

APPENDIX L BLAST MANAGEMENT FRAMEWORK



BLAST MANAGEMENT FRAMEWORK

GRANTS LITHIUM PROJECT

DRAFT - REVISION B

January 2019



1 Purpose

To provide an overview of the Grants Lithium Projects Blast Management requirements and to facilitate further development of all relevant management plans, processes, and the supporting procedures for operations. These management plans and systems include but are not limited to the following;

- Risk Management processes
- Security Risk Assessment and Management of Security Sensitive Ammonium Nitrate
- Blast Management Plan
- Traffic Management Plan
- Emergency Response Plan
- Crisis Management Plan
- Employment, and training and competency processes
- Legislative licensing requirements
- Auditing, compliance and reporting processes
- Incident and Accident Reporting
- Change Management
- Contractor Management
- Stakeholder (including community) consultation processes

The site management plans, processes and supporting procedures will apply to all employees, contractors and visitors to the Grants Lithium Project. In relation to Blast Management, they will cover design requirements, operational requirements and security requirements for management of explosives and ammonium nitrate solid and emulsion, specifically:

- management requirements for explosives and ammonium nitrate;
- emergency response requirements for credible emergency events involving explosives and ammonium nitrate;
- security requirements for explosives and ammonium nitrate;
- training requirements for safe use, transport and storage of explosives and ammonium nitrate;
- auditing and inspection of the use, storage and transport of explosives and ammonium nitrate;
- and
- a summary of change management and document control requirements.



Core Lithium's Management Plans and Processes will be an overarching requirement to all site-specific management plans, processes and operating procedures developed by authorised suppliers and appointed mining contractors. All site procedures will be approved by the Mine Manager.

