ENV-BLA-PLN-001 Blast Management Plan

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1.0 INTRODUCTION

1.1 Overview

The Boggabri Coal Mine (BCM) is an open cut coal mine located 15 kilometres north-east of the township of Boggabri in north-western New South Wales (NSW). BCM is located within the Leard Forest Mining Precinct (Appendix A). This precinct also includes the existing Maules Creek Coal Mine (MCCM) and the Tarrawonga Coal Mine (TCM), both of which are managed by Whitehaven Coal Limited (Whitehaven).

The BCM is managed by Boggabri Coal Operations Pty Ltd (BCOPL), which is a wholly owned subsidiary of Idemitsu Australia (IA) Group. IA is a subsidiary of the Japanese company Idemitsu Kosan Co Ltd (Idemitsu Kosan). BCM is a joint venture between IA (via its subsidiary Boggabri Coal Pty Ltd) (80%), Chugoku Electric Power Australia Resources Pty Ltd (10%) and NS Boggabri Pty Limited (10%).

Environmental assessments first commenced at BCM in 1976 followed by grant of approval for the project in 1989, and the commencement of operations in 2006. In 2009, BCOPL lodged a major project application under the now-repealed Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Project Approval 09_0182 (PA, now known as State Significant Development Approval (SSD) 09_0182), was granted by the then NSW Planning Assessment Commission (PAC) in June 2012. SSD 09_0182 (as modified on nine occasions to date), provides approval to produce up to 8.6 million tonnes per annum (Mtpa) of product coal until December 2036 and the transport of up to 10 Mtpa of product by rail (up to 8.6 Mtpa from BCM and up to 3 Mtpa from TCM (subject to agreement).

At the end of December 2017, BCM shifted from a contractor-operated to an owner-operated (i.e. BCOPL personnel) mine utilising contractors to conduct operations under BCOPL direction.

1.2 Background

Schedule 3, Condition 22 of SSD 09_0182 requires the preparation of a Blast Management Plan (BLMP).

The BLMP was initially prepared in June 2013 in consultation with the Environment Protection Authority (EPA), Community Consultative Committee (CCC) and interested members of the local community, in accordance with Schedule 3, Condition 22 of SSD 09_0182. The BLMP was last updated on 25 January 2019 and approved by the then Department of Planning and Environment (DPE) on 21 February 2019.

1.3 Purpose of this Blast Management Plan

The purpose of this BLMP is to comply with Schedule 3, Condition 22 of SSD 09_0182 and ensure compliance with the blast management conditions.

Furthermore, BCOPL holds Environment Protection Licence (EPL) 12407 which specifies various conditions in relation to managing the impacts of blasting at BCM. This BLMP establishes the management framework for blasting activities at BCM to maintain compliance with conditions of EPL 12407.

1.4 Application of this Blast Management Plan

This management plan applies to BCOPL employees and contractors at the BCM and covers all areas within the ‘Project Approval Area' as defined in SSD 09_0182. A monitoring and locality plan showing the extent of these areas is provided in Appendix A.

2.0 STATUTORY REQUIREMENTS

Schedule 3, Condition 22 and 22A of SSD 09_0182 require the preparation and implementation of a BLMP. The specific requirements of the BLMP are set out in Table 2-1 together with a reference to where each condition is addressed in this document. Additional conditions of SSD 09_0182 relevant to blast management are provided in Appendix B.

Table 2-1: SSD 09_0182 BLMP requirements

SSD Condition No.	Approval condition	BLMP section reference
Schedule 3, Condition 22	The Proponent must prepare and implement a Blast Management Plan for the project to the satisfaction of the Secretary.	Whole BLMP.
Schedule 3, Condition 22(a)	This plan must be submitted to the Secretary for approval within 6 months from the date of project approval.	The original plan was submitted in June 2013 and approved in July 2013.
Schedule 3, Condition 22(b)	This plan must be prepared in consultation with the EPA and the CCC and interested members of the local community potentially affected by blasting operations.	Appendix D.
Schedule 3, Condition 22(c)	This plan must propose any alternative ground vibration limits for public infrastructure in the vicinity of the site.	Section 4.1.
Schedule 3, Condition 22(d)	This plan must describe the measures that would be implemented to ensure: • best management practice is being employed; and • compliance with the relevant conditions of this approval.	Whole plan.
Schedule 3, Condition 22(e)	This plan must include a road closure management plan for blasting within 500 metres of a public road, that has been prepared in consultation with Council.	Section 6.3
Schedule 3, Condition 22(f)	This plan must include a specific blast fume management protocol to demonstrate how emissions will be minimised including risk management strategies if blast fumes are generated.	Section 6.2 & Appendix C.
Schedule 3, Condition 22(g)	This plan must include a monitoring program for evaluating the performance of the project including: • compliance with the applicable criteria; and • minimising fume emissions from the site.	Section 7.0 & Section 6.2
Schedule 3, Condition 22(h)	This plan must include a Leard Forest Mining Precinct Blast Management Strategy that has been prepared in consultation with other mines within the Leard Forest Mining Precinct to minimise cumulative blasting impacts.	Section 6.5 and Appendix E.
Schedule 3, Condition 22A	The Proponent must implement the Blast Management Plan as approved by the Secretary.	Whole plan.

Note: The Blast Management Strategy will be developed in stages and be subject to ongoing review dependent upon the determination of and commencement of other mining projects in the area.

3.0 EXISTING ENVIRONMENT

3.1 Location of sensitive receptors

The BCM operates primarily within the Leard State Forest and adjoins rural and residential receptors on all sides. Properties surrounding the BTM complex have been purchased by BCOPL and Whitehaven, providing an environmental buffer. Properties and residences owned by BCOPL and Whitehaven are not "privately owned land" and are not considered to be blast sensitive receivers.

The acoustic impact assessment (Bridges Acoustics, 2010) in the BCM Environmental Assessment (EA) (Hansen Bailey, 2010) concluded that blasting associated with operations at BCM would produce ground vibration and overpressure levels below relevant amenity criteria at all privately owned residences surrounding the BCM. The locations of privately owned residences (as of October 2020) relative to the BCM are shown in the figure provided in Appendix A of this BLMP.

3.2 Public infrastructure

All public infrastructure, except for an unsealed section of Leard Forest Road, is located at least 2 km from proposed blasting activities. The criterion for ground vibration impacts to public infrastructure is currently set at 50 mm/s. On this basis, blasting activities are unlikely to cause detrimental impact to public infrastructure surrounding the mine.

3.3 Heritage

All non-indigenous heritage items identified in the EA are located at least 2 km from proposed blasting activities. On this basis, it is unlikely that blasting impacts from ground vibration will cause damage to any non-indigenous heritage items.

Aboriginal cultural heritage items identified in the EA are located within 2 km of proposed blasting activities (generally including artefact scatters, isolated artefacts and scarred trees). It is unlikely that these items of Aboriginal cultural heritage will be subject to impacts from blasting activities. All items of aboriginal cultural heritage are managed in accordance with the BCOPL Cultural Heritage Management Plan.

3.4 Neighbouring mining operations

Boggabri Coal Mine (BCM), Tarrawonga Coal Mine (TCM), and Maules Creek Coal Mine (MCCM) make up the BTM complex, a mining precinct within and around the Laird state forest. TCM and MCCM are both open cut mines owned by Whitehaven Coal. TCM is situated to the Southeast of BCM while MCCM sits to the Northwest.

The management of cumulative blasting impacts from these mining operations is briefly described in Section 6.5. Further details on the management of cumulative blasting impacts are found in the BTM Complex Blast Management strategy (Appendix E).

3.5 Prevailing meteorological conditions

Climate conditions in the region are influenced by latitude, the inland location of the BCM and its proximity to the Nandewar Range (Hansen Bailey, 2010). The region typically has long periods of low precipitation, often resulting in droughts.

Summer months are typically hot and winter periods are relatively short with frequent frosts. January is typically the hottest month, reaching an average maximum temperature of 34°C. July is typically the coolest month, reaching an average maximum temperature of 16.9°C.

Temperature inversions are most common in winter months, forming in later afternoon and reaching their maximum at dawn. These conditions have the potential to propagate blasting noise and air blast emissions.

Summer months have higher mean rainfall (approximately 80 mm) compared to winter months (approximately 50 mm).

The BCM Meteorological Station typically records wind from the south-east in summer and the north-west in winter. Winds in Autumn and Spring months are more variable. Autumn is generally the windiest season.

4.0 SOURCES AND TYPES OF BLAST IMPACTS

There are inherent risks associated with blasting that, if managed poorly, may result in reduced safety, environmental and operational performance. These hazards include, but are not limited to:

- excessive ground vibration;
- overpressure exceedances;
- flyrock exceeding blast exclusion zones;
- fume events; and
- misfires.

These hazards are discussed briefly in the following subsections.

4.1 Ground vibration

When a confined explosive charge detonates, some of the energy is released as ground vibrations. The magnitude of ground vibrations depends on:

- the maximum instantaneous charge (MIC) of the blast;
- the distance between the blast and the sensitive receiver;
- blast timing; and
- the characteristics of the intervening material (rock, soils, geological structures, etc.) through which the ground vibration wave propagates.

If not managed appropriately, ground vibration has the potential to cause damage to buildings and other infrastructure. Management measures for the control of ground vibration are detailed in Section 6.4.

4.2 Airblast overpressure

Blasting generates airblast overpressure, a transient air pressure from the explosion that is greater than the surrounding atmospheric pressure. Airblast overpressure can be managed by ensuring that all or most of the explosion energy is consumed in fragmenting and displacing the overburden by the time the gases vent. Improper management of overpressure can result in noise exceedances. Management measures for the control of airblast overpressure are detailed in Section 6.4.

4.3 Flyrock

Flyrock is any rock or stone that is propelled beyond defined blast limits by the force of the explosion. It can pose a serious safety hazard and cause damage to buildings and infrastructure if not managed appropriately. Management measures for the control of flyrock are detailed in Section 6.4.

4.4 Fume

The use of ammonium nitrate-based explosives under variable conditions can lead to unwanted explosive reactions and the generation of nitric oxide (NO) and nitrogen dioxide (NO_2). Nitric oxide is unstable in air and readily oxidises to nitrogen dioxide. Nitrogen dioxide is identifiable as an orange or brown cloud which can be harmful if inhaled. Blast fume is a result of an explosive not reacting completely with the detonation.

There are several potential causes of blast fume including geological conditions, weather, blast design, explosive product selection, explosive quality, blast-hole contamination and bench preparation.

Management measures for the control of blast fume are detailed in Section 6.2 and Appendix C.

4.5 Misfires

Misfires refer to the complete or partial failure of a blasting charge to explode as planned. The explosives that remain after the blast is detonated may be triggered to explode by mechanical means during post-blasting excavation activities, potentially leading to incidents.

Measures that will be implemented to prevent misfires are detailed in Section 6.4.

5.0 BLASTING CRITERIA

5.1 Blasting assessment criteria

BCOPL's blasting assessment criteria, as outlined in Schedule 3, Condition 15 of the SSD 09_0182, are shown in Table 5-1.

Table 5-1: Blasting criteria

Location	Air blast overpressure (dB (Lin Peak)) [1]	Ground vibration (mm/s) [1]	Allowable exceedance
Residence on privately owned land	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months [2]
All public infrastructure	-	50 or alternatively a specific limit determined to the satisfaction of the Secretary by the structural design methodology in AS 2187.2-2006 or its latest version	0%

1) EPL 12407 states that "Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded."
2) rolling 12 months.

SSD 09_0182 requires BCOPL to achieve the ground vibration criterion or to propose alternative ground vibration limits for public infrastructure in the vicinity of the site.

The EA (Hansen Bailey, 2010) determined that ground vibration from BCOPL's proposed blasting were unlikely to impact on privately owned residences or public infrastructure.

The criteria listed in Table 5-1 do not apply if BCOPL has a written agreement with the relevant owner or infrastructure provider/owner and has advised DPHI in writing of the terms of the agreement.

6.0 MANAGEMENT MEASURES

The following general management measures will be applied by all BCOPL employees and contractors.

6.1 Approved hours

Blasting will be undertaken within the hours specified in Table 6-1, as per SSD 09_0182.

Table 6-1: Approved hours for blasting activities

Activity	Monday to Friday	Saturdays	Sundays and Public Holidays
Blasting	9:00 am to 5:00 pm	9:00 am to 5:00 pm	No time*

**Note: Blasting on Sundays and public holidays may be permitted in extraordinary circumstances, but only with the written approval of the Secretary (and the EPA with respect to EPL 12407).*

Additionally, the frequency of blasts will be limited to a maximum of:

a. 1 blast a day; unless an additional blast is required following a blast misfire; and
b. 4 blasts a week, averaged over a calendar year.

In accordance with Schedule 3, Condition 17 of SSD 09_0182, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.

These frequencies do not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, or to blasts required to ensure the safety of people working or visiting the operations.

6.2 Blast fume management protocol

In accordance with SSD 09_0182 requirements, BCOPL will implement a protocol for the management of blast fumes caused by blasting activities. The Australian Explosives Industry and Safety Group (AEISG) *Code of Good Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting, Edition 2, August 2011* identifies potential causes and indicators of blast fume and outlines management strategies for ensuring each cause is mitigated appropriately. BCOPL has used this code of good practice as a basis for developing a site-specific Blast Fume Management Protocol (BFMP). A copy of the BCOPL BFMP is provided in Appendix C.

6.3 Road closure management plan

It is a requirement of SSD 09_0182 that BCOPL develop a road closure management plan for blasting within 500 m of a public road. With the permanent closure of a section of Leard Forest Road within the BCM lease, there are currently no blasting activities proposed to be undertaken within 500 m of a public road and, as such, no road closures will be required. As well as the permanent closure of a section of Leard Forest Road, lockable gates have been installed at all access points and will be maintained for the duration of this management plan. Should blasting be proposed within 500 m of a public road, a road closure management plan will be developed in consultation with Narrabri Shire Council and submitted to DPHI for approval.

