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PART 14 – BLASTING

DEFINITIONS

14.01 In this part, the following definitions apply:

“attended by”

means the physical presence of an authorized person who is in visual contact with and has control over explosive materials;

“avalanche control”

means the controlled elimination of an avalanche hazard using explosives or other methods;

“blasted area”

means an area affected by the detonation of explosives;

“blaster”

means a worker who holds a valid blaster’s permit in accordance with these Regulations;

“blasting agent”

means a relatively insensitive explosive that includes any ammonium nitrate / fuel oil mixture (AN/FO), emulsion, slurry or water gel;

“blaster’s permit”

means a permit issued under these Regulations that authorizes a person to conduct blasting operations;

“blasting area”

means any area extending at least 50 m (165 ft.) in all directions from any place in which explosive materials are being prepared or placed, or in which an unexploded charge is known or believed to exist;

“blasting machine”

means a portable device used to initiate a blast by electricity;

“blasting operations”

includes the preparing, placing and firing of a charge, the handling of misfire, and the destroying of any explosive materials;

“bootleg”

means a remnant of a blast hole that did not properly break when the blast was initiated, also referred to as socket;

“collar”

means the start of a drilled blast hole;

“conveyance”

means a mode of transporting explosives and includes motor vehicles, powered mobile equipment, drilling rigs, trains, boats, aircraft or shaft hoists;

“day box”

means an unlicensed facility not used for overnight storage, and constructed to type 6 magazine specifications, pursuant to the *Explosives Act (Canada)* and its Regulations;

“danger area”

means any area in which there may be danger to any person from flying material or any other hazard resulting from a blast;

“detonator”

means a blasting cap or other device used to initiate detonation of an explosive;

“explosive”

means any chemical compound or mixture which, when detonated, violently decomposes, producing a large volume of gas at high temperatures capable of having destructive effects;

“magazine”

means any building or other structure used for the storage of explosives and built conforming to the standards made pursuant to the *Explosives Act (Canada)* and its Regulations;

“primed cartridge” or “primer”

means an explosive containing a detonator;

“storage box”

means a small container located adjacent to an underground workplace where small quantities of explosives may be stored;

“temporary blaster’s permit”

means a blasting permit issued under these Regulations, valid for a maximum period of 90 days;

“underground magazine”

means the main storage area for explosives underground.

GENERAL

14.02 Any person who handles, transports or stores explosives shall be familiar with and comply with applicable provisions of the *Explosives Act (Canada)* and any Regulations made thereunder, and the *Transportation of Dangerous Goods Act (Canada)* and Regulations.

BLASTER’S PERMITS

Holding valid permit	14.03	No person shall conduct, or be permitted to conduct, a blasting operation unless
Scope of permit	(a)	the person holds a valid blaster’s permit or temporary blaster’s permit issued under these Regulations,
Documented details	(b)	the work involved is under the scope of their permit, and
	(c)	the details of the blaster’s permit have been recorded and verified by the employer.
Blaster appointed	14.04	(1) A blaster shall be assigned responsibility for conducting or directing any blasting operations.
Work in blasting area	(2)	No person shall conduct or direct any work in the blasting area without the prior approval of the blaster responsible for that area.
Safety of work	(3)	No blaster shall authorize or permit any work that may jeopardize the safety of any person.
Age restriction	14.05	A candidate for a blaster’s permit or a temporary blaster’s permit shall
Physically capable	(a)	be at least 18 years of age,
Previous experience	(b)	be physically capable of carrying out the duties of a blaster, and
	(c)	have at least six months experience in connection with blasting operations or have equivalent training and experience acceptable to an examiner

authorized under sections 14.06 or 14.07 prior to qualifying for a blaster's permit.

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| | 14.06 | A temporary blasting permit |
| Examination | (a) | may be issued upon successful completion of an examination that may be written or oral, or given in any other manner as the director may require for the purpose of establishing the qualifications of the applicant, |
| Permit issued | (b) | may be issued by the director or any person authorize by the director in a form prescribed by the director to a person to handle and use explosives, |
| Satisfactory qualifications | (c) | shall be issued under this section when the director or the person authorized by the director is satisfied that the applicant for the permit has an adequate knowledge of the handling and use of explosives, |
| Permit expires | (d) | shall be valid for a specified period not exceeding 90 days and shall be subject to such restrictions and conditions as may be endorsed on it by the person who issues it, and |
| Copy to director | (e) | issued under this section by any person authorized by the director shall be copied and sent forthwith to the director. |
| | 14.07 | A blaster's permit |
| Examination | (a) | may be issued upon successful completion of an examination that may be written or oral, or given in any manner as the director may require for the purpose of establishing the qualifications of the applicant, |
| Permit issued | (b) | may be issued by the director or a safety officer, authorized by the director, in a form prescribed by the director, to a person authorizing such person to conduct blasting operations, and |
| Permit expires | (c) | shall be granted for a period of five years and be subject to such restrictions and conditions as may be endorsed on it by the issuing safety officer. |
| | 14.08 | A blaster shall ensure that |
| Permit available for inspections | (a) | when conducting or directing a blasting operation, their blaster's permit is readily available for inspection upon the request of a safety officer, and |
| Original permit | (b) | the original blaster's permit is kept as proof of issuance, unless a copy is certified as a true copy by the person who issued the permit, or by the director. |
| Blaster's assistants | 14.09 | A worker who assists a blaster to prepare, fix or fire charges and handle misfires shall |
| | (a) | be a qualified person, instructed in the safe handling of explosives, |
| | (b) | remain under the full and direct control of the blaster, and |
| | (c) | be continuously visually monitored by the blaster who is responsible for the assistant's work. |