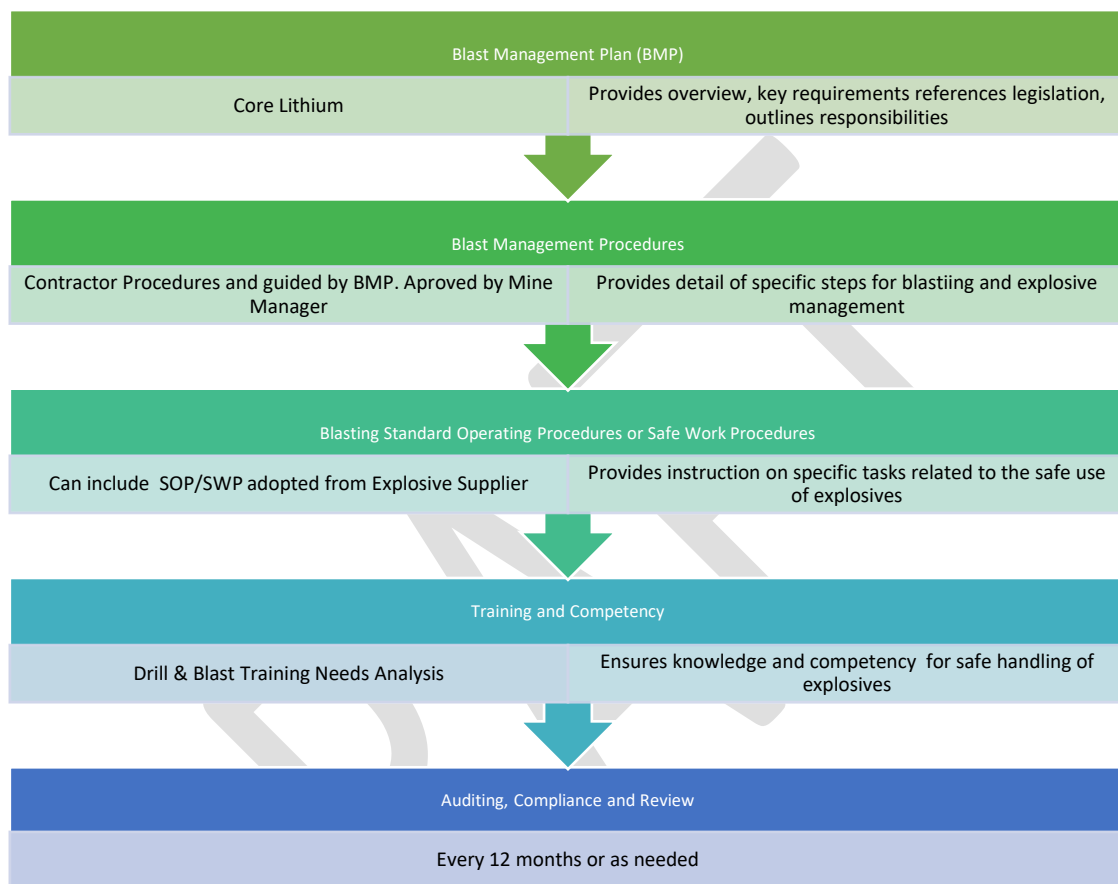


Figure 1: Example Blast Management Framework

2 Legislative Requirements

The Grants Lithium Project Blast Management requirements need to comply with obligations outlined within the following Northern Territory legislation and relevant codes of practice:

- Dangerous Goods Act and Regulations
- Mine Management Act (Part 4 – Mining Activities)
- Work Health and Safety (National Uniform Legislation) Act and Regulations
- Control of Roads Act
- Traffic Act and Regulations
- Australian Code for the Transport of Explosives by Road and Rail (AE Code)



- Australian Dangerous Goods Code (ADG Code)
- AS2187.1 – 1998: Explosives – Storage, Transport and Use - Part 1 – Storage
- AS2187.2 – 2006: Explosives – Storage, Transport and Use - Part 2 – Use of Explosives
- Australasian Explosives Industry Safety Group (AEISG) Codes of Practice;
 - Storage and Handling of Ammonium Nitrate Emulsions, Suspensions and Gels
 - Mobile Processing Units
 - Blast Guarding in an Open Cut Mining Environment
 - Elevated Temperature and Reactive Ground
 - Prevention and Management of Blast Generated NOx Gases in Surface Blasting
 - Segregation Barriers for Transporting Mixed Loads of Detonators and High Explosives
 - On-Bench Practices for Open Cut Mines and Quarries

3 Project Location

The Grants Lithium Project is located on the Cox Peninsula of the Northern Territory, approximately 20km south of Darwin (Figure 2). Grants is accessible from Darwin by the Stuart Highway and Cox Peninsula Road, with the main access to site coming off the Cox Peninsula Road, located approximately 500 m from the pit edge. The proposed intersection with the mine access road is shown in Figure 3.

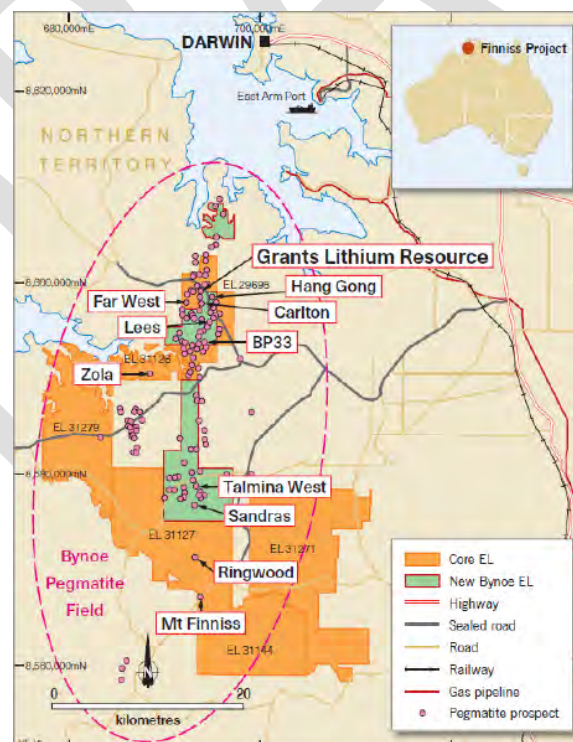


Figure 2: Location of the Finnis Lithium Project area



Figure 3: Proposed Intersection – Grants Project Access and Cox Peninsula Road

4 Blasting Activities

Blasting activities at Grants will be conventional open pit blasting techniques using a combination of Ammonium Nitrate Fuel Oil (ANFO) and Ammonium Nitrate Emulsions (ANE) as bulk explosive products, as well as a variety of high explosive (HE) and detonator products to facilitate the sites blasting requirements.

Blasting within the open pit will occur on a regular basis to achieve the mine production and ore processing requirements. On average, blasting in the Grants Open pit is likely to occur every 2 to 4 days. Initial mining activities are unlikely to require blasting due to the weathered nature of the materials making free digging possible. As the pit approaches the base of the weathered zone (approx. 30 – 40 m below surface) blasting requirements will increase and then become a necessity once fresh rock is encountered.