6.4 Mitigation measures for blasting activities

Mitigation measures to be implemented for blasting within the project approval area defined in Appendix 1 of SSD 09_0182 are outlined in Table 6-2.

All aspects of blast management will be undertaken in accordance with *AS 2187.2-2006-Storage and Use of Explosives,* a copy of which will be retained by the blasting contractor and by BCOPL.

BCOPL will verify that drilling and blasting subcontractors develop adequate and documented work instructions for compliance with the relevant requirements provided in Table 6-2. Drilling and blasting subcontractors are responsible for ensuring their staff (and relevant sub-contractors) are adequately trained and competent in these work instructions.

Table 6-2: Mitigation measures for blasting activities

Activity	Management mitigation measure	Responsibility		
		BCOPL	Blasting Subcontractor	Drilling Subcontractor
Notification	• Provide verbal or written notification of individual blasts to any person who requests to be notified. Notification will generally consist of an email or phone call a day prior to the blast and/or on the day of the blast (if the blasting schedule changes).	•		
	• Notify the workforce about proposed blasting dates and times via the blast notification sign at the entrance to the mine site.	•		
	• Notify the general public about blasting activities by listing proposed blasting dates and times on the BCOPL website (https://www.idemitsu.com.au/mining/operations/boggabri-coal/operational-information-and-monitoring/).	•		
	• Where a planned blast is either 60 minutes prior to or 60 minutes after the planned blast event, the new blast times will be issued by email or phone call to personnel (refer to Section 6.5) at BTM Complex and to the general public on the BCOPL website.	•		
	• Blast notification emails (and records of phone calls) will be recorded and retained for each blast for later reference.	•		
	• Blast notification contact register will be reviewed on an annual basis and updated when necessary.	•		
Exclusion zones	• Prepare a Blast Exclusion Plan to identify blast exclusion zones for all equipment, personnel and fume. Where required, locate sentries so the public are excluded within 500 m of the blast immediately prior to firing.	•	•	

Activity	Management mitigation measure	Responsibility		
		BCOPL	Blasting Subcontractor	Drilling Subcontractor
	• Areas designated as exclusion zones will be inspected immediately prior to blasting to confirm the area is clear of people and livestock. Within forested areas, at risk tracks and access roads within exclusion zones will be inspected by personnel and with the use of drones. Sentries will be stationed at exclusion zone entry points to ensure access is restricted until after each blast is fired.	•	•	
Due diligence	• Ensure personnel undertaking drilling and blasting activities are suitably qualified and experienced for the task that they are undertaking. • Ensure equipment used in drilling and blasting activities is inspected and cleared by BCOPL prior to use.	•	•	•
Storage of explosives	• Construct and maintain explosive magazines in accordance with the *Explosives Act 2003*. • Appoint suitably qualified personnel to oversee the safe and secure storage, handling and record keeping of all explosives on site. • Manage the storage of explosives in a way that minimises the potential for fume generation from faulty explosive product, as outlined in the BFMP (Appendix C). • Dispose of old or deteriorated explosives in an approved manner.	•	•	
Hazard minimisation	• In the event of a storm, drilling and blasting contractors are to respond in accordance with the relevant statutory Lightning Management Plan. • Personnel are to be located an appropriate distance away from blasting activities to minimise the potential for contact with flyrock and blast fume (as detailed in the BFMP in Appendix C). • Maintain a distance of at least 10 m between any energised high voltage electrical cable and a charged blast hole.	•	•	•

Activity	Management mitigation measure	Responsibility		
		BCOPL	Blasting Subcontractor	Drilling Subcontractor
	• Develop and implement a system for the safe management of misfires during blasting activities generally in accordance with *AS 2187.2* and provide for the following: – methods for locating misfires – procedures for marking and identifying misfires – procedures to establish and maintain an exclusion zone related to misfires – the introduction, removal or control of potential detonation or ignition sources – communication/notification of misfires to relevant personnel – a procedure for the treatment of misfires. • Prevent any flame or smoking material within 20 m of any explosive magazine, vehicle carrying explosives, loaded blast hole or explosive material. • Develop a specific hot ground procedure generally in accordance with *AS 2187.2* for blasting in coal seams liable to spontaneous combustion.			
	• Inspect blast holes for hot ground (greater than 57 °C) and, if required, suspend loading operations and seek guidance from BCOPL Shotfirer's on a proposed course of action.		•	
Design	• The maximum weight of explosive detonated in a given delay period is to be limited to design levels. • Charges are to detonate in the correct sequence and with inter-row delays that provide good progressive release of burden. • Burden distance and stemming lengths are designed to minimise the potential for ground vibration, face blow-outs and venting of explosive force.	•	•	

Activity	Management mitigation measure	Responsibility		
		BCOPL	Blasting Subcontractor	Drilling Subcontractor
	• Design each blast to consider: – hardness and nature of the strata – blast geometry including available free faces and the proximity of surface structures and neighbours – mining equipment to be used to load out materials – overpressure and vibration limits (as detailed in Section 5.1). • Provide the following details in each blast design: – drill pattern – diameter, angle, bearing and depth of each blasthole – amount of explosive per blasthole – firing sequence including all delays or firing times – standoff or subdrill. • Blast designs are to be provided to relevant personnel when undertaking preparation for a blast (e.g. drillers, shotfirers, etc.). • Design the size of blasts to allow charging and firing as soon as operationally possible to reduce sleep times, manage overpressure and vibration issues. • Fume risk management strategies outlined in the BFMP (Appendix C) are to be considered during the blast design process. • Develop and implement a procedure for managing blasts that are not fired on the same day as they are loaded.			

Activity	Management mitigation measure	Responsibility		
		BCOPL	Blasting Subcontractor	Drilling Subcontractor
Drilling	• Blast holes are to be drilled at appropriate spacing in accordance with blast design. • Blast hole cave-ins are identified and where necessary, filled in and re-drilled. • Clearly demarcate and set out drilling areas and drill holes. • Drill blast holes in the correct position, at the correct angle, diameter and depth, in accordance with blast designs. • Develop and implement a process so any variations to drilling designs are approved by BCOPL and communicated to relevant parties prior to the commencement of drilling. • Develop and implement a process so any abnormalities (e.g. cavities or changes in strata) encountered by the driller when drilling blast holes are recorded on the blast design plan and communicated to relevant parties. • Notify BCOPL immediately of any lost steels or snapped rods.	•	•	•
Preparation of charges	• Check exposed down hole lines for damage and rectify any faults. • Connections are to be made as close as practical to blast holes. • Keep connections between blast holes to a minimum without stretching connectors. • Connect all Nonel tubes consistently. • Only an industry recognised Nonel starter or electronic blasting box is used for initiating shots. • Develop and implement a procedure for the use of Nonel starters and electric blasting boxes to ensure blasts are fired in a safe, appropriate manner. • Starters and blasting boxes are to be inspected and maintained in good working condition.		•	

Activity	Management mitigation measure	Responsibility		
		BCOPL	Blasting Subcontractor	Drilling Subcontractor
Loading	• Utilise predictive and real-time weather monitoring network to guide blast loading activities. Loading of blasts will be postponed, or the type of explosive that is loaded into the shot will be varied, if significant periods of wet weather are forecast. • Appropriate materials (e.g. 20 mm aggregates) are to be used in stemming to minimise potential for venting explosion gases, blowouts and flyrock. • Stemming columns are such that they are not ejected for considerable distances into the atmosphere. Stemming column lengths must be such that their ejection velocities are low. • Use 'Nonel delay' type or electronic detonators to initiate charges. Restrict the use of detonating cord to presplit blasts only and minimise the potential for dust cloud formation. • Develop a procedure and appoint a suitably qualified overseer to ensure all loading activities are undertaken in a safe, appropriate manner and in accordance with blast designs. • All loading activities are undertaken to minimise the potential for fume generation where practicable, as outlined in the BFMP (Appendix C).	•	•	
Firing	• Utilise predictive and real-time weather monitoring data to guide the timing of firing blasts. • Blasts will be postponed during wet weather, periods of low cloud cover, low (< 1.5 m/s) or high wind speeds (>7 m/s) and during stability class G temperature inversions. If blasts must be fired during these conditions, under extraordinary circumstances, then an Abnormal Conditions Sign-off Sheet will be completed, and approval obtained from the BCOPL Production Superintendent beforehand. • Blast exclusion plans are to be reviewed and approved by the Blasting Subcontractor and BCOPL prior to firing a blast. • A pre-blasting assessment is to be undertaken by the Drill and Blast Engineer in conjunction with the Blast Controller (with input from the shotfirer as required).	•	•	

Activity	Management mitigation measure	Responsibility		
		BCOPL	Blasting Subcontractor	Drilling Subcontractor
Unplanned circumstances	• Identify any changes to planned blasting activities, complete and setting out risk identification, risk assessment and control measures are to be implemented prior to recommencing blasting activities. This includes consideration of the fume generation risks detailed in the BFMP (Appendix C). • Changes to blasting activities that have the potential to cause fume or trigger an exceedance of the blasting assessment criteria (detailed in Section 5.1) are documented and communicated to the Technical Services Manager and the Operations Manager for approval, prior to firing the blast. • Gain approval of the BCOPL (to seek the relevant approval from DPHI & EPA) prior to blasting outside of the approved blasting hours (as outlined in Section 6.1).	•	•	
	• Gain approval of the Secretary of DPHI and EPA prior to blasting outside of the approved blasting hours (as outlined in Section 6.1). • If required, review and approve any changes to blasting activities that are outside of the normal operating protocols.	•		

6.5 Management of cumulative impacts

BCOPL blasting events are communicated and coordinated with the BTM complex. If conflicts occur, further discussions take place, and a blast schedule is agreed upon. Blast schedules will aim to have a considerable gap between firing times to reduce any potential for cumulative impacts. Blast events taking place 60 minutes after or prior to the planned time require new notifications to be issued.

Personnel who will be notified of blast times by the BCOPL Drill and Blast Engineer are:

- BCOPL Environmental Superintendent;
- BCOPL Operations Manager;
- BCOPL Health, Safety and Training Manager;
- TCM Environmental Manager;
- TCM Mining Manager;
- MCCM Environmental Manager; and
- MCCM Mining Manager.

The mines of the BTM Complex have also collaborated on a management strategy for reducing the cumulative impacts from blasting activities. The strategy includes:

- a description of the monitoring network;
- a process for responding to BTM Complex blasting related incidents;
- a process for identifying the mine that was the likely cause of a given blast exceedance; and
- communication and reporting protocols.

A copy of the BTM Complex blast management strategy will be kept and implemented by each mining operations' respective environmental superintendent (or equivalent).

7.0 MONITORING

7.1 Blast monitoring

7.1.1 Parameters and frequency

The parameters and frequency of monitoring are listed in Table 7-1.

Table 7-1: Monitoring parameters

Parameter	Units of measure	Frequency	Measurement device
Overpressure	dB (Lin Peak)	Every blast	Type 1 microphone (blast monitor)
Ground vibration	mm/s	Every blast	Geophone (blast monitor)
Fume	AEISG Code of Good Practice Fume Rating System	Every blast	Video recording

Data obtained from blast monitors (which meet the requirements of Australian Standard AS 2187.2-2006) will be recorded and analysed to determine compliance with blasting criteria (refer Section 5.1) in accordance with Schedule 3, Condition 15 of SSD 09_0182.

In addition to collecting blast data, as described in Table 7-1, BCOPL will also inspect the area around the blast for flyrock distribution.

7.1.1 Locations

In accordance with the requirements of EPL 12407, BCOPL will monitor blasting at two neighbouring residences, 'Goonbri' and 'Wilberoi East', to record overpressure and ground vibration for each blast event. The locations of these blast monitoring sites are shown on the figure provided in Appendix A.

Compliance against blast criteria (refer to Section 5.1) will be assessed using the identified monitoring locations irrespective of land ownership or distance from dwellings.

Table 7-2: Monitoring locations

EPA identification no.	Description of location
N.A.	Goonbri
N.A.	Wilberoi East

7.1.2 Monitoring methodology

All blast monitoring is undertaken in accordance with the methodology outlined in *AS2187.2 Explosives – Storage and Use Part 2: Use of explosives* (Standards Australia, 2006).

Results are automatically forwarded to relevant site personnel. If any criterion has been exceeded this is clearly identified.

7.2 Predictive meteorology system

A predictive meteorology system is implemented to guide the planning and firing of blasts. The system collates data from a website which is available for site personnel to review, with hourly forecasts available up to 48 hours in advance. The website also provides weather forecasts a week or more in advance which is utilised to plan future blasting activities.

7.3 Meteorological monitoring

SSD 09_0182 requires that a permanent meteorological monitoring (MET) station be installed and maintained to continuously measure and record wind speed, wind direction, temperature, solar radiation and rainfall at the BCM. A figure showing the location of the BCM MET station is provided in Appendix A.

The parameters recorded by the BCM MET station and the method by which they will be sampled are outlined in Table 7-3.

Table 7-3: Meteorological monitoring parameters

Parameter	Units	Frequency	Averaging period	Method*
Temperature at 2 m	ºC	Continuous	15 minute	AM-4
Temperature at 10 m	ºC	Continuous	15 minute	AM-4
Wind direction at 10 m	º	Continuous	15 minute	AM-2 and AM-4
Sigma theta at 10 m	º	Continuous	15 minute	AM-2 and AM-4
Rainfall	mm/hr	Continuous	1 hour	AM-4
Solar radiation	W/m^2	Continuous	15 minute	AM-4
Additional requirements: • Siting • Measurement	N/a	N/a	N/a	AM-1 and AM-2 AM-2 and AM-4

**Methods are detailed in the document 'Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales' (DEC, 2006).*

8.0 REPORTING

8.1 Blast pack

A blast pack will be maintained on file by the Drill and Blast Engineer for each blast that is fired. This pack will include:

- a blast exclusion zone plan; and
- a blast assessment and signoff, which includes pre-blast assessments for weather checks, pre-blast and pre-shot fume risk assessments (undertaken in accordance with the BMP) and a post blast sign-off with time and date of blast, blast monitoring results for overpressure, vibration and fume rating (as per the BMP).

