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	SIGNATURE	DATE
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ISSUE/REVISION INDEX

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Issue Codes: RC = Released for Execution, RD = Released for Design, RF = Released for Fabrication, RI = Released for Information, RP = Released for Purchase, RPA = Released for Permit Application, RQ = Released for Quotation, RR = Released for Review and Comments.


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1.0 OBJECTIVE

To define the minimum Health, Safety and Environmental requirements relating to the use of explosives at NAPG project sites for blasting on surface.

2.0 SCOPE AND APPLICABILITY

This standard applies at all NAPG project sites locations where surface blasting is conducted.

Underground blasting shall use Vale underground mining blasting practices and procedures for handling, storage, transportation and use of explosives that meet or exceed legislative requirements.

Where Contractors propose to use alternate standards at a work location a full risk assessment must be submitted demonstrating the same or better risk management for approval by the NAPG HSER Manager and the Project Construction Manager.

This standard applies to all project workers. In addition, workers shall handle, store and use explosives in accordance with regional and national regulations.


3.0 DEFINITIONS

Blaster: A person who holds a valid blaster's certificate granted by the province or a competent person that has completed the on-site blaster apprenticeship program.

Day Box: A portable unit used for keeping explosives in during the day and which meets the requirements of "Explosives—Magazines for Industrial Explosives" published by the Standards Council of Canada.

Detonator: Includes electric blasting caps of instantaneous and delay types, blasting caps for use with safety fuses, detonating cord, delay connectors and non-electric instantaneous and delay blasting caps which use detonating cord, shock tube, gas tube and another replacement for electric leg wires and another similar device.

Explosive: A substance, including a detonator or primed explosive, that is manufactured or used to produce an explosion by detonation or deflagration and that is regulated by the Explosives Act (Canada), but does not include ammunition for weapons or fireworks.

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Magazine: A fixed unit used for the unattended storage of explosives overnight and which meets the requirements of the "Explosives—Magazines for Industrial Explosives" published by the Standards Council of Canada.

Primed Explosive: An explosive containing a detonator.

4.0 RESPONSIBILITIES

General Construction Manager: The implementation of this standard.

Area Managers/Superintendents: The application of, and compliance with, this Standard at work locations within their operational responsibilities. They shall also ensure contractors comply with this standard.

Contractors: Compliance with this and other standards, for their personnel, and their subcontractor's personnel as well as health and safety.

Supervisors: The day-to-day application of this standard. The safety and health of all persons is essential while managing and directing activities associated with the handling and use of any explosives material.


Project Workers: Compliance with this standard. Any person who witnesses an unsafe act or occurrence is obliged to report the incident to his/her supervisor.

4.1 Blasters

Blasters prime responsibility is the safety of all persons while handling, transporting and use of any explosives material. The blaster must also ensure regulatory compliance with federal and provincial regulations and those of Vale's Critical Activity Requirements – CAR 09 Explosives. Nothing relieves the blaster of responsibility for ensuring a safe work place and compliance with applicable regulations and the site-specific Blasting Variance, if any, and the Work Permit for the job.

The blaster is responsible for monitoring all explosives manufacturing dates as all explosives are time sensitive and can become hazardous to handle with age.

The blaster is responsible for maintaining the explosives and accessory inventory

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5.0 REQUIREMENTS

5.1 Additional PPE

In addition to standard PPE the following items are required for the blasting crew:

- a) Where static discharge can be a hazard for workers, i.e., detonating explosives and or explosive accessories, appropriate footwear shall be worn (e.g. static dissipative or conductive footwear).
- b) Respiratory Protection
- c) Test Fitting for Respiratory Protection
- d) Hearing Protection
- e) Rubber Gloves
- f) Waterproof Pants
- g) Waterproof Winter Clothing


5.2 Permits/Special Equipment

- a) Nonferrous Tamping Rod
- b) Brass Retrieving Hook
- c) Retractable Knife (if allowed by site rules)
- d) Blasting Machine
- e) Tape measure with non-sparking weight
- f) Work Permit with Excavation/Blasting Permit
- g) Magazine Permit
- h) Site-Specific Blasting Variance

5.3 Practices

Explosive storage and preparation areas shall:

- 0 Comply with local legislation.
- 0 Have the required fire protection, lightning protection, and signage.

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Vehicles transporting explosives must meet local legislation and be equipped with the required signage and warning devices.

An effective audible warning shall be given prior to detonation. A description shall be outlined in the JHA.

The blaster shall ensure a local blast plan is developed stating:

- 0 Layout and depth of the holes.
- 0 Types of explosives and accessories to be used and quantities required.
- 0 Detonation sequence.
- 0 Minimum time to allow contaminants to clear after detonation.

Each project that requires a surface explosives magazine shall prepare a document demonstrating compliance with the minimum distance criteria between the surface magazine and populated areas, and vulnerable infrastructure such as schools, hospitals, highways and railways.


Access to explosives magazines and preparation areas shall be controlled.

Manufacturer safety guidelines for explosives and accessories shall be followed.

Explosive materials and accessories shall be stored and transported in its original packaging or in suitable containers.