Given the location of the project, blasting is intended to be carried out during daylight hours any day of the week. All other blasting practices will be undertaken according to the site's approval conditions, Blast Management Plan, and supporting management plans, processes and operating procedures.

4.1 Key Positions

The following is an example of the key positions required to fulfil the Blast Management requirements onsite:



- Mine Manager
- Project Manager
- Shotfirer
- Blast Coordinator
 - May be undertaken by the Shotfirer
- D&B Supervisor
- D&B Engineer
- Blast Guards (sentries)
- Magazine Keeper
- Traffic Controller

The Mine Manager has overall responsibility for mining activities at the project, with the Shotfirer responsible for all blast related activities under the appointment by the Mine Manager.

4.2 Blasting Hazards

The following are the main identified hazards anticipated from blasting activities;

- fire (external and in magazines);
- severe weather;
- electrical storm;
- unauthorised use;
- untrained and /or incompetent personnel;
- unplanned and unexpected initiation;
- unexplained loss;
- unauthorised access (Magazine, blast area, and exclusion zone);
- flyrock;
- Nitrous Oxide (NOx) gases;
- air overpressure;
- proximity of infrastructure and personnel workplaces;
- public safety;
- explosives and ammonium nitrate transport vehicle incident; and
- theft.

The Blast Management system will address all hazards identified in relation to the sites blasting activities.



4.3 Key Blasting Procedures

The key (or main) blasting procedures requiring development for operations will cover the following components;

- Transport and deliveries
- Storage
- Use
- Disposal

Blasting procedures as discussed earlier will achieve all the of the obligations required by legislative requirements. Primarily for the Northern Territory, this involves adherence to the Australian Standard (AS2187), and the referenced Code of Practices.

4.3.1 Exclusion Zones and Public Road

Typical blasting exclusion zones for the size and nature of the blasting activities at Grants are:

- 300m for all personnel
- 500m for buildings, office areas, and public spaces

Exclusion zones are risk based on blast plans and other influencing factors. They may be changed as determined by risk assessment completed for every blast as approved by the Shotfirer and Mine Manager.

The Grants Open Pit area is in close proximity to the main access road (a public road) and supporting Mine Operations Centre (MOC) and Processing facilities (Figure 3). Given the proximity, some blasting activities may require the evacuation of some facilities, and the temporary closure of the Cox Peninsula Road, although, given the pit design and development sequence, and pit blasting requirements, the evacuation and road closure requirements are only likely to be required occasionally with that frequency quickly reducing as the pit develops deeper.

Figure 3 shows the 300m and 500m blast exclusion zones based on the pit edge, with the 500m exclusion zone is only just encroaching on the Cox Peninsula Road.