BLASTING LOG

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| Pre-blast and post-blast inspection | 14.10 | (1) All surface blasting operations shall have a blaster's log which records the pre-blast loading details and the results of the post-blast site inspection. |
| Logs available | (2) | Blasting logs shall be maintained for at least five years at the workplace and be available for inspection by workers, worker representatives, or safety officers. |
| Personal logs | (3) | All blasters shall maintain personal logs of all blasting work that they have performed and the personal logs shall be available for inspection by a safety officer. |

SUSPENSION OF BLASTER'S PERMIT

- 14.11** Where there is reason to believe that a blaster has not complied with any regulation relating to blasting
- Employer duty**
- (a) the employer shall ensure that
 - i. an immediate investigation into the matter is conducted and, where determined appropriate, suspend the blaster from conducting or directing any blasting operation, and
 - ii. a report of the investigation is submitted to the director, and
- Safety officer duty**
- (b) a safety officer shall ensure that
 - i. a further investigation of the matter is conducted, and
 - ii. a blaster's permit is suspended or repossessed when there is reason to believe that the safety of workers has been or may be jeopardized by the blaster, and
 - iii. written reasons for the suspension are provided to the persons affected by it.

BLASTING INCIDENTS

- 14.12** In addition to the reporting requirements of the *Occupational Health and Safety Act*, where a blasting incident involves personal injury or an unusual occurrence with explosive materials, the employer and supervisor shall ensure that
- Immediate notification**
- (a) the incident is reported immediately to the director, and
 - (b) a written report of the incident is forwarded without delay, outlining
 - i. the names and permit numbers of all blasters involved,
 - ii. the time, date and location of the incident,
 - iii. the names of any injured persons,
 - iv. the details of the detonators, explosives, accessories, and blasting equipment used,
 - v. a factual account of the incident and the events leading to it, and
 - vi. a description of the action taken by the employer.
- Written report**

TRANSPORTATION OF EXPLOSIVES

- 14.13** (1) No more than 75 kg (165 lbs.) of explosives shall be carried in a vehicle primarily designed for the carriage of passengers and their baggage.
- (2) Explosives carried in a vehicle shall be in a fully enclosed, locked, fire resistant, fixed container or compartment, separate from the passenger compartment.
- 14.14** (1) No explosive material shall be transported in a conveyance unless
- (a) the detonators are kept in a separate container and separated from other explosives by a partition in accordance with the requirements of the *Explosives Act (Canada)* and its Regulations, or a separation between the containers of a minimum of 0.6 m (2 ft.), and
 - (b) the explosive materials are protected from contact with iron or steel surfaces with wood, a tarpaulin, or other suitable materials.
- (2) Placards indicating "explosives" shall be displayed on all sides of a conveyance transporting explosive materials in accordance with the federal *Transportation of Dangerous Goods Shipping Regulations*.
- 14.15** (1) A conveyance used to transport up to 2,000 kg (4,400 lbs.) of explosive materials shall be equipped with at least two fire extinguishers in working order, readily available for use and with a ULC rating of 5 BC or greater.
- Vehicles with passengers**
- Separate containers**
- Placards**
- Fire extinguishers**

		(2) In freezing temperatures, the fire extinguishers on a conveyance shall be of a non-freezing type.
		(3) Notwithstanding subsection (1) where the amount of explosives does not exceed 30 kg (66 lbs.), the number of fire extinguishers may be reduced to one.
Detonators	14.16	Electric detonators shall not be transported in a radio transmitter-equipped conveyance unless <ul style="list-style-type: none"> (a) the leg wires of the detonator are folded and shunted, as shipped by the manufacturer, (b) the detonator is in a closed metal container <ul style="list-style-type: none"> i. lined with wood or other approved materials, and ii. electrically bonded to the conveyance, and (c) any radio capable of transmission is switched off whenever the metal container is open.
Inspection of conveyance	14.17	(1) Before loading explosive materials for transportation, a conveyance shall be inspected to ensure that <ul style="list-style-type: none"> (a) the fire extinguishers are filled and in working order, (b) the electric wiring is completely insulated and firmly secured, (c) the fuel tank and feed lines have no leaks, (d) the chassis, engine, pan and bottom of the conveyance are reasonably clean and free from surplus oil and grease, (e) the brakes and steering apparatus are in good condition, and (f) the conveyance is in sound mechanical condition.
Instruction to workers		(2) Any person engaged in the loading, conveying or unloading of explosive materials shall be instructed in and observe all safety precautions.
Handling		(3) Explosive material shall not be dropped, thrown or abused during loading and unloading.
Passengers		(4) Passengers other than persons assigned to assist in handling explosives shall not be permitted on a vehicle transporting explosives.
Flammable materials	14.18	(1) Flammable material shall not be on or in proximity to a conveyance transporting explosive materials.
Smoking, flames		(2) Smoking or open flames shall not be permitted within 15 m (50 ft.) of a conveyance transporting explosive materials.
Fuelling	14.19	(1) A conveyance shall be adequately fuelled before it is loaded with explosive materials.
Refuelling		(2) A conveyance containing explosive materials shall not be refuelled unless <ul style="list-style-type: none"> (a) refuelling is necessary for the conveyance to reach its destination, (b) the ignition is shut off and the brakes are set, and (c) the fuel tank is filled at a place where the number of persons is kept to a minimum.
Safe operating		(3) A conveyance transporting explosive materials shall be operated in a manner consistent with road, traffic and weather conditions.
Person in charge of conveyance	14.20	(1) A conveyance carrying explosive material, whether parked or mobile, shall be in the charge of and attended by a competent person who is <ul style="list-style-type: none"> (a) at least 18 years of age, (b) the holder of a valid driver's licence, and (c) instructed in the transportation of explosive materials.

