

## Safe Drilling & Blasting



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## Explosives – What are they !! ...

- **Oxidiser** – A chemical that provides oxygen for the reaction. Ammonium Nitrate is the most common oxidizer.

PLUS

- **Fuel** – Reacts with oxygen to provide heat. Common fuels are diesel and aluminum powder.

PLUS

- **Initiation**

Explosives are always looking for the easiest way out



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## Initiating explosives

- **Detonator**

Device used to trigger an explosive device.

- **Delay**

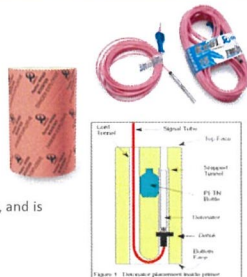
Element within detonator that delays triggering of explosive.

- **Detonating cord**

A high-speed fuse which explodes, rather than burns, and is suitable for detonating high explosives.

- **Booster**

Boosts initiation to ensure detonation of the main charge.



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## High Explosives



Packaged or bulk



ANFO or emulsion



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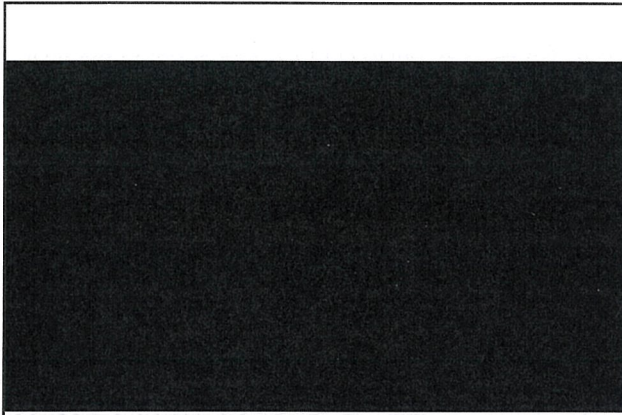
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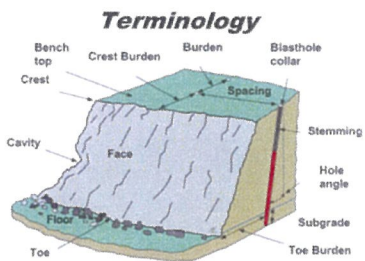
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## Blasting terminology



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## Legislative requirements

**Site HSMS must provide for safe and secure handling, storage, and transporting of explosives.**

- Must cover use, handling and transporting
- Security of explosives must be included





**Risk management process required to identify hazards associated with drilling and blasting.**

- Have you identified all hazards associated with blasting? (lightning, sympathetic detonation, unstable ground etc.)

**The person in control of explosives must ensure:**

- Use of explosive is accounted for,
- Surplus explosive is accounted for,
- Explosives are secure while being transported,
- Appropriate records are kept.



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## Legislative requirements

**Site *must* have a written procedure for dealing with misfires.**

### Safe Working Action Plan

Identify the hazards and risks that have been identified as resulting from the activity, and the controls that are required to manage the risks.

\* 1: Stop 2: Monitor 3: Assess 4: Control 5: Review

Hazard	Controls
1 Loading out shot rock and contacting explosives	Establish a demarcation line across the shot muckpile. This line is to include a buffer between the estimated explosives and the extraction limit for the quarry workers.
2 Employees and Contractors unaware of the incident or associated risks	Conduct a communication meeting with all employees and contractors.
3 Unauthorised access to misfire area	Construct bunding and erect signage warning of Authorized Personnel Only to enter demarcation area.
4 Extraction of rock when demarcation line reached	Extraction of rock to be completed by an excavator with a spotter. The position of the spotter should be such that he never places themselves under load and/or unstable faces.
5 Unauthorised detonation of un-fired explosives while excavating rock	Check for un-fired explosives in front of the excavation face. If un-fired explosives are present, a trained person or someone under direct supervision shall be engaged to remove the explosives. This individual shall remain in the area until the explosives are removed. Communication between the spotter and excavator operator will be via a two-way radio. The radio will transmit the warning that has been received from the spotter and received by the excavator operator.

