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PART 15 – SURFACE and UNDERGROUND MINES or PROJECTS

DEFINITIONS

15.01 In this part, the following definitions apply:

“bench”

means a horizontal step or floor above which material is excavated from a contiguous face and upon which drilling, blasting and material haulage may be conducted;

“catchment berm”

means a bench designed to arrest material which sloughs from a face or wall elevation above the face being worked;

“dam”

means a structure built to impound water in excess of 25 tonnes (27.5 tons) in an underground opening, and constructed in a manner to permit an unobstructed overflow of the water;

“dust exposure occupation”

means employment

- (a) in an asbestos mine, or
- (b) where a worker is required to work 20% of the working time in any one month
 - i. underground in a mine or project,
 - ii. in an open pit, quarry or surface mine,
 - iii. in crushing plants or assay grinding rooms,
 - iv. in operations involving dry milling or dry concentrating, or
 - v. in wet concentrating plants, where plants are not adequately separated from any crushing plants, or
- (c) in an area designated by the director as an area subject to dust exposure;

“first line supervisor certificate”

means a certificate issued by the director to a person who has met the training and experience requirements as established by the director and has successfully completed an examination administered by the director or a safety officer authorized by the director;

“hot-work”

means work that involves burning, welding, cutting, grinding, riveting, using fire or spark-producing tools, or other work that produces a source of ignition;

“machinery”

includes steam and other engines, boilers, furnaces, milling and crushing apparatus, hoisting and pumping equipment, materials-handling equipment, chains, trucks, tramways, blocks, tackle, ropes, tools, and all machines and appliances used in or in connection with a mine;

“manager”

means the worker appointed to be responsible for the management and operation of the mine;

“mine”

includes

- (a) a place where mechanical disturbance of the ground or any excavation is made to explore for or produce mineral-bearing substances, placer minerals, rock, limestone, earth, clay, sand, gravel, coal or carbonaceous material,

- (b) all cleared areas, machinery and equipment for use in servicing a mine or for use in connection with a mine and buildings,
- (c) all activities including exploratory drilling, excavation, processing, concentrating, waste disposal, and site reclamation,
- (d) closed and abandoned mines where there is work activity, and
- (e) surface and underground mines or projects;

“mining plant”

means any roasting or smelting furnace, concentrator, mill or place used for or in connection with washing, crushing, grinding, sifting, reducing, leaching, roasting, smelting, refining, treating, or research;

“mine rescue coordinator”

means a safety officer designated by the director as a mine rescue coordinator;

“pit”

means a working or undertaking for the purpose of opening up, proving, removing or extracting any unconsolidated metallic or non-metallic mineral or mineral-bearing substance, rock, earth, clay, sand or gravel by means of an open excavation in order to supply material for construction, industrial or manufacturing purposes;

“quarry”

means a working or undertaking for the purpose of opening up, proving, removing or extracting consolidated rock by means of an open excavation in order to supply material for construction, industrial or manufacturing purposes and includes an open pit mine;

“surface mine or surface project”

means a pit or quarry where metallic or non-metallic rock, mineral-bearing substance, earth, clay, sand, gravel, coal or carbonaceous material is being or has been removed by means of an excavation open to the surface to supply material for construction, industrial or manufacturing purposes and includes any work, undertaking or facility used in connection therewith;

“underground mine or underground project”

means a mine or project that is not a surface mine and includes any work, undertaking or facility used in connection therewith.

GENERAL APPLICATIONS

Notification of commencement

- 15.02** The director shall be notified in writing
- (a) one month prior to the commencement of any underground mine or project,
 - (b) one month prior to the commencement of any surface mine or project requiring the use of explosives to remove consolidated material,
 - (c) one month prior to the commencement of a diamond drilling operation,
 - (d) six months prior to the commencement of any underground mining of coal, and
 - (e) at least two weeks before the operations are to resume after a cessation of production of four months or more.

Drawings, plans, specifications

- 15.03** (1) Upon request of the director, written notice that includes the drawings, plans, specifications and other information required for an engineering review shall be provided to the director at least 30 days prior to
- (a) the development or construction of a mine or mining plant,
 - (b) the development or construction of a surface project requiring the use of explosives to remove consolidated material,

- (c) the introduction of a new process or mining technology,
- (d) the major alteration of a mining technique or mining technology,
- (e) the use of new methods of construction or equipment installation,
- (f) the making of any major alterations or additions,
- (g) the design of a system for transfer of fuel by gravity from the surface to an underground fuelling station,
- (h) the construction of a bulkhead or dam,
- (i) the construction of a tailings dam or any surface structure for impoundment of tailings, or
- (j) the design of a trolley line system, if the line of the system is to have an operating voltage greater than 300 volts.

(2) The drawings, plans and specifications required under subsection (1) shall be kept readily available at the workplace.

Information on site **15.04** Plans, drawings, sections, specifications and related information showing the current status of the underground mining operation or project shall be maintained at the site of an underground mine or project and made readily available to a safety officer, a member of the joint health and safety committee, and workers concerned, when requested. This information shall include

- (1) A surface plan showing the location of claims with mining operations and showing all lakes, streams, main roads, railways, power transmission lines, buildings, shaft openings, portals, surface workings, diamond drill holes collared on surface, dumps, and tailing ponds and their overflow.
- (2) An underground plan showing all underground workings, including shafts, tunnels, diamond drill holes, refuge stations, fuelling stations, escapeways, explosive magazine, lunch room, firefighting provisions, communication network, dams, and bulkheads.
- (3) Vertical cross-sections of the underground mine or project at suitable intervals and suitable azimuths, showing all shafts, tunnels, drifts, stopes, and other workings in relation to the surface, including the location of the top of the bedrock, surface and bottom of the overburden, and surface of a known body of water or watercourse.
- (4) Adequate ventilation plans showing the normal directions and volumes of the main air currents and locations of permanent fans, ventilation doors, stopes, and connections with adjacent underground mines or projects.