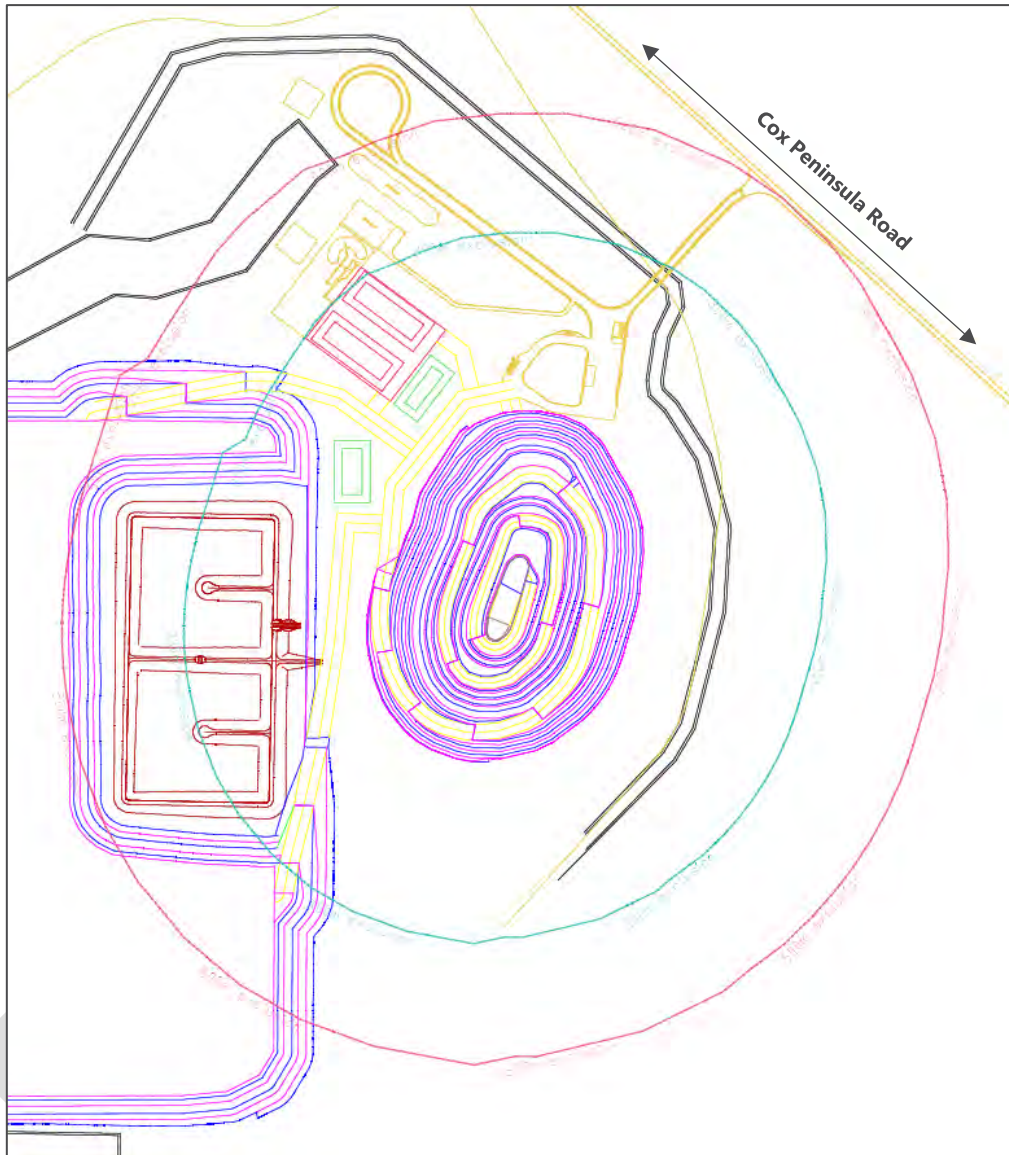


Figure 4: Blast Exclusion Zones from Grants Pit Edge (500m in red)

Closure of the road will require the use of qualified person(s) as required by Northern Territory legislation and may also require approval from DIPL in each instance.



4.3.2 Blast Management Controls

Core is committed to implementing best practice blasting measures at the Grants Lithium Project. Relevant blast management controls are outlined in the following sections.

4.3.2.1 Hours of Operation

Although there are no residential sensitive receivers in the immediate vicinity of the Grants Lithium Project, noise amenity impacts will be managed through operational controls, including defined operating hours. The hours of operation at the Grants Lithium Project are shown in table XX below.

Table 1 – Hours of Operation

Activity	Proposed Hours of Operation	Days of the week
Mining, processing & overburden management	Dayshift: 6:00am to 5:00pm Nightshift: 6:00pm to 5:00am	Monday – Sunday inclusive
Blasting – that requires the Cox Peninsula Road to be closed for Public Safety reasons.	Only to occur during daylight hours. Nominal Blasting times: 13:00pm to 13:15pm 17:00pm to 17:15pm Shot only to be tied in on the same day as the firing.	Monday – Friday Not on week ends Not on Public Holidays
Blasting – that does not require the Cox Peninsula Road to be closed for Public Safety reasons.	Only to occur during daylight hours. Nominal Blasting times: 13:00pm to 13:15pm 17:00pm to 17:15pm Shot may be tied in the day before.	Monday – Sunday inclusive
Loading & dispatch, Stockpile management, Maintenance of plant and equipment	Dayshift: 6:00am to 5:00pm Nightshift: 6:00pm to 5:00am	Monday – Sunday inclusive

If a mis-fire is discovered and the Blast Controller determines that the Cox Peninsula Road needs to be secured to protect the public when the mis-fire is refired, then it will be treated as a separate blast adhering to the notifications and times outlined in this Blast Management Framework.