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## Regulation 86 - Principal hazard management plan for explosives

**Plans need to include:**

- the safety of equipment used at the mining operation for manufacturing, **storing, transporting, and delivering explosives**;
- how explosives brought into the mining operation and used at the mining operation will be accounted for;
- the establishment of **secure storage for explosives** at the mining operation, including a system for signing explosives in and out of storage;
- the identification and control of hazards that may arise during **the charging and firing of explosives**; and
- the establishment of declared **danger zones** that no person may enter while blasting operations are taking place;
- the procedure to find, recover, and detonate **misfired explosives**;
- a register of people at or providing a service to the mining operation who are **approved handlers** under legislation

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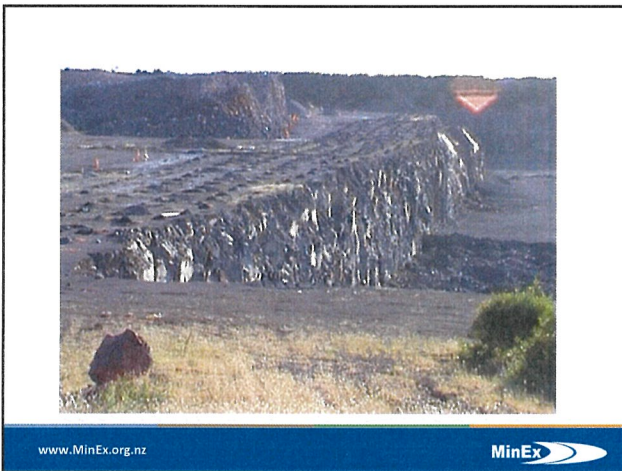
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The Health and Safety in Employment (Mining Operations and Quarrying Operations) Regulations

**Mine workers =**

- Employees of the mine operator, and
- Contractors and their employees while they are working on the mine operator's site.

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**All contractors are both good and not so good.**

**What makes the difference is the way you manage them.**



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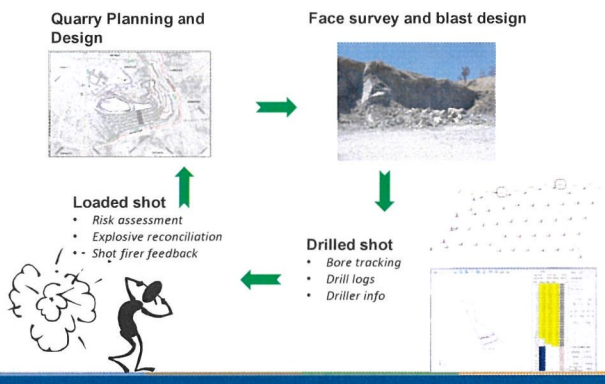
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### Blasting cycle



**Quarry Planning and Design**


**Face survey and blast design**

**Loaded shot**

- Risk assessment
- Explosive reconciliation
- Shot firer feedback

**Drilled shot**

- Bore tracking
- Drill logs
- Driller info

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### Things to consider with each shot

- Stability of faces
- Overhanging rock
- Water on benches (adequate drainage)
- Bench cleaned and level for drilling
- Edge protection
- Security of blast zone
- Access to shot
- Faces clearly visible  
(muck pile from last shot moved)



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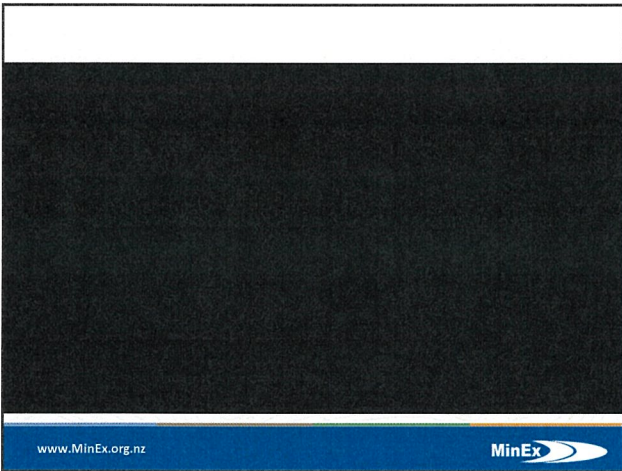
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