40823 Manage surface extractive blasting operations

Kaupae | Level	4
Whiwhinga | Credit	10
Whāinga | Purpose	This skill standard is for surface extractive managers who need to manage surface blasting operations where licensed blasting personnel conduct the blasting activities. It equips surface extractive managers with the knowledge and skills to safely and effectively oversee surface blasting processes at a surface extractive site. This skill standard is not intended for those directly involved in carrying out blasting. This skill standard may be used in programmes leading to qualifications and micro-credentials at Level 4 or above in extractive operations.
Whakaakoranga me mātua oti | Pre-requisites	Skill standard 40822, *Determine compliance and safety management obligations for explosives in an extractive blasting operation,* or demonstrate equivalent knowledge and skill.

Hua o te ako me Paearu aromatawai \| Learning outcomes and assessment criteria

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
1. Conduct risk assessment for surface extractives blasting operations and set controls to mitigate risks effectively.	a. Explain common hazards specific to surface extractive blasting activities.
	b. Explain methods to mitigate these hazards.
	c. Conduct a risk assessment for surface blasting operations and set appropriate controls.
2. Determine geological and environmental factors that influence surface extractives blasting operations and the impact on blast design and execution.	a. Identify geological and environmental factors that influence surface blasting operations.
	b. Explain how these factors are assessed and addressed to optimise blast design and ensure safety.
3. Determine safety protocols and site preparation activities necessary to conduct surface extractives blasting operations in compliance with safety and regulatory requirements.	a. Identify safety protocols necessary for surface blasting operations in compliance with safety and regulatory requirements.
	b. Describe site preparation activities necessary for surface blasting operations in compliance with safety and regulatory requirements.
4. Implement a communication plan for surface extractives blasting operations.	a. Implement a communication plan for surface blasting operations, ensuring clear coordination between the blasting team and other key site personnel and stakeholders.

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
5. Identify emergency documentation requirements and emergency protocols for surface extractives blasting operations in compliance with safety and regulatory requirements.	a. Identify emergency documentation requirements for surface blasting operations.
	b. Describe emergency protocols for handling misfires.
	c. Identify evacuation procedures and assembly points for surface blasting emergencies.
6. Evaluate surface extractives blasting operations processes.	a. Evaluate surface blasting processes compared to the blasting plan, noting any deviations.
	b. Evaluate the implementation of safety protocols during surface blasting operations, identifying any breaches or lapses.
	c. Evaluate the effectiveness and adherence to communication plans involved in the operations, checking for clarity, completeness, and timeliness.
	d. Propose appropriate corrective actions to address any non-compliance or deviations identified, or any opportunities for improvement.

Pārongo aromatawai me te taumata paearu | Assessment information and grade criteria

Assessment specifications:

Evidence presented for assessment against this skill standard may include oral, visual, video, written and practical activities demonstrated in the workplace.

The site manager (who holds the relevant CoC and unit standards) and blast crew supervisor (shot-firer) must ratify the candidates' risk assessment and appropriate controls; this may be a third-party contractor.

The Environmental Protection Authority (EPA) is responsible for assessing and approving hazardous substances and, where appropriate, setting controls on the way the substances are used. Any questions relating to the provisions for hazardous substances should be directed to EPA New Zealand. Contact information https://www.epa.govt.nz/contact-information/

Definitions:

Blasting plan refers to site assessment, objectives, blast design, safety measures, environmental considerations monitoring and control, emergency response, documentation and reporting, including pre-blast, blast logs, monitoring data and post-blast assessment.

Company procedures are the documented methods for performing work activities. They include health and safety, operational, environmental, and quality management requirements. They may refer to legislation, manuals, codes of practice, or policy statements.

Extractive industries refer to mining, underground and surface, quarrying and tunnelling operations.

Ngā momo whiwhinga | Grades available

Achieved.

Ihirangi waitohu | Indicative content

Ancillary equipment

- Blasting galvanometer
- Exploder
- Tamping rods including non-ferrous for underground operations
- Non-ferrous tools
- Crimpers
- Cutters
- Lowering devices.