- Conveyance load limit** (2) A conveyance shall not carry a load of explosives in excess of 80 percent of the manufacturer's rated carrying capacity for that conveyance.
- Trailer restriction** (3) Explosive material shall not be transported in a trailer or in any form of semi-trailer unless it is equipped with power brakes operated from the tractor cab.

UNDERGROUND TRANSPORTATION OF EXPLOSIVES

- 14.21** (1) Where explosives are transported underground by means of mechanical haulage, including trackless equipment
- Right of way** (a) definite arrangements for the right of way of such vehicles shall be made before the vehicle is moved, and
- Speed** (b) the speed of the vehicle shall not exceed 10 km/h (6 mph).
- Locomotive position** (2) Where mechanical track haulage is used, the locomotive shall be maintained on the forward end of the train carrying explosives, unless a qualified worker walks in advance of the train to effectively guard it.
- Spacing** (3) In track haulage, the car or cars carrying explosives shall be separated from the locomotive by an empty car or a spacer of equivalent length.
- Restriction** (4) Explosives shall not be carried on the locomotive.
- Trolley locomotives** (5) Where a trolley locomotive is used for transportation of explosives, the car or cars carrying explosives shall be protected from trolley wire contact and other hazards.
- Shaft conveyance** **14.22** (1) When explosives are being transported in a shaft conveyance, the person in charge of such operation shall give notice or cause notice to be given to the deck and hoist operators.
- Handling explosives on shaft conveyance** (2) Unless under the immediate supervision of a person appointed by the manager or supervisor, no worker shall place, remove or possess any explosives on a shaft conveyance.
- (3) Other material shall not be transported with explosives in any shaft conveyance.
- Transfer of explosives** **14.23** (1) The transfer of explosives from the magazine or other surface storage place shall be arranged so that undue delay does not occur between the time the explosives leave the storage place and the time they are properly stored in designated storage places in the underground workings or distributed to points of use in the underground workings.
- Transfer underground** (2) Explosives shall not be left at any level station or near the shaft collar or other entrance to the underground workings, but shall be transferred from any designated storage place to other designated storage places or points of use without undue delay.

STORAGE OF EXPLOSIVES

NOTE The director, or a safety officer authorized by the director, may issue a magazine licence for storage of explosives at a mine or quarry. Magazine licences for a site other than a mine or quarry shall be granted under the *Explosives Act (Canada)* and its Regulations.

- 14.24** (1) Magazines at a mine or quarry shall
- Licenced magazine** (a) be licenced in a form prescribed by the director,