8.2 Annual Review

The Annual Review will provide a summary of the results of blasting monitoring and evaluate the effectiveness of BCOPL's management of blasting activities for the previous calendar year.

As per the requirements of Schedule 5, Condition 4 of SSD 09_0182, the Annual Review will:

- include a comprehensive review of the monitoring results and complaints records over the past year, which includes a comparison of these results against the:
  - relevant statutory requirements, limits or performance measures/criteria;
  - monitoring results of previous years; and
  - relevant predictions in the EA;
- identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the monitoring data over the life of the project;
- identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
- describe what measures will be implemented over the next year to improve the environmental performance of the project.

8.3 Community Consultative Committee

During meetings with Community Consultative Committee (CCC), members are regularly briefed on the environmental performance of the project.

9.0 INCIDENT AND COMPLAINT MANAGEMENT

All environmental incidents, complaints, non-conformances, or exceedances will be managed as per the BCOPL Incident Management Standard. All environmental incidents will be reported to the BCOPL Environmental Manager, or equivalent, using the BCOPL Incident Report Form. Following an incident, the BCOPL Manager of the Environment is responsible for assigning any corrective or preventative actions.

In accordance with Schedule 5, Conditions 2 and 8 of SSD 09_0182, and the relevant conditions of EPL 12407, BCOPL will notify, at the earliest opportunity, DPHI, EPA and any other relevant agencies of any incident that has cause, or threatens to cause, material harm to the environment as soon as practicable after becoming aware of the incident. Within 7 days of the date of the incident, BCOPL will provide DPHI and any other relevant agencies with a detailed report on the incident, and such further reports as may be requested.

Where an exceedance of criteria and/or performance measure(s) has occurred, BCOPL will, at the earliest opportunity:

- take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department [DPHI] describing those options and any preferred remediation measures or other courses of action; and
- implement remediation measures as directed by the Secretary [DPHI];

to the satisfaction of the Secretary [DPHI].

Any exceedance of a blast criterion in Section 5.1 must be reported to the regional office of the EPA as soon as practicable after the exceedance becomes known to BCOPL (or one of BCOPL's employees or agents).

9.1 Notification to landholders and the community

If monitoring indicates an exceedance of any blast criterion listed in Section 5.0, BCOPL will notify, in writing, any affected privately owned sensitive receptors. The written notification will include the following information:

- details of the exceedance (i.e. date, time, location, dB and/or mm/s levels);
- a copy of relevant blast monitoring data for the month leading up to and including the date of the exceedance.

If ongoing monitoring indicates continued exceedances, BCOPL will continue to provide the affected sensitive receptor with monitoring data, until levels return to below the exceedance level.

Details of exceedances will also be presented at Community Consultative Committee (CCC) meetings, as required.

10.0 CORRECTIVE AND PREVENTATIVE ACTIONS

All contractors and BCOPL employees are to be involved in implementation of corrective and preventative actions at the BCM.

10.1 Preventative actions

Preventative actions will be managed as follows:

- A preventative action may be identified without an environmental incident, non-conformance or non-compliance occurring.
- Preventative actions will be identified and agreed with BCOPL management prior to being implemented.
- Preventative actions may include physical works or changes to plans or procedures, training, or other requirements.

10.2 Non-compliances and corrective actions

Non-compliances and non-conformances will be detected through verifications processes, such as monitoring, inspections, and audits. Corrective actions will be managed as follows:

- When a non-compliance/non-conformance issue is detected, corrective actions will be identified, communicated, agreed on with BCOPL management, and implemented.
- Relevant contractors will be notified immediately of any non-compliant activities that present a risk of causing material environmental harm.
- Where necessary, corrective actions will include a review of relevant plans and procedures.
- Where the non-conformance or non-compliance issue is identified through an inspection, audit or monitoring event, any subsequent corrective actions will be linked to the record of that event.
- Non-compliance/non-compliance reports will be reviewed on a regular basis to ensure actions are progressed appropriately.

11.0 PROPERTY INSPECTIONS

In accordance with SSD 09_0182, if a written request from a landholder within 2 km of the open-cut pit at BCOPL is received, then BCOPL will commission a suitably qualified experienced and independent person to undertake an inspection of the property. The inspection will be undertaken to:

- establish the baseline conditions of any buildings and/or structures on the land, or update the previous property inspection report; and/or
- identify any measures that should be implemented to minimise the potential blasting impacts of the project on these buildings and/or structures.

Following the completion of inspections, the BCOPL Environment Superintendent will provide a written inspection report to the landholder.

An inspection will also be undertaken if the landholder claims that damage to buildings and/or structures has been caused by blasting activities from BCOPL. BCOPL will undertake an inspection within 2 months of receiving the landholder request. If an independent inspection confirms that damage has been caused because of blasting activities, and both parties agree with these findings, BCOPL will repair the damage to the satisfaction of the Secretary.

If there is a dispute over the selection of the suitably qualified, experienced, and independent person, or BCOPL or the landowner disagree with the findings of the independent property investigation, the matter will be referred to the Secretary for resolution.

The timeframe for completion of the inspection and provision of the report is subject to suitable access arrangement being granted by the landholder.

12.0 ROLES AND RESPONSIBILITIES

Roles and responsibilities for the implementation of this management plan are outlined in Table 12-1.

Table 12-1: Roles and responsibilities

Role	Responsibility
BCOPL General Manager	• Provide sufficient resources for the effective implementation of this management plan • Negotiate with affected parties to resolve ongoing complaints
BCOPL Mining Manager	• Ensure blasts are scheduled so blasts from TCM, MCCM and BCM are fired at appropriately timed intervals to minimise cumulative impacts • Providing sufficient resources for the effective implementation of this management plan • Mitigation measures outlined in this management plan are achieved on site
BCOPL Environmental Manager	• Providing sufficient resources for the effective implementation of this management plan • Mitigation measures outlined in this management plan are achieved on site
BCOPL Environment Superintendent	• Blast monitoring is undertaken according to the requirements of this management plan and relevant Australian standards • Maintain blast awareness amongst mine personnel and contractors via inductions • Respond to community complaints (including the completion of appropriate corrective and preventive actions) • Liaise with regulatory authorities regarding blast management • Coordinate property inspections and repairs to landholders of properties, if required • Report blast-related incidents to the relevant regulatory authority • Maintain the site's meteorological monitoring system • Review and update this management plan • Relevant employees and contractors are aware of their obligations under this management plan
Operations Superintendent	• Develop and implement specific procedures for employees and subcontractors to uphold their responsibility to facilitate compliance with this management plan • Ensure relevant employees and subcontractors under their control are aware of their obligations under this management plan • Inspect the area around the blast for flyrock distribution • Undertake all blast design management in accordance with Section 6.0 of this management plan • Liaise with the TCPL & MCCM Mining Manager's regarding blast scheduling to ensure blasts from TCM and BCM are fired at appropriately timed intervals to minimise cumulative impacts

Role	Responsibility
Short-term Planning Superintendent	• Implement blast mitigation measures in accordance with Section 6.4 of this management plan • BCOPL undertake all blast design management in accordance with Section 6.0 of this management plan
Drill and Blast Engineer	• Undertake relevant blast design management activities in accordance with Section 6.0 of this management plan • Provide relevant environmental data to assist BCOPL with their reporting requirements, in accordance with Section 8.0 of this management plan
BCOPL Blasting Subcontractor employees	• Undertake relevant blast management activities in accordance with Section 6.0 of this management plan • Undertake all drilling activities in accordance with Section 6.0 of this management plan
All BCOPL employees and contractors	• Undertake activities, as required, in accordance with this management plan under instruction from their supervisor • Inform their direct supervisor of any blast related issues as they arise

13.0 REVIEW

Review of the BLMP will be undertaken by BCOPL in accordance with Schedule 5, Condition 5 of SSD 09_0182, within 3 months of submitting the following:

- annual review under Schedule 5, condition 4 of SSD 09_0182;
- incident report under Schedule 5, condition 8 of SSD 09_0182;
- independent audit under Schedule 5, condition 10 of SSD 09_0182; and
- any relevant modification to SSD 09_0182.

Where this review results in revisions to any such document, then within 4 weeks of the completion of the revision, unless the Secretary agrees otherwise, the revised document will be submitted to the Secretary for approval.

14.0 REFERENCES

14.1 Internal

- BCOPL. *Environmental Incident Response Management Plan.*
- BCOPL. *Incident Management Standard.*
- BCOPL. *Pollution Incident Response Management Plan.*
- BCOPL. *Lightning Management TARP.*
- BCOPL. *Cultural Heritage Management Plan.*

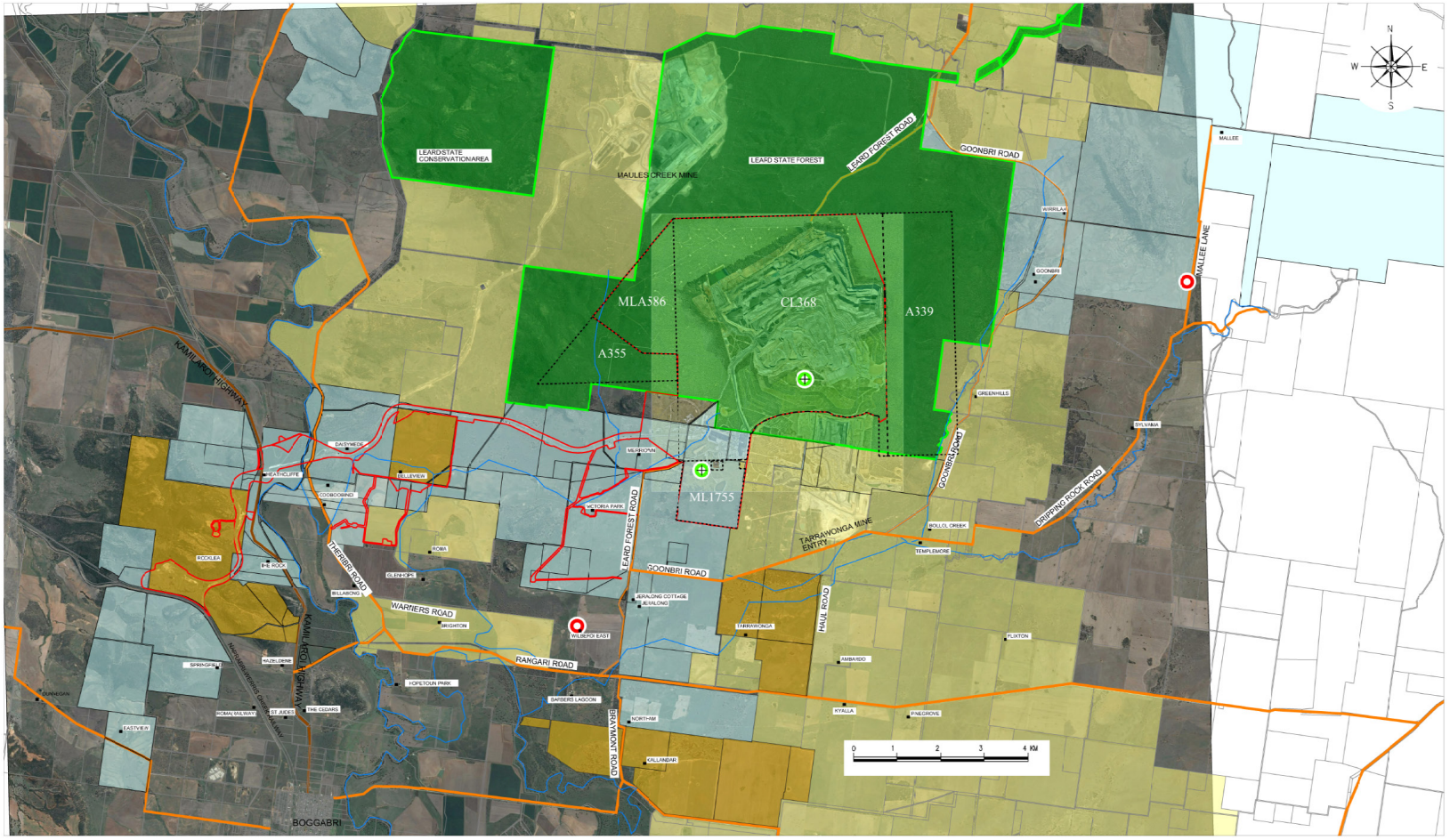
14.2 External

- Australian Explosives Industry and Safety Group Inc. (2011). *Code of Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting, Edition 1.*
- Bridges Acoustics (2010). *Acoustic Impact Assessment: Continuation of Boggabri Coal Operations Mine Environmental Assessment, Paterson, NSW.*
- Department of Environment and Conservation (2006). *Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales.*
- Hansen Bailey (2010). *Continuation of Boggabri Coal Operations Mine Environmental Assessment. Singleton, NSW.*
- Hansen Bailey (2011). *Continuation of Boggabri Coal Operations Mine Environmental Assessment – Residual Matters Report. Singleton, NSW.*
- Standards Australia (2006). *AS 2187.2 Explosives – Storage and Use Part 2: Use of Explosives.*

15.0 ABBREVIATIONS

Abbreviation	Definition
AEISG	Australian Explosives Industry and Safety Group
AS	Australian Standard
BCM	Boggabri Coal Mine
BCOPL	Boggabri Coal Operations Pty Ltd
BLMP	Blast Management Plan
BTM Complex	Boggabri-Tarrawonga-Maules Creek Complex
CCC	Community Consultative Committee
CHPP	Coal Handling and Preparation Plant
DPHI	Department of Planning, Housing and Infrastructure
EA	Environmental Assessment
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPA	Environment Protection Authority
EPL	Environment Protection Licence under the POEO Act
MCCM	Maules Creek Coal Mine
MET	Meteorological monitoring station
MIC	Maximum Instantaneous Charge
Mt	Million tonnes
Mtpa	Million tonnes per annum
NO	Nitric oxide
NO2	Nitrogen dioxide
NSW RR	NSW Resources Regulator
PAC	NSW Planning Assessment Commission
POEO Act	Protection of the Environment (Operations) Act 1997 (NSW)
ROM	Run-of-mine
TCM	Tarrawonga Coal Mine

Appendix A
Blast Monitoring and Locality Plan



REV	REVISIONS	DATE

Completion of the Quality Record is evidence that thedrawing has been verified conforming with the requirements of the Quality Plan. Where the Quality Record is incomplete all information on this drawing is intended for preliminary purposes only as it isunchecked.

