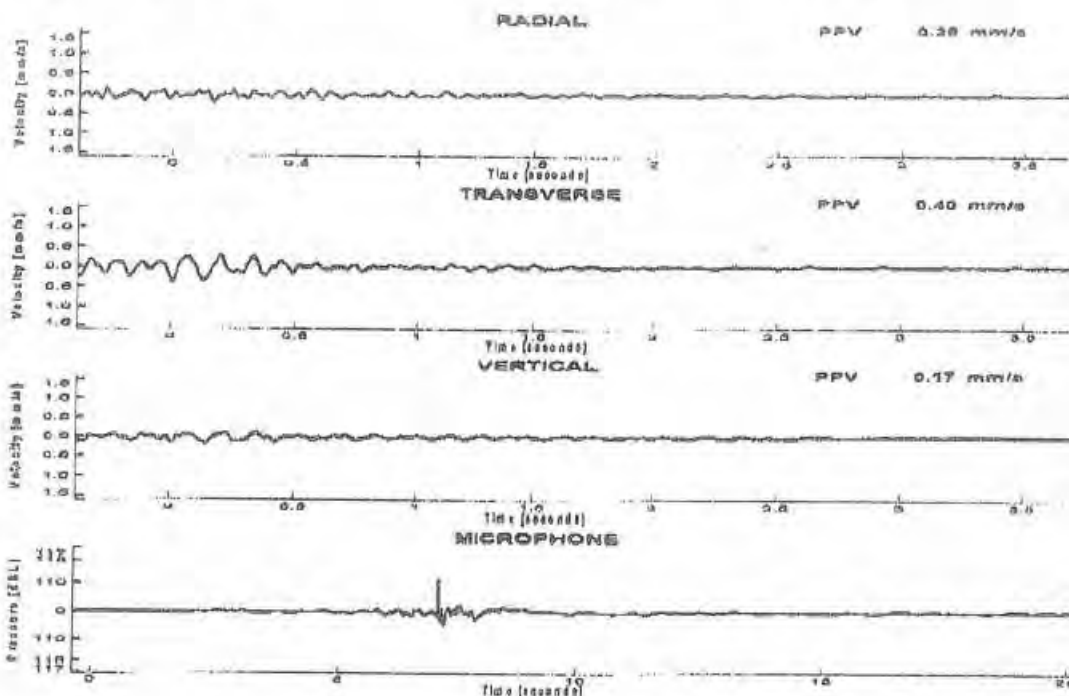
Typical Blast Results Sheet

Whitehaven

Time: 15:03:19
Date: 18 Nov 2005

Monitor Location:
Blast No/Id:

Gundawarra
WH133



BLAST SUMMARY

Pattern Type	: Staggered	Max. Inst. Charge	kg
Pattern Size (m)	: 7 x 9	Explosive (Type & Weight)	
Designed Tonnage	: kg	a) TM840 at 1.3g/cc	
Bench Height (m)	: 6 - 25 mtrs	b) .	
Number of Rows	: 13	c) .	
Number of Holes	: 94	Delay Type - Electronic	
Blasthole Dia. (mm)	: 229mm	- Average Interval (ms)	ms
Stemming (m)	: 4.5m	- Duration (ms)	ms
Sub Drill	: 0		

Peak Vector Sum Velocity : 0.42 mm/s
Peak Overpressure : 111.1 dBL

Comments & Observations

Monitoring conducted by:Jim Drane.....
(Roche Mining/Roche Blasting Services)

Checked by:

TM Serial Number: 3041

Last Calibration: 08 Apr 2005