Blast plan

- Blast design
- Rock properties
- Explosive selection and charge weight per hole
- Drilling pattern
  - Hole placement
  - Hole diameter, depth and spacing
- Timing and sequencing
- Initiation system
- Monitoring/analysis of blast
- Safety measures
- Water management.

Communication plan such as pre-blast warnings and area clearance confirmations, public notifications.

Controls to mitigate risks such as competent workers, inspection, testing of all machinery and ancillary equipment, ground support, adherence to blasting regulations and standard operating procedures, blast pattern optimisation and maintaining safe working distances.

Documentation

- Blast design
- Blast notification
- Blast log
- Safety procedures

- Clearance plans
- Exclusion zones
- Incident reports
- Environmental impact
- Regulatory compliance
- Misfire reports
- Post-blast assessment
- Communication records
- Emergency plan.

Environmental factors

- Wind speed and direction
- Air temperature
- Humidity
- Precipitation, e.g. Heavy rainfall
- Vibration
- Air overpressure levels during and after the blast
- Unstable environments
    - Atmosphere (gases)
    - Combustible material(s).

Geological features

- Types of rock
    - igneous (plutonic, volcanic)
    - sedimentary (clastic, chemical, organic)
    - metamorphic (foliated, non-foliated)
- Principles/considerations relevant to blasting
    - rock type and composition
    - geological structures, e.g. faults, fractures and joints
    - rock mass properties
    - groundwater conditions
    - seismicity and geohazards
    - hot and reactive ground
    - geological mapping
    - environmental considerations.

Hazards for surface blasting

- Blast Fumes
- Dust
- Fragmentation
- Misfires
- Overbreak Rock Falls
- Secondary Explosions
- Blast Overpressure Ground Vibration
- Toxic Fumes
- Mobile Equipment.

Control measures for surface blasting hazards

- Blast fumes
  - Confinement of explosives use suitable and sufficient stemming to confine the explosives to minimise the air exposure to the explosives during firing.
  - Bulk Explosives Selection: Ensure ANFO is not used in wet holes.
  - Delay Timers: Use delay detonators to reduce the peak concentration of blast fumes.
- Dust
  - Water Sprays: Employ water sprays at blast sites to suppress dust formation.
  - Dust Collectors: Install dust collectors and extraction systems to capture airborne particles.
- Fragmentation
  - Blast Design Optimisation: Use computer simulations to optimise blast designs, reducing unwanted fragmentation.
  - Controlled Blasting Techniques: Implement controlled blasting techniques such as pre-splitting to manage fragmentation.
  - Misfires
  - Rigorous Inspection and Testing: Conduct thorough inspections and functionality tests of all explosive materials and blasting equipment.
  - Training: Provide comprehensive training for handling misfires safely, including proper disposal techniques.
- Overbreak
  - Precision drilling: Ensure accurate drilling to minimize overbreak by adhering strictly to the blasting design.
  - Blast monitoring: Utilize blast monitoring technology to use as feedback into blast designs to control the extent of the blast and reduce overbreak.
- Rock falls
  - Rock bolting and meshing: Secure loose rocks with bolts and mesh in both underground and surface settings.
  - Regular site inspections: Perform regular inspections and maintenance to identify and mitigate hazards from potential rock falls.

- Secondary explosions
    - Explosive material handling protocols: Strictly control the storage, handling, and use of explosive materials to prevent secondary explosions.
    - Environmental monitoring: Monitor the blast area for any flammable gases or materials that could trigger secondary explosions.
- Blast overpressure
    - Adherence to Blast Design: Load blast holes with explosives mass specified in the design and confine with sufficient and suitable stemming.
    - Blast Design Optimisation: Ensure blast overpressure limits are considered for the blast design, blast overpressure is monitored. The timing, direction and velocity of firing can be optimised to reduce or re-direct the blast overpressure.
- Ground vibration
    - Blast design: Reduce the mass of explosives per hole and the number of blastholes detonating close together (the maximum instantaneous charge)
    - Blast monitoring: Measure peak particle velocity to determine compliance with compliance limits that have been set.
- Toxic fumes
    - Chemical selection: Select explosives with reduced potential for generating toxic gases.
    - Respiratory protection: Provide appropriate respiratory protection equipment to personnel if toxic fumes are expected or detected.
- Mobile equipment
    - Spotter: Guide the mobile equipment across the blast to avoid explosives.
    - Equipment selection: Ensure vehicles are selected that can manoeuvre on the blast to avoid driving over explosives.