General Legend

- Roads
- Kamilaroi Highway
- Blast Monitor
- Meteorological Stataion
- Residence / Property name
- Creek / River
- Boggabri Coal Mine Project Approval Area
- Mining Leases or Authorisation Boundary

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
DRAWN	NIC GARDNER		19/9/23
DWG CHECKED by			

Property Ownership

- Boggabri Coal
- Joint Ownership Boggabri Coal & Whitehaven Coal Mining
- Whitehaven Coal
- Leard State Forest / Conservation Area

SCALE: See Bar Scale

FILE REF: Blast Monitoring Locations figure 190921.dwg

PLOT FILE: Blast Monitoring Locations figure 190923.pdf

Figure 1

ORIG. FILE SIZE: A3

Boggabri Coal Operations

Bcggabri Coal Mine
Blast Monitoring Locations

DRAWING NO: 190923c

REV

Appendix B
Statutory Requirements

B.1 Statutory requirements

The various SSD 09_0182 conditions relevant to blast management are detailed in Table B-1, together with a reference to where these conditions are addressed in this BMP.

Table B-1: Relevant conditions from SSD 09_0182

<table>
<tr><th>Applicable Condition</th><th>Requirement</th><th>BLMP Reference</th></tr>
<tr><td>Schedule 3 Condition 15</td><td>The Proponent must ensure that blasting on the site does not cause exceedances of the criteria in Table 6.
<table>
<tr><th>Location</th><th>Airblast overpressure (dB(Lin Peak))</th><th>Ground Vibration (mm/s)</th><th>Allowable exceedance</th></tr>
<tr><td>Residence on privately owned land</td><td>120
115</td><td>10
5</td><td>0%
5% of the total number of blasts over a period of 12 months</td></tr>
<tr><td>All public infrastructure</td><td>-</td><td>50 or alternatively a specific limit determined to the satisfaction of the Secretary by the structural design methodology in AS 2187.2-2006, or its latest version.</td><td></td></tr>
</table>
However, these criteria do not apply if the Proponent has a written agreement with the relevant owner or infrastructure provider/owner, and the Proponent has advised the Department in writing of the terms of this agreement.</td><td>Section 5.1</td></tr>
<tr><td>Schedule 3 Condition 16</td><td>The Proponent must only carry out blasting on the site between 9 am and 5 pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Secretary</td><td>Section 6.1</td></tr>
<tr><td>Schedule 3 Condition 17</td><td>For the project, the Proponent may carry out a maximum of:
a) 1 blast a day; unless an additional blast is required following a blast misfire; and
b) 4 blasts a week, averaged over a calendar year.</td><td>Section 6.1</td></tr>
</table>

Applicable Condition	Requirement	BLMP Reference
	This condition does not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, or to blasts required to ensure the safety of the mine or its workers. Note: For the purposes of this condition, a blast refers to a single blast event which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.	
Schedule 3 Condition 18	If the Proponent receives a written request from the owner of any privately owned land within 2 kms of the approved open cut mining pit on site, for a property inspection to establish the baseline conditions of any buildings and/or structures on his/her land, or to have a previous property inspection report updated, then within 2 months of receiving this request the proponent must: a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to: • establish the baseline condition of any buildings and/or structures on the land, or update the previous property inspection report; and • identify any measures that should be implemented to minimise the potential blasting impacts of the project on these buildings and/or structures; and b) give the landowner a copy of the new or updated property inspection report. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Proponent or landowner disagrees with the findings of the independent property investigation, either party may refer the matter to the Secretary for resolution. The timeframe for completion of the inspection and provision of the report is subject to suitable access arrangement being granted by the landowner.	Section 11.0
Schedule 3 Condition 19	If the owner of any privately-owned land claims that the buildings and/or structures on his/her land have been damaged as a result of blasting on site, then within 2 months of receiving this claim in writing from the landowner, the Proponent must: a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties, to investigate the claim; and b) give the landowner a copy of the property investigation report. If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent shall repair the damages to the satisfaction of the Secretary. If there is a dispute over the selection of the suitably qualified, experienced and independent person, Proponent or landowner disagrees with the findings of the independent property investigation, either party may refer the matter to the Secretary for resolution. The timeframe for completion of the inspection and provision of the report is subject to suitable access arrangement being granted by the landowner.	Section 11.0

Applicable Condition	Requirement	BLMP Reference
Schedule 3 Condition 20	During mining operations on site, the Proponent must: a) implement best management practice to: • protect the safety of people and livestock in the surrounding area; • protect public or private infrastructure/property in the surrounding area from any damage; • minimise the dust and fume emissions of any blasting; and • minimise blasting impacts on heritage items in the vicinity of the site; b) co-ordinate the timing of blasting on site with the timing of blasting at other mines within the Leard Forest Mining Precinct to minimise the cumulative blasting impacts of the mines; and c) operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on site, to the satisfaction of the Secretary.	Section 6.0
Schedule 3 Condition 21	The Proponent must not undertake blasting on-site within 500 metres of: a) any public road without the approval of Council; or b) any land outside the site not owned by the Proponent, unless: • the Proponent has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and the Proponent has advised the Department in writing of the terms of this agreement, or • the proponent has: – demonstrated to the satisfaction of the Secretary that the blasting can be carried out closer to the land without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structure on the land; and – updated the Blast Management Plan to include the specific measure that would be implemented while blasting is being carried out within 500 metres of the land.	Section 6.3

Conditions of EPL 12407 which are relevant to blast management are detailed in Table B-2, together with a reference to where these are addressed in this BMP.

Table B-2: Relevant conditions from EPL 12407

Applicable Condition	Requirement	BMP Reference
L5.1	The airblast overpressure level from blasting operations at the premises must not exceed 120dB (Lin Peak) at any time at any noise sensitive locations. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	Section 5.1
L5.2	The airblast overpressure level from blasting operations at the premises must not exceed 115dB (Lin Peak) at any noise sensitive locations for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	Section 5.1
L5.3	Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 10 mm/sec at any time at any noise sensitive locations. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	Section 5.1
L5.4	Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5 mm/sec at any noise sensitive locations for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	Section 5.1
L5.5	Blasting operations at the premises may only take place between 9:00am-5:00pm Monday to Saturday. Blasting is not permitted on public holidays. Blasting outside the hours specified above can only take place with the written approval of the EPA.	Section 6.1
L5.6	Blasting at the premises is limited to 1 blast on each day on which blasting is permitted. Note: Additional blasts are permitted where it is demonstrated to be necessary for safety reasons and the EPA and neighbours have been notified of the intended blast prior to the additional blast being fired.	Section 6.1
L5.7	Condition L5.6 does not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, or to blasts required to ensure the safety of the mine or its workers. Note: For the purpose of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.	Section 6.1

Applicable Condition	Requirement	BMP Reference
O6.1	Blast Fume Offensive blast fume must not be emitted from the premises. Definition: Offensive blast fume means post-blast gases (whether visible or invisible, odorous or odourless) from the detonation of explosives at the premises that by reason of their nature, duration, character or quality, or the time at which they are emitted, or any other circumstances: (i) are harmful to (or is likely to be harmful to) a person that is outside the premises from which it is emitted, or (ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted.	Section 6.2 & Appendix C
M7.1	To determine compliance with limit condition(s) for blasting: a) Airblast overpressure and ground vibration levels experienced at the following noise sensitive locations must be measured and recorded for all blasts carried out in or on the premises; • Identified on "Goonbri" and "Wilberoi East" identified on the map titled Plan No. 1 EPL Boundary and Environmental Monitoring locations dated 05/03/2019 (DOC19/227801) b) Instrumentation used to measure the airblast overpressure and ground vibration levels must meet the requirements of Australian Standard AS 2187.2-2006. Note: A breach of the licence will still occur where airblast overpressure or ground vibration levels from the blasting operations at the premises exceeds the limit specified in conditions L3.1 to L3.4 at any noise sensitive locations other than the locations identified in the above condition.	Section 7.1
R4.2	The licensee must report any exceedance of the licence blasting limits to the regional office of the EPA as soon as practicable after the exceedance becomes known to the licensee or to one of the licensee's employees or agents.	Section 9.0

Appendix C
Blast Fume Management Protocol

ENV-BLA-PRO-001 Blast Fume Management Protocol

March 2024 Revision No. 4

idemitsu

IDEMITSU
BOGGABRI COAL

Document details and history

Document details

Document title ENV-BLA-PRO-001 Blast Fume Management Protocol

File name E230384_3_Blast Fume Management Protocol_V4

Document status and review

Edition	Comments	Author	Authorised by	Date
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V3		J McDonough / D Martin	P Forbes	July 2018
V4		J Crowe / P Johnston	L Tolson	March 2024

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Appendices

1.0 INTRODUCTION

This Blast Fume Management Protocol (BFMP) has been developed for Boggabri Coal Operations Pty Ltd (BCOPL), a wholly owned subsidiary of Idemitsu Australia Resources Pty Limited (80%), Chugoku Electric Power Australia Resources Pty Ltd (10%) and NS Boggabri Pty Limited (10%). Boggabri Coal Operations Mine (BCM) is located 15 km north-east of the township of Boggabri in north-western New South Wales. The project is an open cut coal mine that has been operating since 2006. Truck and excavator operations are undertaken to produce a crushed and screened run-of-mine (ROM) coal product. Coal is loaded onto trains via a train loading facility at the mine site and transported by rail to overseas consumption via the Port of Newcastle.

BCM is managed by BCOPL who also operate the Coal Handling and Preparation Plant (CHPP). BCOPL engages a mining operator to undertake open cut mining activities.

Project Approval (09_0182) for the BCM granted by the NSW Planning Assessment Commission under the now-repealed Part 3A of the *Environmental Planning and Assessment Act 1979* (NSW) ((EP&A Act) on 18 July 2012, as modified from time to time (Project Approval) allows BCOPL to extend its mining operations for a further 21 years, and increase its production rate to 7 million tonnes per annum (Mtpa) of ROM coal from a total resource of 145 million tonnes (Mt).

Schedule 3, Condition 22 of the PA requires the preparation of a Blast Management Plan (BLMP). This BFMP is required as part of the BLMP. All staff and contractors working at BCM are required to operate in compliance with this BFMP.

1.1 Requirement for a Blast Fume Management Protocol

As outlined in Schedule 3, Condition 22 of the PA, BCOPL are required to:

"…prepare and implement a Blast Management Plan for the project to the satisfaction of the Secretary. The plan must:

… (f) include a specific blast fume management protocol to demonstrate how emissions will be minimised, including risk management strategies if blast fumes are generated."

This BFMP has been developed to satisfy this requirement and is considered a subordinate document to the BCOPL Blast Management Plan.

1.2 Aim of this Blast Fume Management Protocol

The aim of this BFMP is to provide those BCOPL employees and contractors involved with blasting activities at the BCM with an outline of the processes that must be followed during the various stages of the blasting process to minimise the potential for blast fume and human health impacts in the event of a significant blast fume event.

1.3 Scope of this Blast Fume Management Protocol

This BFMP details how activities at the BCM will be managed to minimise any potential impacts caused by blast fume. It outlines the key contributing factors that can lead to fume generation and lists a series of management controls for implementation by BCOPL employees and contractors. This plan applies to all blasting activities undertaken within the 'Project Approval Area' as defined in Appendix 2 of Project Approval 09_0182.

This BFMP describes monitoring and recording that will be undertaken, incident response, notification to regulatory authorities and the provision of training and general awareness requirements. It is important to note that all blasting related activities at BCM are undertaken by contactors.

The management actions listed in this BFMP will, therefore, be implemented by all relevant contractors through their own internal procedures. The use of internal contractor procedures does not negate the requirement for all contractors and suppliers associated with blasting activities to adhere to the commitments in this BFMP.

1.4 Description of Blast Fume

The use of ammonium nitrate-based explosives under variable conditions can lead to unwanted explosive reactions and the generation of oxides of nitrogen (NOx), a combination of post blast gases which are predominantly nitrogen dioxide (NO_2), but may also include small amounts of nitrous oxide, nitric oxide (NO), carbon monoxide and carbon dioxide.

The two main gases, NO and NO_2, are often found as by-products in the post-blast gases of ammonium nitrate-based explosives. Nitric oxide is unstable in air and readily oxidises to nitrogen dioxide. A cloud of NO_2 can range from yellow to dark red/purple in colour, depending on the concentration and size of the gas cloud.

These gases are potentially harmful to humans and livestock.

1.5 Factors that Contribute to Blast Fume Generation

In an open cut coal mining operation, there are a number of potential causes of blast fume. Key contributing factors associated with the generation of blast fume at an open cut coal mine include, but are not limited to:

- explosive formulation and quality assurance;
- geological conditions;
- blast design;
- explosive product selection;
- contamination of explosives in the blast hole;
- on-bench practices, including sleep time; and
- weather.