Magazine construction		(b) be constructed in conformity with the <i>Magazine Standards for Blasting Explosives and Detonators</i> of the <i>Explosives Act (Canada)</i> and its Regulations.
Magazine location		(c) be located in accordance with the Table of Quantity and Distances shown in Table 14-1 at the end of this Part, and
Warning signs		(d) have "Danger – Explosive" signs posted conspicuously beside the road approaches to the magazine, but not on the structure.
Flammable material		(2) Flammable material shall be kept a safe distance, at least 7.5 m (25 ft.) from a container or storage place for explosive materials.
Explosives delivered	14.25	(1) Explosives delivered to a workplace shall be (a) attended by a competent person, or (b) properly kept in locked and secured containers.
Safe location		(2) Explosives shall be kept at a safe location.
Explosives on conveyance		(3) Explosive materials shall not be kept on a conveyance unless they are in secure containers and attended by a competent person.
Storage beyond normal hours		(4) Explosives that are to be stored beyond normal working hours shall be returned to a licenced magazine or otherwise stored in accordance with the requirements of the <i>Explosives Act (Canada)</i> and its Regulations.
Storage beyond 90 days	14.26	(1) Explosives retained more than 90 days from the date of purchase shall be stored in a licenced magazine.
Surface storage		(2) When stored on the surface, explosives in excess of 75 kg (165 lbs.) and detonators in excess of 100 shall be stored in a licenced magazine.
Detonator storage	14.27	(1) Detonators shall not be stored with any other type of explosive materials.
Magazines for detonators		(2) Magazines or containers for detonators shall not be located (a) when underground, within 15 m (50 ft.) of any other explosives, or (b) when on the surface, within 50 m (165 ft.) of any other explosives.
Igniters		(3) Igniter cords, matches, pull wire lighters and other flammable accessories shall be stored separately from any detonators or explosives.
Smoking restriction		(4) No person shall smoke within 15 m (50 ft.) of any place or building where explosives are stored or while handling explosives.
Magazine inspection	14.28	Every magazine shall (a) be under the charge of a person authorized by the employer or owner who shall carry out a weekly inspection of the magazine,
Stock rotation		(b) have the stock of explosives rotated so that for each type and size of explosive, the oldest stock is used first,
Magazines locked		(c) on the surface of a mine or other site above ground, be kept locked at all times except when explosives are being moved,
Log book		(d) on the surface, have a current inventory of its contents in a special log book and all entries shall be signed by the authorized person in charge,
Housekeeping		(e) be kept clean, dry and free from grit at all times, and any spillage shall be cleaned up immediately,
Spilled explosives		(f) be kept free of broken explosive packages or spilled explosives, and when necessary the shelves and floors shall be treated with a suitable neutralizing agent to remove all traces of explosive substances,
Tidiness		(g) have its contents arranged in a tidy and organized manner including any explosives returned to it from a workplace, and
Exposed metal		(h) not contain any exposed iron or steel except for its fixtures.

DRILLING

- Previously blasted area** **14.34** (1) Drilling shall not be done in a previously blasted area until the area to be drilled is exposed and carefully examined for holes or remnants of holes containing explosive materials.
- Bootlegs** (2) If a hole or remnant of a hole containing explosive materials is found, those materials shall be detonated or removed prior to any other work commencing.
- Drill size** **14.35** Drill holes shall have sufficient diameter to permit free insertion of the explosive materials to the bottom of the hole without cutting, pounding, ramming or applying undue pressure on the explosive.
- Headings** **14.36** Development headings shall not be abandoned or work discontinued until
(a) the material broken at the firing of the last round has been cleared from the face, and
(b) the whole face of the heading is examined for explosives from missed or cut-off holes.
- Surface drilling** **14.37** No drilling shall be done on surface
(a) within 0.3 m (12 in.) of any hole that has been blasted or any remnant of such a hole, and
(b) within the greater of 5 m (16 ft.) or a distance equal to one-half the depth of another hole that contains explosives, unless it is being drilled pursuant to section 14.72(4).
- Underground drilling** **14.38** In an underground operation, before drilling or sampling begins at a working face, the following procedure shall be followed:
(1) The exposed face shall be
(a) washed with water, and
(b) carefully examined for misfires, cut-off holes and remnants of blasted holes.
(2) All remnants of blasted holes shall be conspicuously marked by
(a) a ring of contrasting paint or crayon, and
(b) inserting sticks or plugs into the holes for lifter remnants in a heading.
(3) Where operating conditions preclude the use of water
(a) an alternative safe method shall be used for checking each face for misfires and cut-off holes, and
(b) a written safe work procedure detailing the method shall be prepared and followed.
(4) Drilling or sampling shall not be done within
(a) 0.15 m (6 in.) of any hole that has been blasted or any remnant of such hole, and
(b) 1 m (3 ft.) of any hole containing explosives.
(5) Drilling and charging operations shall not be conducted simultaneously on the same face with one above the other or within 7.5 m (25 ft.) horizontal distance.

HANDLING EXPLOSIVES

- Blaster appointed** **14.39** A blaster shall be responsible for directing the work for any blasting operation.
- Safety fuse use** **14.40** (1) A worker shall not use safety fuses in an underground mine for blasting operations in chutes, draw points, passes or millholes.