Personal Protective Equipment (PPE)

- Safety glasses
- Hearing protection
- Overalls
- Gloves
- Boots
- Safety helmet.

Safety protocols such as PPE requirements, escape way maintenance, and barricading procedures.

Site preparation such as clearing and barricading blast areas, gas monitoring systems, setting up communication systems, protective barriers, blast mats, and emergency evacuation planning.

Rauemi | Resources

Legislation, regulations and/or industry standards

- Hazardous Substances and New Organisms (HSNO) Act 1996; https://www.legislation.govt.nz/act/public/1996/0030/latest/DLM381222.html.
- Health and Safety at Work Act 2015 (HSW); https://www.legislation.govt.nz/act/public/2015/0070/latest/DLM5976660.html.
- Health and Safety at Work (General Risk and Workplace Management) Regulations 2016; https://www.legislation.govt.nz/regulation/public/2016/0013/latest/dlm6727530.html.
- Health and Safety at Work (Worker Engagement, Participation, and Representation) Regulations 2016; https://www.legislation.govt.nz/regulation/public/2016/0016/latest/dlm6314002.html.
- Health and Safety at Work (Mining Operations and Quarrying Operations) Regulations 2016; https://www.legislation.govt.nz/regulation/public/2016/0017/latest/DLM6732829.html.
- Health and Safety at Work (Hazardous Substances) Regulations 2017; https://www.legislation.govt.nz/regulation/public/2017/0131/latest/DLM7309401.html.
- Safe Work Instruments (SWIs) published by WorkSafe NZ.
- MinEx; Extractives industry safe drill and blast in surface operations code of practice.
- MinEx; Guidelines for the safe use, storage, and disposal of explosives in surface mines and quarries.
- Approved codes of practice issued pursuant to the HSW Act.
- Land Transport Act 1998 and associated Regulations; https://www.legislation.govt.nz/act/public/1998/0110/latest/DLM433613.html.
- WorkSafe NZ's Good Practice Guidelines for the extractives industries, available from https://worksafe.govt.nz/.
- Health and Safety at Opencast Mines, Alluvial Mines and Quarries good practice guidelines.
- AS 2187.1:1998 *Explosives – Storage, transport and use – Storage.*
- Territorial and/or Local Authority plans and bylaws for the storing of explosives.
- Occupational health and safety guidelines, available at https://worksafe.govt.nz/.

Where any Acts, regulations, standards, codes of practice, guidelines, or authority requirements and conditions cited in this skill standard are amended, replaced, or superseded during the lifetime of the standard, the current versions shall apply for assessment purposes until this skill standard is formally reviewed.

- Companies and/or contractors blasting policy and procedures.
- Blast management plans.
- Principal Hazard Management Plan for explosives.
- Emergency plan.
- Material safety data sheets.
- Explosive technical data sheets.

Pārongo Whakaū Kounga | Quality assurance information

Ngā rōpū whakatau-paerewa | Standard Setting Body	Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council
Whakaritenga Rārangi Paetae Aromatawai | DASS classification	Engineering and Technology > Extractive Industries > Extractive Industries Management
Ko te tohutoro ki ngā Whakaritenga i te Whakamanatanga me te Whakaōritenga | CMR	CMR 0014

Hātepe | Process	**Putanga** | Version	**Rā whakaputa** | Review Date	**Rā whakamutunga mō te aromatawai** | Last date for assessment
Rēhitatanga | Registration	1	25 September 2025	N/A
Kōrero whakakapinga | Replacement information	N/A		
Rā arotake | Planned review date	31 December 2030		

Please contact Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council at qualifications@hangaarorau.nz if you wish to suggest changes to the content of this skill standard.