Strategies for the management of each of these contributing factors are detailed in Section 2.0.

2.0 BLAST FUME MANAGEMENT

2.1 Risks, Impacts and Management Measures

Relevant aspects of blasting activities and associated risks, impacts and management measures that will be implemented at BCM are outlined below in Table 2-1. Also detailed are the key parties responsible for implementation of these management measures.

Table 2-1: Aspects, Risks, Impacts snd Management Controls for Fume Mitigation

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
Explosive formulation & quality assurance	Explosive quality	Poor blast performance e.g. incomplete detonation of explosive leading to fume generation. Precursor delivered to mine site out of specification. Precursor degraded during transport and storage. Incomplete detonation of the explosive column. Oxygen imbalance	Ensure precursors have batch traceability and quality control documentation with tolerances for each batch held at manufacturing facilities.			●
			No bulk, packaged or initiation explosives shall be used at the mine unless the vendor has been approved by site management and has supplied the relevant material safety data sheets and technical data sheet documents. Copies of all relevant documents will be retained on site for reference.	●	●	●
			Visual inspections of materials at all stages of processing		●	●
			Recording bench conditions and variations to blast design and communicating to all affected parties. Information that will be recorded includes: • incorrectly drilled holes; • missing holes; • collapsed/slumping holes; • density & amount of product loaded;		●	
			• presence of water (surface and sub-surface); and		●	●
			• depth of holes.			●

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
			Review as-loaded data versus design to look for inconsistencies. Review fume events to verify if event was caused by specific product or MMU.		●	
	Quality assurance & auditing	Failure to conduct quality tests	Quality check all raw materials used in the precursors for compatibility, including visual inspections of bulk and initiating explosives.			●
			QA sheets for delivery can be obtained from relevant suppliers.			●
			Diesel quantities are tracked on every blast and recorded in blast packs.			●
	Mixing of raw materials	Failure to conduct quality tests Incomplete detonation of the explosive column. Oxygen imbalance	Use dye with ANFO based products and visual inspection of bulk explosives.			●
			On bench quality control testing to be undertaken and recorded for every MMU load. This includes density, gassing rates and product temperature, which will be stored in blast packs.			●
			Review as-loaded data versus design to look for inconsistencies.		●	●
			Review fume events to verify if event was caused by specific product or MMU.		●	
	Fines in Ammonium Nitrate (AN) prill and crystallisation of emulsion due to temperature cycling.	Poor diesel absorption by AN prill. Impacts to product densities and stability.	AN prill to be consumed as per the stock rotation process, current stock of AN is generally consumed within 2-5 days. This minimises the effects of weather and deterioration.			●

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
	Bulk explosive development	Poor blast performance e.g. incomplete detonation of explosive leading to fume generation	Where a product change is suggested by the Blasting Contractor, approval will be sought from BCOPL in consultation with the Mining operator to ensure the proposed change does not increase the potential for fume generation.	●	●	●
	Product rotation	Product past used by date	Raw materials to be consumed as per the stock rotation process, initiating explosives will be managed as per magazine management rules and checked during stocktake.			●
			AN prill to be consumed as per the stock rotation process, current stock of AN is generally consumed within 2–5 days. This minimises the effects of weather and deterioration.			●
	Delivery System	Failure to conduct quality tests	Monthly calibration of MMU's metering systems, undertaking density and visual checks during mixing of raw materials.			●
	Contractor	Failure to conduct quality tests	Auditing schedule to ensure compliance of storage and procedures.		●	●
			BCOPL to undertake annual audit of blasting operations and systems.	●		

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
Geology	Blasting to base of weathering and other areas which have a lack of relief in weak/soft strata.	Fume issues from blasts in areas known to contain weak/soft strata	Develop and maintain Horizon Risk Matrix with rules to match each level of risk.		●	
			Modifying blast design and/or explosive product selection to suit geological conditions, methodology should be to reduce the explosive density/energy in soft strata		●	●
			Planning schedule should also consider the size of the blast and where appropriate the extent of the blast boundaries.		●	●
			Drill logs to be reviewed to map areas of concern, e.g. soft/broken/faulted ground		●	●
			Load sheets to contain specific instructions on loading so there is no overloading/over powering in blast holes		●	●
	Loading in faulted/fractured ground Back break & broken ground	Slumping holes, no drill cuttings, fume from known specific areas	Planning schedule should also consider the size of the blast and where appropriate the extent of the blast boundaries.		●	
			Review drill logs and consider loading holes with air/gravel decks or hole liners to mitigate product runaway. Ensure design, explosive product selection and stem height is suitable for conditions observed.		●	
			Review loading sequence to minimise delay, utilise collar protectors and gas bags where slumping, broken ground or faulting occurs.		●	●

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
			Drill logs to be reviewed to map areas of concern, e.g. soft/broken/faulted ground. Ensure loading practices suit any conditions observed		●	●
			Shotfirer to inspect sleeping shots daily, record and report on any changes e.g. slumping		●	●
			Design blast geometry and timing to promote adequate movement and relief.		●	
	Areas with high clay content	Hole 'bulling' and fume	Review drill logs to map areas of concern		●	
			Consider the use of hole liners and decking techniques. Modifying blast design and/or explosive product selection to suit geological and moisture conditions, methodology should be to reduce the explosive density/energy		●	
	Ground movement/product sensitisation	Slumped blast holes & explosive column dislocation	Design blast geometry and timing to promote adequate movement and relief.		●	
			Ensure primer is positioned in the column of explosive as per contractor procedures.			●
			Holes to be primed as per manufacturer's specifications, further priming to be used in areas of faulting			●

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
Blast design	Explosives desensitisation during blast	Incomplete detonation of the explosives column Desensitisation of adjacent columns Minimal or uncontrolled movement in blast	Selecting suitable explosives and accessories for the hole depth, diameter, moisture level, ground hardness and density. Products selected will be capable of mitigating against the presence of wet holes/extreme weather events (where appropriate).		●	●
			Selecting initiating devices that are suitable to initiate and maintain the detonation, compatible with the explosives and used in accordance with explosive manufacturer's recommendations		●	●
			Design blast geometry and timing to promote adequate movement and relief. Optimise loading and timing around back and side walls to promote relief.		●	
			Shotfirer to inspect hole locations prior to loading & D&B Engineer to check as drilled data to ensure pattern is drilled to design		●	●
			Utilise face scans to optimise face burden design.		●	
	Blast layout and delays	Minimal or uncontrolled movement in blast Fume from back or ends of blast	Design blast geometry and timing to promote adequate movement and relief.		●	
			Ensure primer is positioned in the column of explosive as per manufacturers recommendation.			●
			Utilise face scans to optimise face burden design.		●	

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
	Inadequate confinement	Hole cratering or flyrock	Use appropriate/proven stemming heights, stemming will ideally be crushed aggregate.		●	●
			Utilise face scans to optimise face burden design.		●	
			Optimise loading and timing around back and side walls to promote relief.		●	
	Lack of understanding of the possible causes, and prevention techniques of fume	Repeated significant fume events/poor blast performance Inexperienced designer	Following blast design parameters, capturing and recording changes and storing all design records in 'Blast Packs'. Ensuring all personnel involved in the design of blasts are appropriately qualified and experienced and have a comprehensive understanding of the factors that can lead to the generation of blast fume			●
			Blast design parameters to be approved by Mining Technical Services Superintendent		●	
Product selection	Choice of explosive product	Desensitisation of adjacent columns	Select suitable explosives and accessories for the hole depth, diameter, moisture level, ground hardness and density. Products selected will be capable of mitigating against the presence of wet holes/extreme weather events (where appropriate).		●	●

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
	Compliance with manufacturers recommendations	Repeated significant fume events/poor blast performance	Explosives technical data sheets to be followed when selecting appropriate explosives, if the technical data sheets cannot be adhered to then the design needs to be risk assessed with all appropriate parties. Consent by the Mining operator's, Operations Manager would need to be given prior to loading/firing.		●	●
			Blast design parameters to be approved by Mining Technical Services Superintendent.	●	●	
	Explosive product is not suitable for ground conditions (water, rock mass, strength etc.).	Fume issues from blasts in areas known to contain weak/soft strata	Selecting suitable explosives and accessories for the hole depth, diameter, moisture level, ground hardness and density. Products selected will be capable of mitigating against the presence of wet holes/extreme weather events (where appropriate).		●	
	Priming explosives are not suitable for the explosive product	Incomplete detonation of the explosives column Desensitisation of adjacent columns	Initiating explosives will be managed as per magazine management rules and checked during stocktake process.			●
			Holes to be primed as per manufacturer's specifications, additional priming to be considered in areas of faulted or broken ground			●
			Ensure primer is positioned in the column of explosive as per procedure.			●

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
Contamination	Managing wet holes	Slumped blast holes	Holes with damp walls or water within the blast hole will be treated as 'wet' and will require appropriate bulk explosives.		●	●
			Holes adjoining 'wet' hole will also be treated as being wet to mitigate impact of potential runoff or subsurface water.			●
			Discharged water run-off to be kept away from blast holes as per blasting contractor procedure		●	●
			Dynamic holes will be assessed as having 1m (column height) per hour recharge after dewatering. Extra attention to explosives selection and sleep time needs to be considered for dynamic holes.		●	●
	Mud/sediment in the base of holes	Fume from product contamination Slumping blast holes	Dip and record depths of mud, water and wet walls. Load suitable products as per explosive supplier's recommendations.		●	●
			Consider the use of gas bags or hole liners to mitigate product contamination.		●	●
			Shotfirer to inspect sleeping shots daily			●
	Definition of dry/wet/dynamic holes	Slumping holes	Holes with damp walls or water within the blast hole will be treated as 'wet' and will require appropriate bulk explosives.			●
			Holes adjoining 'wet' hole will also be treated as being wet to mitigate impact of potential runoff or subsurface water.			●

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
			Dynamic holes will be assessed as having 1m (column height) per hour recharge after dewatering. Extra attention to explosives selection and sleep time needs to be considered for dynamic holes.			●
			Dip and record depths of mud, water and wet walls. Load suitable products as per explosive supplier's recommendations. Utilise gas bags to keep explosive product separated from water.			●
	Stemming material and techniques	Cratering and fly rock	The stemming material shall be crushed aggregate, the stemming should be free from contamination and free flowing to allow accurate and controlled loading into the blast holes. Stemming should be stored so that there is minimised risk of contamination caused by larger rock/fines/clay.			●
On bench practices	Education and training on product selection and bench practices	Repeated significant fume events/poor blast performance	Ensuring all personnel involved in on bench activities are appropriately qualified and experienced and have a comprehensive understanding around the factors that can lead to the generation of blast fume Appropriate supervision/management of blasts crews			●
			As loaded data to be recorded and reviewed for compliance			●
			On bench quality control testing will be carried out for every load of product and recorded on load sheets (which are stored in blast packs).		●	●
			Blast designs parameters to be approved by appropriate superintendent		●	
			Induction process to familiarise all personnel onsite of post blast fume		●	

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
	Bench drainage techniques	Slumping holes, water laying on bench	Bench preparation sign off prior to loading		●	●
			Adequate bunding and drainage in place prior to drilling and loading		●	●
			Minimise dewatered holes running into adjoining holes.			●
	Process for exceeding recommended or maximum sleep times	Slumping holes, changes to the conditions of the shot during loading (i.e. rainfall on a sleeping shot).	Manufacturer's sleep times should be strictly adhered to and cannot be exceeded without BCOPL approval.	●	●	●
			Understand technical specifications of explosive products, blast crew training and manage blast schedule with loading, weather and sleep times being considered.		●	●
			Load sequence to allow for blasts to be cut-off.		●	●
	Dynamic water in holes	Slumped blast holes (usually when using non-water-resistant explosives).	Dip and record depths of mud, water and wet walls. Load suitable products as per explosive supplier's recommendations.		●	●
			Dewater and monitor recharge rate from confirmation if dynamic. Discharged water run-off to be kept away from blast holes.		●	●
			Minimise the sleep times of shots.		●	●
			Choosing explosive products according to manufacturer's recommendations and amount of water in holes.			●

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
	Inspection regime of sleeping shots	Slumping holes	Ensure shots that are slept have daily inspections to check for visible signs of slumping.			●
			Load sequence to allow for blasts to be cut-off if required.			●
	Delay between drilling and loading in broken ground	Collapsed, short holes Water ingress	Scheduling sequence to minimise sleep time of the explosives.		●	●
			Planning schedule should also consider the size of the blast and where appropriate the extent of the blast boundaries, and avoid blast joins near areas of concern (faults, broken ground).		●	
			Utilise collar protectors and gas bags, where required.			●
	Tolerance of error allowable for the location of the drill holes	Holes out of position, desensitized explosives and dislocated columns	Compare 'as drilled' data to design and consider redrilling holes if necessary +/-1 m.		●	●
			Drill and Blast Engineer to inspect hole locations prior to loading to ensure pattern is drilled to design.			
	Product variation from approved blast plan	Powder factor too high	Load rules need to state the allowable variances of loading before contacting the D&B Engineer.		●	●
			Blast contactors maintain auditing and inspection schedule.			●

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
	Loading sequence and techniques	Slumping holes, water laying on bench	Loading sequence should consider location of wet holes, broken ground, overall sleep time and surface drainage so to mitigate water spreading across dry areas of the blast. Holes with damp walls or water within the blast hole will be treated as 'wet' and will require appropriate bulk explosives. Holes adjoining 'wet' hole will also be treated as being wet to mitigate impact of potential runoff or subsurface water. Dynamic holes will be assessed as having 1m (column height) per hour recharge after dewatering. Extra attention to explosives selection and sleep time needs to be considered for dynamic holes.		•	•
	Firing a blast outside of approved hours or frequency	Impacts to public amenity	Blasting will only be undertaken between the hours of 9:00am–5:00pm Monday to Saturday unless written approval of the Secretary of DP&E has been obtained. The frequency of blasts will also be limited to a maximum of 1 blast per day and 4 blasts per week (averaged over a calendar year). These frequencies do not apply to blasts that generate ground vibration of 0.5mm/s or less at any residence on privately-owned land, or to blasts required to ensure the safety of people working or visiting the BCM.	•	•	•