Explosives in clothing		(2) Explosive materials shall not be kept in the clothing worn by any worker.
Detonators		(3) Any detonator or detonating connector (relay) shall be kept and handled separately from other types of explosive materials until the last practicable moment before bringing them together.
Stripping casing		(4) Explosives, other than blasting agents, shall not be stripped of protective casings or wrappers.
Electrical storms	14.41	(1) Upon the first sign of an electrical storm (a) the handling of explosive materials shall be suspended, (b) all persons shall be removed from the danger area, and (c) the danger area shall be guarded by the use of signs near the danger area and guards posted outside the danger area for the duration of the storm. (2) The blaster appointed by the employer shall determine the duration of the suspension of operations and that decision shall not be overruled by any supervisory personnel.
Igniters	14.42	(1) Other than a device used for igniting a safety fuse, no flammable material or open flame, including any ignited materials, shall be in proximity to explosive materials or within the blasting area. (2) Any explosive hardened by low temperature shall not be warmed near an open fire or a steam boiler or by direct contact with steam or hot water.
Heating explosives		(2) Any explosive hardened by low temperature shall not be warmed near an open fire or a steam boiler or by direct contact with steam or hot water.
Damaged or deteriorated explosives	14.43	Explosive materials that are stained, damaged, or deteriorated shall be examined by a blaster or other qualified person and where (a) the defect in any explosive is found to be slight, it may be used but only with a new explosive as a primer, and (b) any explosive materials are deemed to be unusable they shall be destroyed in a safe manner.
Containers with explosives	14.44	(1) A container or package that is known or suspected to contain explosive materials or residue of those materials shall be handled with care to prevent undue impact or exposure to excessive heat. (2) Any surplus box, carton or liner that contained explosive materials shall be collected and destroyed in a safe manner.
Destroying containers		(2) Any surplus box, carton or liner that contained explosive materials shall be collected and destroyed in a safe manner.
Unused explosives	14.45	(1) Any unused explosive materials shall be returned to a container or magazine or destroyed in a safe manner. (2) Explosive materials shall not be abandoned.
Non-sparking tool	14.46	Only a non-sparking implement designed for punching a hole in the cartridge of an explosive shall be used for that purpose.
Primers	14.47	(1) Primers shall be made up as close to the time they are used as is practicable and only in sufficient numbers for the immediate work. (2) Detonators, igniter cords, or other explosives shall not be transported in any conveyance, whether on the surface or underground, unless placed in separate, suitable closed containers.
Detonators transported		(2) Detonators, igniter cords, or other explosives shall not be transported in any conveyance, whether on the surface or underground, unless placed in separate, suitable closed containers.
Detonators kept separate		(3) A worker carrying detonators with other explosives from the nearest storage place to a point of use without placing them in a container shall keep them separate from the other explosives.
Made-up primers		(4) In no case shall made-up primers be transported.

LOADING HOLES

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| Holes examined | 14.48 | A hole shall not be loaded with explosive materials until it has been examined and, if necessary, cleaned. |
| Pneumatic loading | 14.49 | (1) When a hole is pneumatically loaded with a blasting agent, it shall be done by means of semi-conductive hose specifically designed for that purpose. |
| Grounding for pneumatic loading | | (2) A machine used for pneumatic loading shall be
(a) effectively grounded before and during the loading operation, and
(b) not grounded to a haulage rail, pipe line, or other similar conductor. |
| Order of loading | | (3) An electric detonator shall not be placed in a hole prior to the pneumatic loading of an explosive.
(4) A liner with any detonator shall not be placed in a hole prior to pneumatic loading of an explosive. |
| Non-sparking tools | 14.50 | (1) A loading pole or tamping rod made of a sparking material shall not be used to load or tamp an explosive. |
| Use of tamper | | (2) Tamping of an explosive shall be done with pressure, not impact. |
| Pressure on primer | | (3) Undue pressure shall not be exerted on any primer. |
| Equipment near loaded holes | 14.51 | (1) Except under the direction of a blaster, no motor vehicle or mechanical equipment shall be permitted closer than 6 m (20 ft.) to a loaded hole. |
| Connecting explosives | | (2) Except for the interconnection of charges in the same hole, no explosive charge shall be connected to another charge or attached to a trunk line until immediately before the intended time of detonation. |
| Loaded holes | | (3) Holes that have been loaded, whether primed or not, shall not be left unattended.
(4) A worker shall be posted to ensure that holes referred to in subsection (3) are not tampered with when the work crew is absent from the site. |
| Fuse length | 14.52 | (1) No fuse shorter than 1 m (3 ft.) shall be used. |
| Lighting fuses | | (2) No fuse shall be lighted at a point closer than 1 m (3 ft.) from the capped end. |
| Capped fuses | | (3) Capped fuses shall be supplied in standard lengths. |
| Firing with fuses | | (4) Where more than one charge is fired, each fuse connected to a charge shall be lighted by a suitable and reliable timing device. |
| Igniter cord | | (5) Where igniter cord is used, no connections shall be made to fuses until all holes are loaded. |
| Leaving blast area | | (6) Immediately after the ignition of igniter cord, all workers shall leave the workplace that will be affected by the blasting operation. |
| All loaded holes fired | | (7) All holes charges with explosives in one loading operation shall be fired in one blasting operation. |