4.3.2.2 General Operational Controls

Core will implement the following blast management practices over the life of the Grants Lithium Project:

- Blasting at Grants Lithium Project will occur on the days & times outlined in Table 1
- Detailed design will be undertaken for each blast in order to maximise the blast efficiency, minimise dust, fumes, ground vibration and air blast, the potential for fly rock and to ensure compliance with site specific blasting conditions.
- An exclusion zone will be established for each blast to protect the safety of operations personnel and any wildlife.
- Core will monitor blasts as mine development progresses (refer to Section 4.3.3), so that blast prediction site laws can be further refined, and future blast designs can be optimised based on more detailed site information.

4.3.3 Blast Monitoring

Blast monitoring of all blasts at the Grants Lithium Project will be monitored. Blast monitoring locations will be selected based upon their spatial appropriateness in terms of capturing representative air blast and vibration signals nearby to the open pit.

Monitoring will also be undertaken by video camera. During each monitoring event, the following will be recorded:

- coordinates of the blast and each monitoring location;
- measured vibration and overpressure at each monitoring location;
- maximum instantaneous charge;
- number of holes;
- blast type; and
- meteorological conditions.

Fume monitoring and post blasting assessments will be undertaken at Grants Lithium Project. Fume monitoring requirements include the following:

- visual assessment and analysis of each blasting event to determine whether excessive fume was generated as a result of the blast. All blasts undertaken at Grants Lithium Project will be video recorded to provide a record of the blast;



- in the event that any blast at Grants Lithium Project leads to the development of excessive fumes an analysis of the blast will be undertaken to determine the cause of the blast fume development and whether the blast fume travelled off site; and
- meteorological monitoring to determine the potential offsite impact of nitrogen oxide fumes.

Meteorological data will be obtained from an Automated Weather Station (AWS) installed on-site.

4.3.4 Reporting and Review

A report will be prepared for each blast at the Grants Lithium Project. The monthly Site Management Report will aggregate blast monitoring results. The following information is expected to be reported in the Site Management Reports:

- include a comprehensive review of the blast results & monitoring results;
- identify any trends in the monitoring data over the life of the development;
- identify any discrepancies between the predicted and actual blast results, and analyse the potential cause of any significant discrepancies; and
- prescribe what measures will be implemented over the current calendar year to improve the blasting performance



Appendix 1

Road Closure Plan

Road Closure Plan for blasting at Grants Lithium Project adjacent to Cox Peninsula Road.

Purpose

To provide a Management Plan and Operating Procedure for the temporary closure of Cox Peninsula Road, whenever blasting occurs at Grants Lithium Project.

Procedure

This document provides a Road Closure Management plan, and Operating Procedure, the key aspects of the document include:

- the notification of affected parties
- a protocol for the passage of emergency vehicles

Notification

Landholders within a 2km radius of Grants Lithium Project shall be notified two days prior to blasting.

The communities of Belyuen & Wagait Beach shall be notified two days prior to blasting.

Traffic Management

An authorised and competent traffic management company will be contracted to manage each road closure in accordance with Department of Infrastructure Planning and Logistics (DIPL) requirements, including:

- The correct placement of signage on the day of the blast
- Certified controllers will be used for all road closures and must be familiar with the road closure procedures, be accredited by DIPL, wear reflective vests and carry an operable hand-held radio on the same frequency as Blast Co-ordinator
- Traffic controllers must be set up and in position thirty minutes prior to the anticipated firing time, and able to make radio contact with the Blast Coordinator until the blast has been cleared. All traffic controllers must be at least 300m from the boundary of the blast and public road traffic halted 500m from the blast zone.



- The traffic controllers shall close the road prior to blasting, when advised by the Blast Co-ordinator. All traffic and personnel must then be cleared from the affected area by a competent person and the Blast Co-ordinator advised when this has been completed. Physical barriers should then be placed across the road to prevent access as per the Traffic Control Plan.
- All traffic must be halted for the duration of the blast. In the case of emergency traffic refer below: **Emergency Vehicle Passage**
- The traffic controllers shall not re-open the road until advised by the Blast Coordinator that it is safe to do so. Prior to re-opening, the road shall be inspected to ensure it is in a safe and trafficable condition. Any damage, fly-rock or other traffic hazards shall be rectified, with personnel and ancillary equipment available on standby for immediate road clearing purposes when deemed necessary. When the blast has been cleared and the road inspected, normal traffic can be resumed, and signage removed.