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
Weather	Fume cloud drift Rainfall causes explosive to become 'wet' in blast hole	Fume cloud is generated and is carried by wind towards a public area or private residence Water in blast hole limits detonation of explosive resulting in excessive fume	Undertake pre firing risk assessment to determine risk and potential level of fume.			•
			Assessing weather conditions prior to firing each shot. Shots will not be fired during adverse weather conditions (i.e. wet weather, periods of low cloud cover, wind speeds >7 m/s and during stability class G (or higher) temperature inversions), unless for safety reasons, or to minimise further deterioration of the explosive product	•	•	
			Review blast clearance plans for sensitive site locations and ensure contact details are available.		•	•
			Use forecasts from the predictive weather system to guide the scheduling of blast preparation activities.		•	•
Research	Repetitive fume events directly related to: • Specific horizon • Pit location • Sleep time	Fume events directly contributable to a specific parameter	End of month review of fume levels to determine frequency and trends. This will include analysis of fume rating per pit or specific area of the pit to understand whether pits/areas of pits are performing worse than others. If a pit is found to record higher blast fume levels, then an assessment of the fume results from each horizon will be undertaken to understand the fume risk each horizon presents. If a horizon has been determined to be a high or medium risk, measures will be put in place to reduce fume. These may include product choice, reduced sleep time, reduced shot size or a combination of all.	•	•	

Aspect	Risk	Impacts/Indicators	Management Measure(s)	Responsibility		
				BCOPL	Mining Operator	Drill/Blast Contractor
	• Bulk explosive type • Presence of water • Geological features • Occurrence of fume frequency too high		All fume events will require an investigation to determine contributing factors and develop corrective actions. This will include carrying out an investigation to determine any correlation between sleep time and recorded fume levels.		•	
			Should the six-monthly fume target (98% of shots recording 0-2 fume rating) be exceeded, a review between all parties will be held to determine if independent consultation is required to determine contributing factors.		•	
Post blast fume management	Public access to potential fume area following a blast	Ingestion of NO_x gases from contact with blast fume cloud	Sensitive receivers within 2 kilometres of active blasting areas will be provided with information advising them of potential actions to take in a declared emergency. Updates to sensitive receivers will be provided annually, as required.	•		
			Relevant personnel will be provided with appropriate training regarding the identification of blast fume events and response protocols in the event of a blast fume emergency	•	•	•

2.2 Incident Response

All incidents related to blasting at BCM will be managed in accordance with the process described in the Blast Management Plan. It is unlikely that exposure to blast fume in a well-ventilated environment will cause impacts to human health; however, NOx gases are still considered a potential threat and will be managed accordingly. Generally NOx plumes generated during blasting will dissipate to background levels in a relatively short time. Dissipation is highly dependent on local atmospheric conditions.

2.2.1 Exposure Prevention

In cases where a NOx plume does not dissipate and has the potential to result in human exposure, the following actions will be taken:

- No personnel will be permitted to enter the plume.
- Personnel will be instructed to move away from the path of the plume.
- If indoors, personnel will be instructed to close all windows and doors, stay inside and cease operating air conditioning units, if possible.
- If in a vehicle, personnel will stay inside and use recirculated air conditioning, if possible.

2.2.2 Following Exposure

If a person has been exposed to NOx gases, medical attention will be provided as soon as it is safe to do so (i.e. once the fume cloud has cleared). The possibility of delayed and life-threatening pulmonary oedema dictates the following:

- Any person exposed to a visible plume of NOx, and/or any person experiencing sudden acute effects of coughing, shortness of breath or irritation of the mucous membranes of the eyes, nose or throat following post-blast NOx events will be examined by a medical practitioner without delay, even if no NOx smell was noticed or symptoms are mild.
- The treating medical practitioner will be informed of the potential NOx exposure.

In accordance with the requirements of the Australian Explosives Industry Safety Group (AEISG) Code of Good Practice, information will be provided to the medical practitioner as per Appendix A.1**.**

2.2.3 Notification of Fume Incidents

In the event that a blast produces fume that rates a 3C at its highest extent and leaves site, or any blast that rates 4 or 5 (refer to Section 3.1), the BCOPL will report to the Department of Planning and Environment (DP&E) compliance officer.

In accordance with the Project Approval and the EPL, BCOPL will provide verbal and written notification to relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment in accordance with the process described in the Blast Management Plan.

Additionally, all contractors at BCM are required to notify the BCOPL Health Safety and Environment Manager immediately, should they become aware of an environmental incident.

2.2.4 Post-Fume Incident Investigation

Should blast fume be generated from a blast, the Blast Fume Event Tree shown in Figure 2-1 below will be used during the subsequent incident investigation to identify which of the fundamental causes was the significant contributor to the generation of NOx.

The Blast Fume Post Incident Investigation template is shown in Appendix A.6 and will be completed for all blasts with post blast fume. If required, an Incident Cause Analysis Method (ICAM) incident investigation will be completed for fume events that are reportable to the DP&E.

BCOPL Operations Manager, Technical Services Superintendent and Health, Safety and Environmental Manager will be provided with the investigation report once the likely causes have been identified. Then appropriate action plans will be put in place to mitigate and reduce the generation of fume from future blasts under similar circumstances.

The Blast Fume Event Tree will also be used to educate relevant personnel to ensure appropriate steps are taken in the design, loading and firing of the blast to minimise the likelihood of generating fume from the blast.

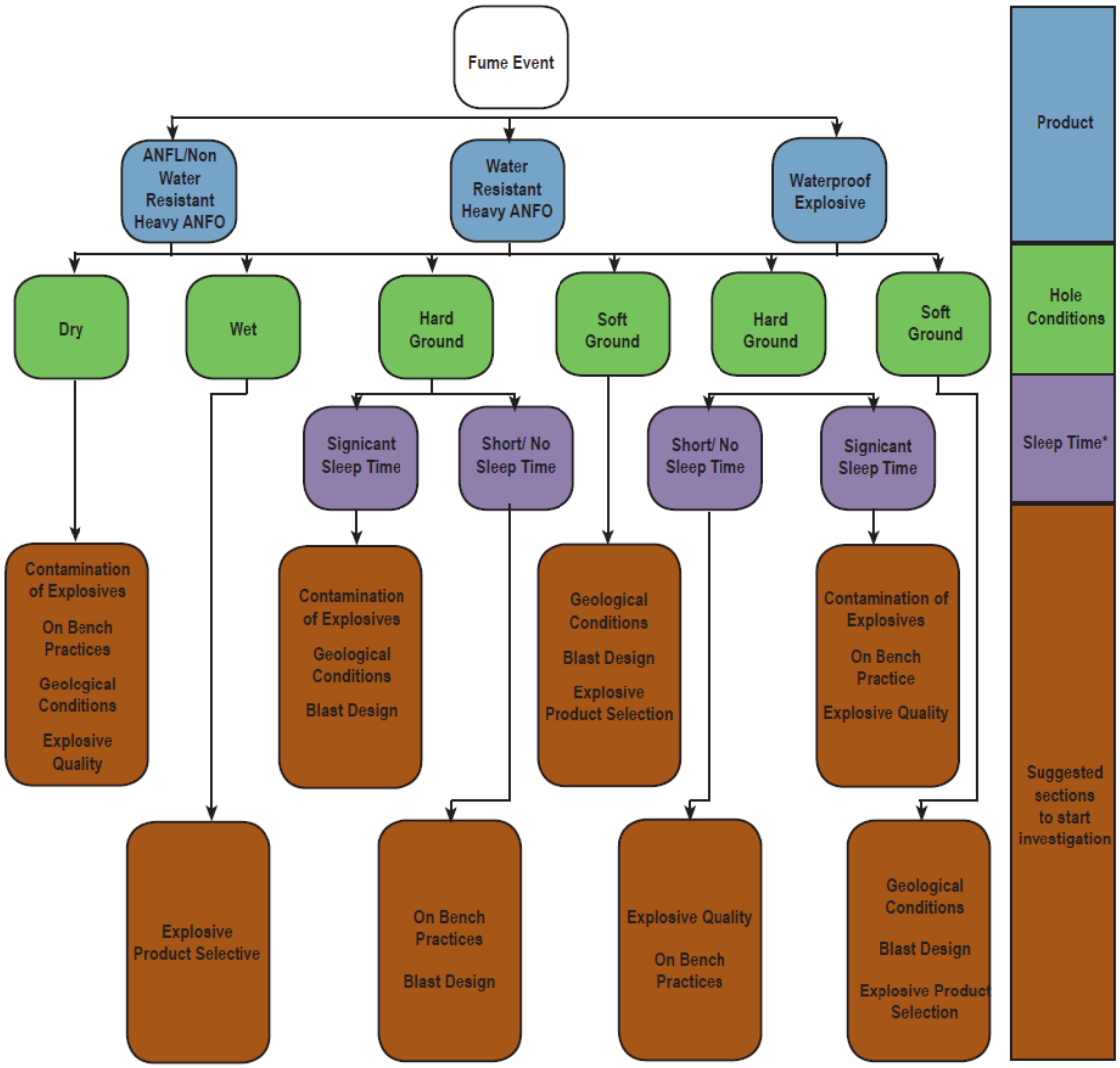


Figure 2-1: Blast Fume Event Tree (Source: AEISG, 2011)

3.0 RATING AND RECORDING

All blasts will be rated for fume in accordance with the fume rating system described below in Section 3.1. Fume will be recorded in accordance with BMS-SMS-PRO-033 Drill and Blast '.

The data recorded for each blast includes the following:

- blast ID and location;
- fume rating, location and extent;
- quantities of all bulk explosives used;
- sleep time;
- blast design parameters, including timing;
- weather; and
- in hole water rating.

Records of fume ratings are to be kept on the mine site and retained for a minimum of two years. The Department of Resources and Energy (DRE) may take up the option of reviewing and discussing these results with the mine from time to time.

A video record of each blast fired will be taken. Any video should be a minimum duration of one minute following the blast and should capture any post blast fume until the fume dissipates, leaves the site, or leaves the view of the camera. All video records will be kept on site for a minimum of two years.

3.1 Fume Rating System

BCOPL has adopted the fume rating system detailed in the *Code of Good Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting, Edition 2* (AEISG, August 2011).

Each blast will be rated according to the appearance and extent of the fume cloud that is produced. Assessing the amount of NOx gases produced from a blast will depend on the distance the observer is from the blast and the prevailing weather conditions.

The rating scale will range from 0–5 and will be based on the colour and density of the fume cloud. The extent of the NOx gases will also be assessed and will be done on a simple scale from A to C, where:

A = Localised (i.e. NOx gases localised across only a few blast holes)

B = Medium (i.e. NOx gases from up to 50% of blast holes in the shot)

C = Extensive (i.e. extensive generation of NOx gases across the whole blast).

The AEISG adopted fume rating system is shown in Figure 3-1.

Level	Typical Appearance
Level 0 No NOx gas	
Level 1 Slight NOx gas	
1A Localised	
1B Medium	
1C Extensive	
Level 2 Minor yellow/orange gas	
2A Localised	
2B Medium	
2C Extensive	
Level 3 Orange gas	
3A Localised	
3B Medium	
3C Extensive	
Level 4 Orange/red gas	
4A Localised	
4B Medium	
4C Extensive	
Level 5 Red/purple gas	
5A Localised	
5B Medium	
5C Extensive	

Figure 3-1: Fume Cloud Appearance and Rating (Source: AEISG, 2011)

4.0 TRAINING AND AWARENESS

All BCOPL employees and contractors will complete general blast fume awareness training in their site familiarisation induction.

Additional education and awareness programs will be provided for relevant personnel consistent with their roles and responsibilities as detailed in relevant contractor explosives and shotfiring management documents. Training records will be kept by each relevant contractor.

Training on the management actions outlined in this document will be provided by suitably experienced or qualified personnel. Training will typically cover the following aspects associated with blast fume management:

- the identification and rating of post-blast NOx gases;
- the potential health impacts of NOx gases;
- potential causes of blast fume;
- fume mitigating actions as detailed in this document;
- site specific blasting operation procedures (provided by relevant contractors);
- reporting procedures in the event of a post-blast fume event; and
- incident and emergency response procedures for blast fume management.

5.0 DOCUMENT REVIEW

Review of the of the BFMP will be undertaken by BCOPL in accordance with Project Approval schedule 5 condition 5, within 3 months of submitting the following:

- annual Review under Schedule 5, condition 4 of the Project Approval;
- incident report under Schedule 5, condition 8 of the Project Approval;
- independent audit under Schedule 5, condition 10 of the Project Approval;
- any relevant modification to the Project Approval.

Where this review results in revisions to any such document, then within 4 weeks of the completion of the revision, unless the Secretary agrees otherwise, the revised document will be submitted to the Secretary for approval.

6.0 ROLES AND RESPONSIBILITIES

Roles and responsibilities for the implementation of this management protocol are detailed in Table 6-1.