ELECTRICAL BLASTING

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| Standards | 14.53 | (1) Electrical blasting circuit shall not be used within the minimum distance specified by <i>ANSI/IME 20-1988, Safety Library Publication entitled Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Commercial Electric Detonators (Blasting Caps)</i> , or other similar standard acceptable to the director. |
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- Minimum distance from radio transmitters** (2) Where the minimum distance has not been determined, no electrical blasting circuit shall be used within
- (a) 100 m (330 ft.) of any CB or other mobile or portable radio frequency transmitter, or
 - (b) 1000 m (3,300 ft.) of an AM, FM, TV or other fixed radio frequency transmitter.
- Alternate control of radio transmitters** (3) Where control of mobile transmitters cannot be maintained on a public highway
- (a) warning signs shall be posted to instruct operators of motor vehicles to turn off transmitters,
 - (b) where necessary, traffic control persons shall be posted to instruct operators of mobile transmitters to turn off transmitters, and
 - (c) blasting circuits shall be kept on the ground.
- Testing circuits** (4) Where a shot is fired electrically, the blaster shall test the electrical circuit with an approved circuit-testing device immediately before blasting.
- Blasting machine** **14.54** A blasting machine shall be under the care of a blaster.
- 14.55** (1) A blasting machine shall be
- (a) kept in good mechanical condition,
 - (b) tested, using methods specified by the manufacturer, on a regular basis and before any blast which may require the maximum output of the machine, and
 - (c) isolated from and not connected to the electrical blasting circuit until the blast is ready to be fired.
- Firing capacity marked** (2) The firing capacity shall be clearly marked on a blasting machine, and the capacity not exceeded.
- Batteries not permitted** (3) Dry- or wet-cell storage batteries shall not be used to fire an electric detonator.

BLASTING FROM POWERLINE

- Blasting switch** **14.56** (1) Electric detonators shall not be fired from a power line or from an electrical generator unless a blasting switch specifically designed for that purpose is used.
- Switch isolated** (2) During an electrical blasting operation, the blasting switch shall be inaccessible to all persons except the blaster and be isolated from the circuit until the blast is ready to be fired.
- Lighting and power circuits** **14.57** (1) Electric power from lighting or power circuits shall not be used for firing charges unless
- (a) the blasting circuit has an isolating transformer, and
 - (b) a special firing device that opens the blasting circuit by gravity is used.
- Blasting cable** (2) The blasting circuit conductors between the firing device and the blast site shall be No. 12 AWG or heavier, and be readily identifiable as blasting cable.
- (3) Where expendable connecting wire is used, it shall not be lighter than No. 20 AWG.
- Blasting switch** **14.58** Every electric power line blasting switch shall
- (a) have the live side of the device installed in a fixed box that is locked and accessible only to the blaster, and

Lightning gap		(b) incorporate a lightning gap <ol style="list-style-type: none"> i. of at least 1.5 m (5 ft.) between the blasting switch and the service switch, and ii. that shall only be closed by a twist-type plug and cord assembly immediately before firing.
Switch for multi-circuits	14.59	(1) Where a single blasting switch is used for several blasting circuits, an isolating switch equipped with short-circuiting means shall be installed in each circuit and located in a safe place.
Circuit conductors near power		(2) Blasting circuit conductors shall be kept at least 0.15 m (6 in.) away from power and lighting cables and from any electrical conductors.
Conductors insulated		(3) All blasting circuit conductors leading to a blasting site shall be insulated and, except when firing the blast, kept short circuited.
Wires disconnected	14.60	When blasting in more than one blast site from a main power line <ol style="list-style-type: none"> (a) lead wires shall be disconnected from the main line after a blast, and (b) no other blast shall be wired into the main line until lead wires from all fired blasts have been disconnected.
Wiring into main line		
Underground blasting	14.61	(1) Blasting in a shaft, shaft station or other workings being driven from a shaft shall be done by means of electricity <ol style="list-style-type: none"> (a) after the first 3 m (10 ft.) of advance has been made in the shaft, and (b) until such time as the permanent timbers and ladders have reached the level upon which blasting is being done. (2) Blasting in a raise, where free escape is not readily available, shall be done by means of electricity from a safe location outside the raise.

GUARDING OF BLASTS

Warning signs	14.62	(1) A blasting area shall be clearly identified by signs to prevent inadvertent access of vehicles, equipment or pedestrians.
Guard persons		(2) The blaster shall post guards as necessary to guard all possible access points to the danger area.
Instruction to guards		(3) The blaster shall instruct the guards as to their duties and responsibilities.
Guard stations		(4) Guards shall be posted at locations that are protected from flying material and other hazards resulting from the blast.
Guard duties		(5) Once assigned to a post by the blaster, a guard shall prevent all persons from entering the danger area.
Guard at post		(6) Guards shall remain at their posts until <ol style="list-style-type: none"> (a) the charge is detonated and the "All Clear" signal sounds, or (b) they are personally relieved by the blaster.
Guard on surface		(7) For surface blasts a signalling device, having a distinctive sound audible within the proximity of the danger area, shall be used to sound a warning of a blast. (8) A signalling code for surface blasts shall be established and posted at conspicuous locations outside the danger area.
Working adjacent to blast	14.63	Where parties are working adjacent to each other on surface or in connected workings underground, safe work procedures shall be implemented for blasting operations and blast times.

- Blast near openings** **14.64** Before any round is fired, when an active heading is within 8 m (26 ft.) of another opening or drill hole, the supervisor shall
- (a) make a thorough examination of the other opening, drill hole collar or the nearest point of intersection,
 - (b) satisfy himself or herself that the heading can be advanced in a safe manner, and
 - (c) ensure that any access to the nearest point of intersection with the other opening or drill hole is guarded.