It is prohibited to smoke, have open flames, carry lighters, tools or material that could produce sparks, within 10m of an explosive, magazine, day box or blast area.

No devices that have a radio frequency capable of setting off explosives and/or accessories are permitted where explosives are being stored or handled, e.g., **less than 1W** or as prescribed by regulations. Host operations may set specific limits that projects must follow.

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The transportation of explosives from the magazine to the place of use shall be done in designated and signed vehicles with appropriate permits in place.

Detonators and other explosives must never be carried together in the same box.

The blaster will ensure all required signage, barricades and notifications are in place prior to delivery of explosives to a blast location. Barricades must be placed a minimum of 8m from a loaded hole. When a blast pattern is located in proximity of an active haul road, a berm must be constructed a minimum distance of 8m from the nearest hole.

No unauthorized person is permitted on a blast pattern; permission must be obtained from the Blaster or Supervisor.

The blaster shall check to ensure that all persons have left the blasting site and the vicinity that may endanger their safety before releasing it for blasting, in order to ensure complete evacuation of people and equipment.


A process shall be in place to return to the blasting area only after the dissipation of gas and dust, misfires checked and authorized by the blaster.

No drilling is permitted within 4.5m for a 6.5" diameter drill bit and 2.2m for a 4.5" diameter drill bit, unless otherwise outlined by an approved Government variance from a loaded hole. This does not apply if a hole is required to be drilled to manage a misfire, a caved loaded hole or if ground conditions require immediate loading of a hole.

No metal cutting or welding is permitted within 50m of a loaded hole.

No maintenance work can be carried out on equipment when located on a blast pattern without the prior permission of the blaster.

No vehicles other than those associated with blasting activities are permitted on a blast pattern or within 8m of a loaded hole.

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Blasters helpers must be instructed by the blaster and be under his/her direct supervision at all times when during explosive loading. Prior understanding and familiarization of working around explosives required prior to assisting blaster.

A lightning detector must be used to monitor the approach of any thunderstorms. When an explosive loading operation is in progress and the storm is detected at 12 km (8 mi) the Mine Operations Supervisor will order the evacuation of the mine. The area will remain evacuated for a minimum of 30 minutes and until the storm is no longer detected or observed within 12 km or 8 mi of the area. For additional guidance refer to *Working in Adverse Weather*.

The blaster shall destroy misfires, waste and deteriorated, damaged or time-expired explosives in accordance with the local legislation and the manufacturer's guidelines.


The blaster shall collect empty explosives cartons and ensure they are disposed of appropriately.

The blaster shall check the inventory upon arrival to site prior to loading. Daily records are required for any explosives movement and a final inventory must be conducted prior to site departure.

When handling explosives, situations that produce elevated heat, shock and/or friction must be avoided. Any one of these or any combination can cause a detonation. A blaster must ensure the drill hole is of sufficient size to admit the free insertion of explosives to the bottom of the hole without ramming, pounding or applying undue pressure. A hole that does not allow the free insertion of explosives should be redrilled to clean the hole.

Explosives handlers and users of new types or brands of explosives must be informed of their properties and manufacturers' safe handling recommendations.

Unused explosives and accessories stored in the blaster's day box must be attended by an authorized employee and returned to the magazine immediately after loading is complete. Accessories used for pattern tie in, temporarily stored in the blasters day box, must be immediately transported and stored in the magazine once blasting activities are complete. The blasters truck must only be used for blasting activities when carrying explosives and accessories in the blaster's day box.

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If misfires are observed or suspected in the detonated material after the blast area has been released, the work shall be stopped immediately, the area shall be evacuated, and the concern shall be reported to the blaster who in turn shall take appropriate measures to control the risk.

5.4 Environment

The handling, transportation, storage and use of explosives and all other hazardous materials shall be conducted in compliance with all applicable laws, regulations, including orders of the Environmental authorities in the project's jurisdiction.

Explosives personnel must take every precaution to protect the environment and wildlife.


Empty explosives cartons and boxes must be burnt in a designated area only and with the appropriate Hot Work Permit.

Used nonel lead in shock tube must be picked up following a blast and disposed per site specific procedure or burnt only in a designated area specified in the Hot Work Permit.

6.0 TRAINING AND/OR QUALIFICATION REQUIREMENTS

All persons associated with the storage, handling, transportation, loading or detonating of any explosives material must be trained and competent. Users must be licensed or trained, including refreshers, as follows:

- a) Blasting Certificate or completion of Site Blaster Apprenticeship Program, familiarization of blasting procedure and limitations under blasting variance.
- b) Risk Prevention for Explosives (per RAC-09);
- c) Oil spill reporting, containment and clean-up;
- d) Transportation of Dangerous Goods training;
- e) WHMIS training;
- f) Basic First Aid;

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7.0 REFERENCES

- Canada Explosives Regulations, 2013.
- "Explosives—Magazines for Industrial Explosives", Standards Council of Canada.
- Vale Critical Activity Requirements—RAC-09, Explosives
- NAPG, Working in Adverse Weather, NAPG-SAF-SPI-0021

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