Table 6-1: Roles and Responsibilities for Implementation of this Protocol

Role	Responsibility
BCOP General Manager	• Provide sufficient resources for the effective implementation of this management plan • Negotiate with affected parties to resolve ongoing complaints
BCO Operations Manager	• All mitigation measures outlined in this management plan are achieved on site • Negotiate with affected parties to resolve ongoing complaints
BCOPL Health Safety and Environment Manager	• All the mitigation measures outlined in this management protocol are achieved on site • Liaise with regulatory authorities and approve blasting activities outside of normal hours, or during adverse weather conditions
BCOP Environment Superintendent	• Liaise with regulatory authorities regarding notification of blast fume incidents • Review and update this management protocol • Relevant employees and contractors are aware of their obligations under this management protocol
BCOP Technical Services Superintendent	• Ensure fume history/trends are captured in monthly reporting
BCOP Drill & Blast Engineer	• Ensure designs take into account the potential for fume by assessing: – horizon risk level; – expected hole conditions for the blasting material type; – correct energy match for material type; – designed powder factor; – product selection; – expected sleep time; – bench topography; and – blast timing • Ensure D&B design are signed off by the Technical Services Superintendent • Ensure the charge sheets are designed with appropriate powder factor • Ensure the reporting protocol is followed • Report and track fume ratings • Maintain horizon risk matrix

Role	Responsibility
Mining Operator Environmental Advisor	• Assess weather conditions prior to firing each shot • Position and placement of NOx monitors
Mining Operator Technical Services Superintendent	• Ensure D&B Engineers are taking into account the potential for fume generation for all D&B designs • Approve design parameters for D&B
Mining Operator Production Superintendent	• Coordinate drill bench preparation prior to drilling and where possible minimise the potential for water pooling on the pattern
Mining Operator Operations Manager	• Ensure all employees and subcontractors under their responsibility are aware of their obligations under this management protocol • Develop and implement internal procedures to facilitate compliance with this management protocol
Drilling Contractor Drill Operator	• Drill the drill pattern to plan • Notify the Drill Supervisor of changes in ground conditions • Record on drill logs the following: – geological/ground conditions; – depth to coal seam; and – moisture conditions • Ensure adequate hole protection is in place
Drilling Contractor Drill Supervisor	• Coordinate drill activities in consultation with the D&B engineer • Ensure drillers are fulfilling their responsibilities • Coordinate water management activities on the pattern from the bench preparation stage through the completion of drilling
Blasting Contractor Shotfirer	• Ensure the charging plan is followed • Ensure that any changes to the charging plan are discussed with the D&B Engineer prior to their implementation • Supervise trainee shot firers and blast crew • Ensure explosive quantities are recorded hole by hole • Monitor product usage during loading • Ensure blasting activities are completed in accordance with the drill and blast procedures, in particular: – managing loading activities to prevent contamination of explosives; – primer location and quantity is complaint; – appropriate stemming practices are employed; – accurate placement of gas bags;

Role	Responsibility
	– ensure adequate hose handling techniques are employed; and – cup density checks are conducted to ensure correct densities are met • Identify and record any hole slumping • Ensure all reporting is completed to requirements
Blasting Contractor Blast Supervisor/Manager	• Ensure that all personnel working on the shot are trained and competent • Ensure adequate resources are assigned to blasting activities • Ensure the charge plan is followed • Ensure any changes to the charge plan are approved • Ensure shot firers are fulfilling the shot firer's responsibility • Ensure all blasts are monitored for overpressure and ground vibration • Ensure all blasts are observed and/or video recorded • Report all fume events to a BCOPL supervisor • Ensure approvals for blasting are in place before initiating a shot • Ensure the sentries are placed at the appropriate locations to reduce the risk of fume exposure for personnel on site • Ensure blasting activities follow procedures for shot prep, charging, stemming, blast guarding and post blast inspections • Ensure equipment delivers explosives within calibration • Review raw material quantities against manufacture and load specifications • Manage stock rotation and precursor material quality checks • Monitor sleep time of all blasts • Develop and implement internal blasting procedures to facilitate compliance with this management protocol

7.0 REFERENCES

7.1 Internal

- BCOPL. *Blast Management Plan.*
- BCOPL. *Pollution Incident Response Management Plan.*
- Author (year). *Document Title.*

7.2 External

- Australian Explosives Industry and Safety Group Inc. (2011). *Code of Good Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting, Edition 2.*
- Standards Australia (2006). *AS 2187.2 Explosives – Storage and Use Part 2: Use of Explosives.*

8.0 ABBREVIATIONS

Abbreviation	Definition
AEISG	Australian Explosives Industry and Safety Group- a group of explosives company working in a collaborative manner to improve explosives safety in Australia
AN	Ammonium Nitrate
ANE	Ammonium nitrate emulsions classed as UN No 3375. These include both emulsions and water gels
ANFO	A mixture of ammonium nitrate and fuel oil with or without a dye colouring agent (definition from AS2187.0)
BEZ	Blast Exclusion Zone
BCM	Boggabri Coal Mine
BCOP	Boggabri Coal Operations Pty Limited
Bench Assistant	A person assisting the shotfirer on the bench in blasting activities
BFMP	Blast Fume Management Protocol
Blast Designer	The person with direct management responsibility for the design of blasting practices in any mining situation, including the selection of explosive products
Blasting Supervisor/Contractor (BS)	The person supervising blasting activities of the shotfirer and shot crew. My also be the lead shotfirer
BLMP	Blast Management Plan
Bulling or bull hole	The formation of voids in a blasted area as a result of energy being released in soft material
Burden relief	A measure of the time delay, provided by the initiation design, between two consecutive burdens, measured in ms/m
Confinement	A measure of the effort required from detonation gasses to displace the fractured rock
D&B	Drilling and blasting
Deep hole	A blast hole of greater than 30 metres
Desensitisation	The process of reducing or removing the sensitivity of an explosives, whether temporarily or permanent
Dewatered hole	A blast hole which has had rain or surface water removed using an in-hole pump or other mechanical means
DP&E	NSW Department of Planning and Environment

Abbreviation	Definition
DRE	Division of Resources and Energy
DRG	Division of Resources and Geoscience
Drill and blast superintendent	The nominated drill and blast person accountable for the performance, safety as well as meeting production requirements of the Department of some mines
Drill and blast Supervisor	The person supervising blasting activities of the shotfirer and shot crew. He/she may be the lead shotfirer
Driller	The contractor or individual responsible for drilling the blast pattern to the blast design specification. Data and information on actual conditions encountered and variations to the pattern are to be recorded and advised to the blast designer and shotfirer
Dry hole	A blast hole which contains no detectable water
Dust	Airborne particulate matter ranging in diameter from 10 to 50 microns
Dynamic water	Water that's in motion (i.e. flowing water)
EA	Environmental Assessment
EP&A Act	*Environmental Planning and Assessment Act 1979 (NSW)*
EPA	Environment Protection Authority
EPL	Environment Protection Licence under the POEO Act
FMP	Fume Management Plan
FMZ	Fume Management Zone - a predicted zone where fume is likely to be present after a blast. The FMZ is managed to ensure that persons are not exposed to fume in this area
Fumes	Gases belonging to oxides of nitrogen, particularly NO2, the most prevalent and harmful. Fume is a combination of post blast gases, which are predominately nitrogen dioxide but may also include nitrous oxide, nitric oxide, carbon monoxide and carbon dioxide. Nitrogen dioxide is the only one of the post blast gases that is visible
Gas bag	An inflatable bladder used to block off a blast hole and support explosives or stemming
Gassing	Chemical reaction creating small gas bubbles in explosives blends with the addition of chemical gassing agents. This process increases the sensitivity of the explosives
Hole liner	A flexible plastic tube which is placed into a blast hole before product is loaded into the tube, providing some protection from water or broken ground
Hole saver	A plastic funnel which is placed in the collar of a hole, allowing product to be loaded, but preventing fallback of dirt or water ingress
ICAM	Incident Cause Analysis Method

Abbreviation	Definition
Ideal explosion	A chemical reaction that produces products (solids, liquids, gasses) at volumes, concentrations and of type in accordance with conventional theoretical reaction equations
MET	Meteorological monitoring station
MIC	Maximum instantaneous charge
MMU	Mobile Manufacturing Unit – a vehicle built to strict specifications to manufacture and deliver explosives onto a bench
MMU Operator	Person trained, assessed and found competent to operate an MMU, and who is authorised and appointed as the MMU operator by the company or mine site
Mt	Million tonnes
Mtpa	Million tonnes per annum
NO	Nitric oxide
NO2	Nitrogen dioxide
NOx	Oxides of nitrogen - nitrogen bases gases such as nitric oxide, nitrogen oxide, nitrogen dioxide, nitrogen monoxide and mononitrogen monoxide
NOx	Multiple combinations of oxides of nitrogen (N2O, NO, NO2, N2O4, N2O3, N2O5) with nitrogen dioxide (NO2) being the principle hazardous nitrous fume
Non ideal explosion	A chemical reaction that does not produce products (solids, liquids, gasses) at volumes, concentrations and of type in accordance with conventional theoretical reaction equations
OEH	NSW Office of Environment and Heritage
POEO Act	*Protection of the Environment (Operations) Act 1997 (NSW)*
Post-blast fume	Gases generated by the explosive reaction during blasting
Potentially Exposed	
Site	A site that is potentially exposed to the effect of a hazard. In this case ‘fume’
Precursor	A material resulting from a chemical or physical change when two or more substances consisting of fuels and oxidisers are mixed and where the material is intended to be used exclusively in the production of an explosive (definition from AEMSC Code of good practice precursors for explosives)
Project Approval	Project Approval 09_0182
Recharge	A term used to describe the re-entry of water back into a blast hole after it has been dewatered
ROM	Run-of-mine

Abbreviation	Definition
Sensitivity	A measure on how easily an explosive can be initiated. Highly sensitive = easily initiated
Shotfirer	This is a statutory appointment directly responsible for the safety, security and outcomes of a blast
Sleep time	The time between explosives being loaded into a blasthole and their initiation (Definition from AS2187.0)
SMS	Safety and Health Management System required by legislation for a site to operate under the Coal Mining, Quarrying and Metals Mine or Explosives Act
Stemming	The material used to plug a blast hole
STEL	Short term exposure limit
Senior Site Executive	The person appointed as the Senior Site executive under mining legislation
TDS	Technical Data Sheets
TWA	Time Weighted Average
Wet hole	A blast hole that contains any amount of detectable water
Wet sides	A description of a section of blast hole that is not filled with water, but is, however wet at the sides

Appendix A

A.1 Information for Medical Staff

The following effects may be encountered after NOx exposure:

- Acute:
  - Cough
  - Shortness of breath
  - Irritations of the mucous membranes of the eyes, nose and throat
- Short term:
  - Pulmonary oedema, which may be delayed for up to 4–12 hours
- Medium term:
  - R.A.D.S. (Reactive Airways Dysfunction Syndrome)
  - In rare cases, bronchiolitis obliterans, which may take from 2–6 weeks to appear
- Long term:
  - Chronic respiratory insufficiency

High level exposure particularly associated with methhaemoglobinaemia can cause chest pain, cyanosis, and shortness of breath, tachapnea, and tachycardia. Deaths have been reported after exposure and are usually delayed. Even non-irritant concentrations of NOx may cause pulmonary oedema. Symptoms of pulmonary oedema often don't become manifest until a few hours after exposure and are aggravated by physical effort. The patient will be advised to rest and if any respiratory symptoms were present, will have been administered oxygen. The patient will need to be treated symptomatically but as a base line it is suggested that the following investigations are required:

- Spirometry
- Chest x-ray
- Methhaemoglobin estimation

Because of the risk of delayed onset pulmonary oedema, it is recommended that as a precaution, the patient be observed for up to 12 hours. As no specific antidote for NOx exists, symptoms will have to be treated on their merits.

A.2 Blast Fume Performance

The results of blasts fume performance will be recorded in the internal monthly report and the Annual Environmental Management Report (AEMR).

A.3 Horizon Risk Matrix

A.3.1 High Risk Horizons (Weathered material & Braymont Horizon)

- Use primarily ANFO in high risk horizons
- Ensure the blast pattern is designed for a suitable powder factor to reduce fume potential and maintain suitable fragmentation
- Limit use Heavy ANFO (60/40) product in these horizons
- Minimise use of emulsion products in these horizons

- Follow an uninterrupted load-tie-fire process in these horizons
- Hole liners to be used where required in adverse conditions (e.g. Broken, Faulted, Wet)
- Minimise sleep time.

A.3.2 Medium Risk Horizons (Weathered material, Bollol Creek & Jeralong Horizon)

- Limit use Heavy ANFO (60/40) product in these horizons
- Ensure the blast pattern is designed for a suitable powder factor to reduce fume potential and maintain suitable fragmentation
- Follow an uninterrupted load-tie-fire process in these horizons
- Hole liners to be used where required in adverse conditions (e.g. Broken, Faulted, Wet)
- Minimise sleep time.

A.3.3 Low Risk Horizons (Merriown, Jeralong & <15m Braymont Upper Horizon)

- Ensure the blast pattern is designed for a suitable powder factor to reduce fume potential and maintain suitable fragmentation
- Hole liners to be used where required in adverse conditions (e.g. Broken, Faulted, Wet).

A.4 Example of Blasting Environmental Assessment & Sign Off

Blast Assessment and Signoff TEC-PRO-006-FRM-002

Blast ID:			
Date:		Planned Firing Time:	
Blast Notification Sent:		☐ Yes	☐ No
NOTE: If the planned time for the blast has been rescheduled, the modelled dust path needs to be reviewed.			
Modelled Dust Path Reviewed:		☐ Yes	☐ No
Fume Risk – Rating:			

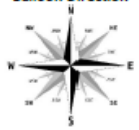
1st Pre-blast Assessment (2-3hrs before planned firing time) – *Completed by Drill & Blast Engineer*			
Time of assessment:		Balloon Direction	
Wind Speed: (*OK if >1.5m/s & <7m/s*)	m/s		
Wind Direction: (No compliance criteria)			
Rainfall: (*OK if = 0mm*)			
Stability Class: (*OK if <=6*)			
Met conditions suitable to proceed?		Review	Yes

2nd Pre-blast Assessment (prior blast guard meeting) - *Completed by Drill & Blast Engineer*			
Time of assessment:		Balloon Direction	
Wind Speed: (*OK if >1.5m/s & <7m/s*)	m/s		
Wind Direction: (No compliance criteria)			
Rainfall: (*OK if = 0mm*)			
Stability Class: (*OK if <=6*)			
Have abnormal conditions been identified in this blast?		☐ Yes - Review	☐ No
Met conditions suitable to proceed?		☐ No – Review	☐ Yes

NOTE: Blasting can only proceed if the above meteorological conditions are all suitable and NO abnormal circumstances have been identified.