RETURNING TO A BLASTED AREA

- 14.65** Following a blast, no person shall return or be allowed to return to a blasted area until
- (a) a minimum of 30 minutes has elapsed from the time the last shot is heard, where a blast has been fired with safety fuse and two or more shots or blasts are fired, or
 - (b) the firing cables have been disconnected from the blasting machine and the lead wires have been short-circuited, and
 - (c) the switches of the blasting circuit have been locked in the open position in the case of a blasting operation using a power or lighting circuit.
- 14.66** After a blast is detonated
- (a) no person shall enter a blasted area until
 - i. sufficient air has been introduced into the workplace to drive out or dilute the gases produced by the blasting operation to a safe level,
 - ii. the blaster has examined the blasted area for undetonated explosive materials and other hazards, and
 - iii. the blaster has given permission for work to proceed, and
 - (b) any hazards shall be identified by the blaster and controlled before other work resumes in the blasted area.
- 14.67** (1) A blaster shall not leave a blasted area before examining the area and attending to any undetonated explosive materials and other hazards caused by the blast.
- (2) Where unauthorized access to a blasted area is effectively prevented, and before any work commences, a blaster shall examine the area and give permission for work to proceed.
- 14.68** (1) Before other work is resumed in a blasted area, loose material on any face or slope shall be scaled, trimmed or otherwise stabilized by the use of equipment, machines and methods that minimize the hazard of injury to workers.
- (2) When loose material is being removed in a blasted area, precautions shall be taken to protect workers against undetonated explosive materials and other hazards that may exist.

MISFIRES

- 14.69** When a misfire occurs, no person shall return or be allowed to return to a blasted area
- (a) until a minimum of 30 minutes has elapsed when a misfire occurs or is suspected when using safety fuse, or
 - (b) until a minimum of 10 minutes has elapsed from the time the blasting cable was disconnected and short circuited when using electric or delay element detonators, or

- Charge burning** (c) until at least 60 minutes has elapsed when a charge is known or suspected to be burning or where post detonation fumes exist.
- 14.70** When there is evidence or suspicion of a misfired charge or undetonated explosive materials
- Minimum number of workers** (a) only the minimum number of persons required to correct the hazard shall be permitted in the blasted area,
- Hand removal of material** (b) no person shall use metallic equipment in the immediate vicinity of any explosive materials until after a blaster has directed the hand removal of as much broken material as possible, and
- Metallic equipment** (c) metallic equipment shall only be used to remove broken material if
- i. a blaster directs the use of the equipment,
 - ii. the illumination of the area is adequate, and
 - iii. precautions are taken to prevent injury to any person from accidental detonation.
- 14.71** Blasters shall ensure that they
- Shots counted** (a) count the number of shots exploding , when possible,
- Supervisor notified** (b) report to the supervisor where it is believed that any shot did not fire, and
- Misfires marked** (c) identify any misfired hole by inserting a conspicuous, non-metal marker at its outer end, or by roping the area off by any other manner approved by the supervisor.
- 14.72** (1) Any charge that has been misfired shall not be withdrawn, but blasted at a proper time and without delay.
- Blasting of misfires**
- Holes washed** (2) Where a mixture of ammonium nitrate and fuel oil has misfired it shall be washed out of the hole.
- Surface hole** (3) A misfired hole on the surface shall be clearly marked off for a distance of 8 m (26 ft.) around the collar of the hole.
- Drilling additional holes on surface** (4) Where an additional hole and charge are necessary for the blasting of a misfired charge on the surface, the blaster shall
- (a) determine the location, direction and depth of any hole necessary for blasting the misfired charge and supervise its drilling,
 - (b) ensure that the hole being drilled is at least 1.5 m (5 ft.) from any part of the misfired charge, and
 - (c) record in the daily examination and report book the location of any misfired shot remaining at the end of the shift.

UNDERWATER BLASTING

- 14.73** (1) Only explosive materials and blasting accessories having hydrostatic pressure and water resistant packaging or properties shall be used in an underwater blasting operation.
- Water resistant properties**
- (2) Whenever explosive materials are used in an underwater blasting operation, a blasting flag (International Code Bravo, a solid red flag) shall be displayed.
- Blasting flag**
- (3) Precautions shall be taken to prevent damage to structures in the danger area of an underwater blast.
- Nearby structures**
- (4) No underwater blast shall be detonated
- (a) when any diving operation or watercraft is within the danger area, and
 - (b) until the diving supervisor has given permission to the blaster to fire the charge.
- Detonation**

- Site examined** (5) After detonating an underwater blast, the site shall be examined by a blaster or by a competent diver who
- (a) has been instructed in the recognition of undetonated explosive materials and other blasting related hazards, and
 - (b) is under the direction of a blaster.
- Misfires** (6) The blaster shall ensure that misfires are properly handled and other blasting related hazards are removed.

SPECIAL EFFECTS BLASTING

- Certification** **14.74** Special effects blasting shall be carried out under the direction of a blaster certified in this specialty in accordance with the *Explosives Act (Canada)*, and its Regulations.