Shot Firing Procedure

This procedure shall apply to all blasting at Grants Lithium Project where fly-rock is considered to present a potential risk to traffic on Cox Peninsula Road or when it is otherwise considered necessary to close that road. The approximate area of affected blasting shall be illustrated on the blast sentry plan and include a 300-metre exclusion zone. The Shot Firer shall fire the blast according to Australian Standard's and in accordance with other applicable blasting and environmental procedures, with the following exceptions:

- If passage of emergency vehicle is necessary
- Blasting will not take place at times when adverse conditions (or other prevailing conditions) make road closure hazardous.
- All blasts that require the closure of Cox Peninsula Road will be tied up on the day of firing and must not be left tied up overnight.
- All blasts that require the closure of Cox Peninsula Road and will not be tied up if weather conditions are expected to prevent blasting within the required time frame.
- Misfires identified while Cox Peninsula Road is closed will be treated as separate blasts in order to prevent lengthy road closures.

After firing, the Blast Coordinator shall advise the traffic controllers and sentries when it is safe to check the road for damage/fly-rock and if traffic flow can be permitted (under supervision) prior to final clearance. Radio silence must be maintained, and traffic controllers remain in position until the blast has been cleared and the road inspected.



Emergency Vehicle Passage

- If traffic controllers or sentries encounter emergency vehicles (Police, Ambulance or Fire) requiring immediate access along Cox Peninsula Road, it may be necessary to abort the blast.
- Traffic controllers and/or sentries must break radio silence and inform the Blast Coordinator if access is required (or has occurred) once the shot firing is in progress. If the blast can be halted, emergency vehicles can be allowed to pass, and the shot firing procedure recommenced once the road is clear and secured.

Role	Accountabilities for this document
Site supervisor	<p>Oversee the review of process and procedure</p> <p>Review and approve procedure</p> <p>Ensure a process for training of relevant personnel</p> <p>Complete the road closure checklist and submit required notifications</p> <p>Review procedure</p> <p>Ensure a process for training of relevant personnel</p>
Drill and Blast Supervisor	<p>Complete the road closure checklist and submit required notifications</p> <p>Assist in the procedure development where required</p> <p>Supervise and document the provision of procedure training</p> <p>Ensure procedure is communicated, understood and followed by all personnel</p>
Traffic Controller	<p>Position and remove required signage according to RTA guidelines and approved traffic control plan.</p> <p>Prevent access to the closed area while blasting in progress and until notified by the Blast Co-ordinator</p>
Sentries	<p>Prevent access to the closed area while blasting in progress and until the blast has been cleared.</p>
Blast Coordinator	<p>Assist in the procedure development where required.</p> <p>Ensure procedure is followed and blasting is carried out in accordance with shot firing and road closure procedures.</p> <p>Remain in contact with the traffic controllers and sentries during the shot firing process.</p> <p>Report any deficiencies with the procedure.</p>



Glossary of Terms

Airblast	The airborne shock wave or acoustic transient generated by an explosion
Blast	The action of breaking and displacing rock by means of explosives
Blast area	The area of a blast within the influence of flying rock missiles, gases, and concussion
Blast monitor	An instrument that measures seismic waves along three mutually perpendicular axes (x, y, z) to determine Peak Particle Velocity
Decibel (dB)	A unit of sound measurement which quantifies pressure fluctuations associated with noise and overpressure dB (Lin Peak) Decibel associated with the maximum excess pressure in the overpressure wave. Lin represents linear – indicating that no weighted or adjustment is made to the measurement
Flyrock	Rocks or any other debris propelled from the blast area by the force of an explosion
Fumes	The gaseous products of an explosion. For the purpose of fume classification, only poisonous or toxic gases, such as carbon monoxide, hydrogen sulphide, and nitrogen oxides are considered
Ground vibration	Motion of ground caused by the passage of seismic waves originating from a blast. The rate of the ground vibration movement is referred to as Peak Particle Velocity (PPV) and is measured in millimetres per second (mm/s)
Maximum Instantaneous Charge	The maximum permissible charge weight allowed to ensure the radial propagation of vibration does not exceed assessment criteria at a receiver distant from the blast site
Mis-fire	A blast that fails to detonate completely after an attempt at initiation, also the explosive material itself that failed to detonate as planned
Overpressure	A pressure wave in the atmosphere which is caused by the detonation of explosives. Overpressure consists of both an audible (noise) and inaudible energy. The energy of the overpressure is measured in decibels (Lin Peak).
Sound Level Meter	An instrument that measures sound pressure levels in decibels
Stemming	Inert material used to maximise the effect of an explosion by filling the remainder of hole after they have been charged with explosives