Where a blast must be fired (due to extenuating circumstances) under "Review" status or where abnormal circumstances have been identified, the Pre-blast Review process is to be undertaken in accordance with TEC-PRO-006-ATT-001 TARP Blasting Weather Conditions.

Pre-blast Review *(completed when blasting under "Review" status)*		
NOTE: if the result from the pre-blast assessment is "Review" or abnormal circumstances have been identified, the Pre-blast Review process is to be undertaken in accordance with TEC-PRO-006-ATT-001 TARP Blasting Weather Conditions.		
Any potential further risks (outside of the TARP) identified?	☐ Yes	☐ No
JSA undertaken? (to be attached)	☐ Yes	☐ No
Environmental Superintendent/ or delegate - Signature:		
Production Superintendent Signature:		

Final Pre-blast Assessment (Prior to handing over to Shotfirer) – *Completed by Blast Controller*			
Time of assessment:		Balloon Direction	
Rainfall: (*OK if = 0mm*)			
Low cloud cover: (*Yes/No*)			
Are Conditions Suitable for Firing?		Yes	No

Document Owner	Version	Approval Date	Next Review	Printed	Page
Tech Services Manager	1.0	31/10/2021	31/10/2024	12/06/2024	1 of 2

Please return completed document to the Drill & Blast Engineer immediately following the blast. THIS IS A LEGAL DOCUMENT.

IDEMITSU BOGGABRI COAL	**Blast Assessment and Signoff**	TEC-PRO-006-FRM-002

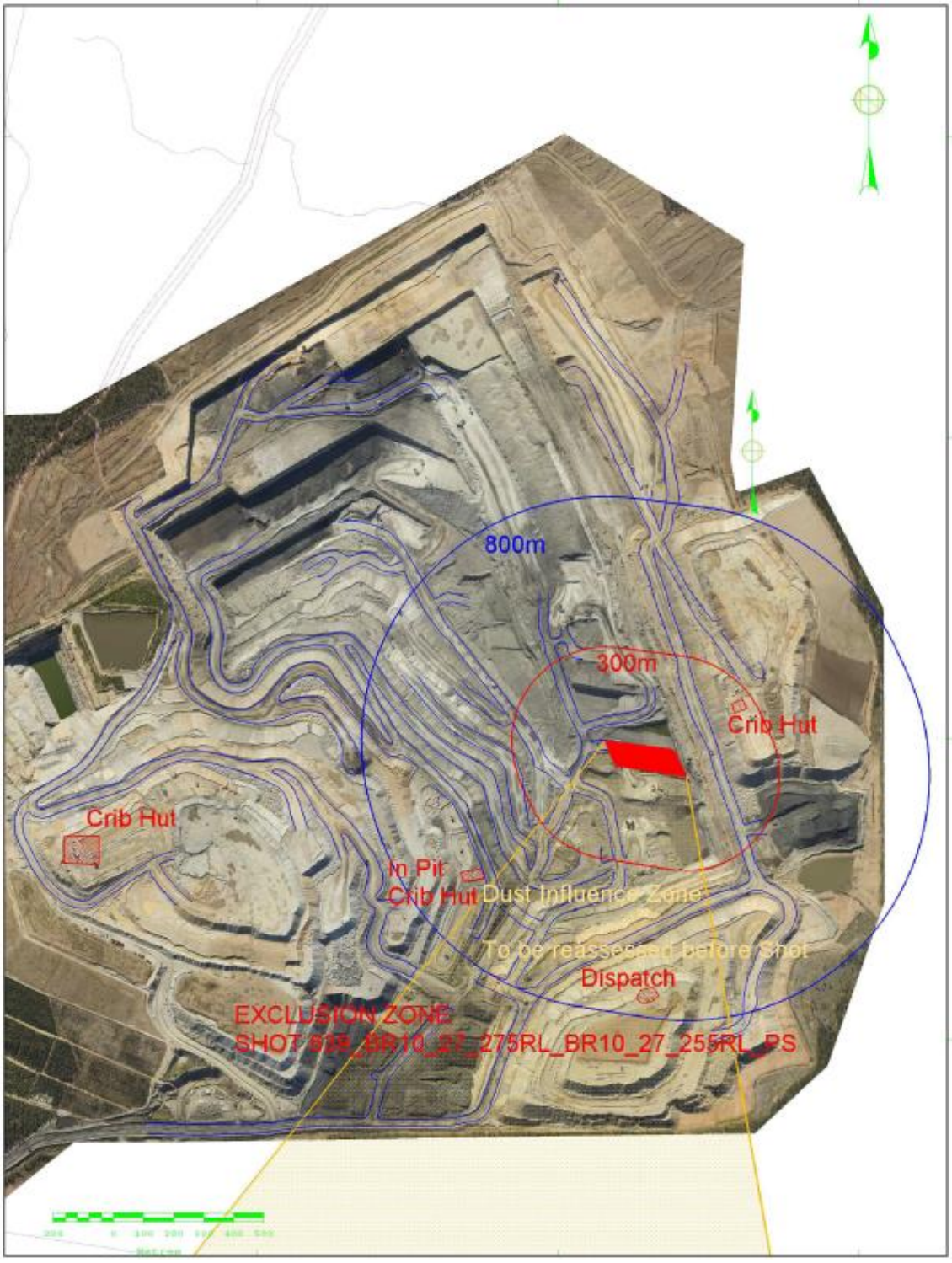
Blast Signoff – *Completed by Blast Controller*				
Shotfirer satisfied with the firing location?			☐ Yes	☐ No
Shotfirer satisfied with the exclusion zone?			☐ Yes	☐ No
Where required, controls implemented in accordance with *TEC-PRO-006-ATT-001 TARP Blasting Weather Conditions*			☐ Yes	☐ No
Blast Controller Name:		Signature:		
Shotfirer Name:		Signature:		

Post Blast Results – *Completed by the Drill & Blast Engineer*						
Blast ID:						
Date:		Actual Firing Time:				
Did flyrock exceed the 300m exclusion zone:		☐ Yes	☐ No			
Fume Observed:		☐ Yes	☐ No			
Post Blast Fume Using Code of Good Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting, Edition 2, (AEISG, August 2011)						
Fume Class:	Nil	1 = Slight	2 = Yellow/Orange	3 = Orange	4 = Orange/Red	5 = Red/Purple
Fume Extent:	A = Localised (a few blast holes)		B = Medium (up to 50% of blast)		C = Extensive (most/all of blast)	
All fume events ranked 1 or greater are considered incidents and are to be entered into INX as events. Fume events to be reported as per HST-STD-006 Incident Management. Operations Superintendent and Short-Term Planning Superintendents are to be notified as soon as practicable after firing. *Note: where there is more than 1 blast, fume ranking for each blast is to be noted in the comments section below.*						
Noise and Vibration Monitor Readings						
Monitor Record Type: ☐ Triggered Event Report ☐ Continuous 12 Hr Events Report						
Wilberoi East:	mm/s	dB	Goonbri East:	mm/s	dB	
If ground vibration exceeds 5mm/s or the overpressure exceeds 115dB – the event is to be reported per HST-STD-006 Incident Management. Operations Superintendent, Short-Term Planning Superintendents and Environmental Superintendent are to be notified as soon as practicable after firing.						
Notes / Comments:						

Document Owner	Version	Approval Date	Next Review	Printed	Page
Tech Services Manager	1.0	31/10/2021	31/10/2024	12/06/2024	2 of 2

Please return completed document to the Drill & Blast Engineer immediately following the blast. THIS IS A LEGAL DOCUMENT.

A.5 Example of Blast Specific Clearance Plan



A.6 Example of Blast Fume – Post Incident Investigation

Blast Incident Report BMS-EMS-STD-004-FRM-004

Notification details					
Method	☐Verbal ☐Email ☐Text Message	**Date:**		**Time:**	
Reported by:		**Reported to:**			

Incident classification

☐Fume ☐Flyrock ☐ Vibration ☐ Noise ☐ Misfire ☐ Spills/Contamination

Fume event ranking as per AEISG				
☐ Level 1	☐ Level 2	☐ Level 3	☐ Level 4	☐ Level 5
☐ Localised ☐ Medium ☐ Extensive	☐ Localised ☐ Medium ☐ Extensive	☐ Localised ☐ Medium ☐ Extensive	☐ Localised ☐ Medium ☐ Extensive	☐ Localised ☐ Medium ☐ Extensive
Did the fume breach the exclusion zone: ☐ Yes ☐ No				
If yes provide comment:				

Incident details			
Blast ID:			
Date:		Time:	
Reportable incident:	☐ Yes ☐ No		
Brief incident description: (10 – 15 words)			
Detailed description:			

Root cause

The incident is believed to have occurred due to the underlying cause (or causes) below with the factors (present or absent) that allowed the incident to occur.

Underlying cause	Factors (present or absent)	Mitigation measures

Blast Incident Report

BMS-EMS-STD-004-FRM-004

Corrective action plan The incident investigation team believes the following corrective actions will prevent the indient recurring and reduce risk. All contributing factors are addressed here, including PEEPO factors and ICAM absent / failed defences and organisational factors					
Action	Hierarchy of control	Responsible department	Responsible person	Completion date	Risk ranking (priority)

Investigation team		
Name	Position	Company

Investigation details						
Weather conditions at the time of the blast (taken from Sentinex site)						
Temperature	2m		10m		60m	
Inversion conditions present?			☐ Yes ☐ No			
Wind conditions	Gust		Wind direction		Wind Speed	
Weather conditions fo r3 days prior to the blast (refer to Sentinex Meteorological Daily Statistics Summary						
Has any rainfall been experienced on site?			☐ Yes ☐ No			
Day 1			Day 2		Day 3	
Comments:						

Report sign-off I have reviewed the inestigation and agree with the findings and corrective actions			
	Name	Signature	Date
Report compiled by:			
Technical Services Manager			
HSETC Manager			
Operations Manager			

Appendix D
Record of Stakeholder Consultation

Stakeholder	Date	Consultation
Tarrawonga Coal Mine	Various	Consultation with Tarrawonga Coal Mine has been undertaken regularly as part of the BTM Complex meetings.
Maules Creek Coal	Various	Consultation with Maules Creek Coal has been undertaken regularly as part of the BTM Complex meetings.
Boggabri Coal Operations Mine – Community Consultation Committee (CCC)	30 April 2013	A summary of the Blast Management Plan was presented to the CCC. Representatives of the CCC were invited to review the document in full and provide further feedback if desired. No additional comments have been received to date.
EPA	7 June 2013	A copy of the BMP has been submitted to the EPA for comment. A reply was received on 18 June 2013 stating that 'the Environment Protection Authority (EPA) encourages the development of such plans to ensure that proponents have determined how they will meet their statutory obligations and designated environmental objectives. However, we do not approve or endorse these documents as our role is to set environmental objectives for environmental/ conservation management, not to be directly involved in the development of strategies to achieve those objectives. This email should meet the Project Approval consent requirements requiring consultation with the EPA.
EPA and CCC	August 2016	A summary of the BMP was presented to the CCC. Representatives of the CCC were invited to review the document in full and provide further feedback if desired. A copy of the BMP was provided to the EPA for comments.
DPE	October 2017	Revised BMP sent to DPE for review and approval. Review comments provided to Boggabri Coal in February and revised plan re-issued to DPE for approval in July 2018.
DPE	25 January 2019	Revised BMP submitted to DPE and approved on 21 February 2019, following consultation with EPA.
EPA	November 2023	A copy of the revised BMP was provided to the EPA for review and comment.
CCC	04 November 2021	A copy of the revised BMP was provided to the CCC for review and comment. A summary of the BMP was presented to the CCC. Representatives of the CCC were invited to review the document in full and provide further feedback if desired.
DPE	November 2023	A copy of the revised BMP was provided to the DPIE for review and comment (at the same time as EPA & CCC). Document addressing consultation comments to be submitted following receipt of the necessary comments.
EPA	22 March 2024	A copy of the BLMP sent to EPA for review and comment.
CCC	February 2024	A summary of changes was presented to the CCC for comment.

Appendix E
BTM Complex Blast Management Strategy

A copy of the approved BTM Blast Management Strategy can be found on our website: https://www.idemitsu.com.au/mining/wp-content/uploads/2016/02/BTM-Complex-Blast-2024-FINAL-Clean.pdf

Department of Planning, Housing & Infrastructure

Our ref: MP09_0182-PA-66

Ms Alex Williams
Environmental Superintendent
Boggabri Coal Pty Limited
386 Leard Forest Road
Boggabri, NSW, 2382

16/08/2024

Subject: Blast Management Plan

Dear Ms Williams

I refer to the Blast Management Plan submitted in accordance with Schedule 3, Condition 22 of the approval for the Boggabri Coal Mine (MP09_0182). I also acknowledge your response to the Department's review comments.

I note the Blast Management Plan has been prepared in consultation with the Environment Protection Authority and the Community Consultative Committee for the project, and contains the information required by the conditions of approval.

Accordingly, as nominee of the Planning Secretary, I approve the Blast Management Plan (rev 6, dated March 2024).

You are reminded that if there are any inconsistencies between the Blast Management Plan and the conditions of approval, the conditions prevail.

Please ensure you make the document publicly available on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact Brittany Golding on 02 9995 5742.

Yours sincerely

Stephen O'Donoghue
Director
Resource Assessments

As nominee of the Planning Secretary