SEISMIC BLASTING

- Remote location** **14.75** Where explosives are transported on mobile drilling rigs
- (a) the vehicle shall be operated only in remote locations, where conventional means of transportation and storage of explosives are not practicable and where public safety is not a factor,
 - (b) less than 200 kg (440 lbs.) of explosives and 200 detonators shall be carried and stored in separate transportation containers built to *Type 6 Magazine Standard*, and
 - (c) explosives and detonator containers shall be
 - i. fitted with doors or lids facing at least 90 degrees apart,
 - ii. situated not less than 1 m (3 ft.) apart,
 - iii. so located that the contents are not endangered by heat sources on the drill unit,
 - iv. attended by the operator at all times that explosives are carried, and
 - v. emptied daily and explosives and detonators shall be transferred to a licenced magazine for overnight storage.
- Quantity of explosives**
- Containers**
- Unattended loaded holes** **14.76** When conducting seismic blasting
- (a) loaded holes shall not be left unattended, except in isolated locations,
 - (b) if the loaded holes are not blasted immediately, they shall
 - i. have leg wires shunted together and tucked into holes,
 - ii. be suitably use-identified and covered, and
 - iii. be recorded in the blaster's log, and
 - (c) loaded holes shall be blasted within 30 days of loading.
- Delayed blasts**
- Blast within 30 days**

AVALANCHE CONTROL

- Procedures submitted** **14.77** Proposed procedures for avalanche control shall be submitted to and accepted by the director prior to explosive charges being
- (a) dropped from a helicopter or other aircraft, or
 - (b) placed manually on site by workers, or
 - (c) projected by any means.
- Procedures reviewed** **14.78** Blasting procedures for avalanche control shall
- (a) be reviewed annually and any proposed changes to the accepted procedures shall be submitted to the director for approval, and
 - (b) include instruction that explosives are not to be primed until the last practicable moment, which means
- Priming explosives**

- i. when the explosives are as close to the control route as possible,
- ii in a safe, sheltered location, excluded from public access, and
- iii. the pull-wire lighter is not placed on the safety fuse assembly until immediately before placing the charge.

TABLE 14 – 1
Quantity-Distance Table for Blasting Explosives Hazard Division 1.1 and 1.5
 (columns explained on following page)

Quantity (kilograms)	Distance in metres					
	D2	D4	D5	D6	D7	D8
50	10	30	180	45	270	400
60	10	32	180	45	270	400
70	10	33	180	46	270	400
80	11	35	180	48	270	400
90	11	36	180	50	270	400
100	12	38	180	53	270	400
120	12	40	180	55	270	400
140	13	42	180	60	270	400
160	14	44	180	63	270	400
180	14	46	180	65	270	400
200	15	47	180	65	270	400
250	16	51	180	70	270	400
300	17	54	180	75	270	400
350	17	57	180	80	270	400
400	18	59	180	83	270	400
450	18	62	180	88	270	400
500	20	64	180	90	270	400
600	21	68	180	95	270	400
700	22	72	180	100	270	400
800	23	75	180	105	270	415
900	24	78	180	108	270	430
1000	24	80	180	113	270	445
1200	26	86	180	120	270	475
1400	27	90	180	125	270	500
1600	29	94	180	130	270	520
1800	30	98	180	135	270	540
2000	31	105	180	140	270	560
2500	33	110	185	153	275	610
3000	35	120	205	163	305	640
3500	37	125	220	170	330	680
4000	39	130	235	178	350	710
5000	42	140	255	190	380	760
6000	44	150	270	203	405	810
7000	46	155	285	213	425	850
8000	48	160	300	223	445	890

TABLE 14 – 1 (cont.)
Quantity-Distance Table for Blasting Explosives Hazard Division 1.1 and 1.5

Quantity	Distance in metres					
(kilograms)	D2	D4	D5	D6	D7	D8
9000	50	170	310	235	465	930
10000	52	175	320	240	480	960
12000	55	185	340	255	510	1020
14000	58	195	360	270	540	1080
16000	61	205	375	280	560	1120
18000	63	210	390	295	590	1180
20000	66	220	405	305	610	1220
25000	71	235	435	325	650	1300
30000	75	250	460	345	690	1380
35000	79	265	485	365	730	1460
40000	83	275	510	380	760	1520
50000	89	295	550	410	820	1640
60000	94	315	580	435	870	1740
70000	99	330	610	460	920	1840
80000	105	345	640	480	960	1920
90000	110	360	670	500	1000	2000

Explanation of Columns

- D1 & D3: These columns apply to factory operations, thus they have not been included.
- D2: This is the separation between two magazines, provided there is an effective barricade between them.
- D4: This is the required distance between a magazine and a very lightly traveled road.
- D5: This is the distance required between a magazine and most roads and highways. There is an overriding minimum distance of 180 m.
- D6: This is the minimum distance between barricaded magazines.
- D7: This column applies to very busy roads and to buildings where people may assemble. There is a minimum distance of 270 m to an isolated inhabited building and 400 m to groups of buildings.
- D8: This is the distance between a magazine and a building of vulnerable construction. Vulnerable construction includes high-rises, schools, hospitals, etc. There is an overriding distance of 400 m.

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