Names available on site **15.05** Notices shall be posted in conspicuous places at each mine or mining plant setting out the name, business address and business telephone number of

- (a) the director,
- (b) the person in charge of the mine or mining plant,
- (c) the employer at the mine or mining plant, and
- (d) the owner of the mine or mining plant.

Mine design **15.06** A design report shall be prepared and maintained

- (a) assessing the ground stability of the active and proposed workings of the mine or project,
- (b) including drawings, plans, specifications developed by or under the direction of a professional engineer,
- (c) based upon geo-technical engineering practices that
 - i. describe the geology of the mine,
 - ii. outline the geometry of existing and proposed excavations,
 - iii. describe previous occurrences of ground instability,
 - iv. describe the mining method including stope sequencing and blasting methods,

- v. specify the ground support system,
 - vi. describe measures planned and used to assess potential ground instability such as instrumentation and computer modeling, and
 - vii. shall be forwarded upon request to the director in accordance with section 15.03,
- (d) that will be assessed and updated at least annually and before any alteration is made to the mine that may significantly affect the ground stability of the mine or project, and
- (e) readily available at the mine site for review by the workers, a joint health and safety committee at the workplace, or a safety officer.

- Tailings dams** **15.07** A tailings dam or any other surface structure for the impoundment of tailings shall be
- (a) designed in accordance with good engineering practice by a professional engineer,
 - (b) constructed in accordance with the design of the professional engineer, and
 - (c) maintained so that the structure provides stability against any static and dynamic loading to which it may be subjected.

MINE CLOSURE

- Notice to director** **15.08** Written notice shall be given to the director at least 14 days prior to closing a mine and shall ensure that

- Openings protected**
- (a) when a mine has been closed down or work in it has been discontinued permanently or for an indefinite period, the entrances to the mine and all other pits and openings, dangerous by reason of their depth or other conditions, shall be fenced and kept securely fenced or otherwise protected against inadvertent access,
 - (b) prior to the mine operation closing permanently, all shafts or raise openings shall be
 - i. capped with a stopping or reinforced concrete, or
 - ii. filled and kept filled with material so that any subsidence of the material will not endanger any person, and
 - (c) the stopping prescribed in subsection (b)(i) shall be
 - i. secured to solid rock or to a concrete collar secured to solid rock, and
 - ii. capable of supporting a uniformly distributed load of 12 kPa (1.7 lb. per sq. in.), or a concentrated load of 24 kN (5,395 lbs.), whichever is greater.

- 15.09** When a mine is

- (a) closed down or the work in it has been discontinued
 - i. an accurate mine plan showing the boundaries of the mine workings and the mineral claims as of the closure date shall be submitted to the director within six weeks after the closure of the mine,
 - ii. all hazardous materials shall be stored or disposed of in a manner consistent with the requirements of these and other Regulations under the *Occupational Health and Safety Act*, or similar standards acceptable to the director, and a full list sent to the director, and
 - iii. all explosives, detonators and igniters shall be properly disposed of and not stored at any such closed mine without the written permission of the appropriate agencies and in accordance with Part 14 – Blasting, or
 - (b) abandoned, the power supply to the mine or mine plant shall be disconnected from the power source and the director notified in writing within 14 days of the power disconnection.
- Mine plan**
- Hazardous substances**
- Explosive materials**
- Power supply**

FIRE PROTECTION

Underground procedures	15.14	(1) Procedures shall be developed, implemented, communicated and followed in case of a fire in an underground mine or project, or in a structure or building on the surface at or near an underground mine or project.
Alarm test		(2) An alarm system shall be installed to warn workers of a fire in an underground mine or project.
Posted procedures		(3) A written copy of the procedures required by subsection (1) or extracts of them and a notice explaining the alarm system shall be posted in the shaft house and other conspicuous places where they will be obvious to workers.
Workers advised of procedures		(4) A supervisor shall instruct every worker in the procedures and the alarm system.
Fire alarm test		(5) A test of fire alarm procedures shall be conducted at least once every 12 months during each production shift.
Alarm type		(6) An alarm system in an underground mine or project shall <ol style="list-style-type: none">consist of the introduction into all workplaces of sufficient quantities of ethyl mercaptan gas or similar gas readily detectable and identifiable by all workers, andbe kept ready for immediate use.
Test report		(7) A report shall be kept of each test of the fire alarm procedures referred to in subsection (5) and be available at the mine or project for three years.
Refuge station	15.15	Where the fire procedure in an underground mine or project provides for the use of a refuge station for workers, the refuge station shall be <ol style="list-style-type: none">constructed of materials having at least a one-hour fire-resistance rating,of sufficient size to accommodate the workers to be assembled therein,capable of being sealed to prevent the entry of gases,equipped with a means of voice communication with the surface, andequipped with a means for the supply of compressed respirable air and potable water to accommodate the workers to be assembled therein.
Fresh-air base	15.16	A fresh-air base shall be <ol style="list-style-type: none">provided underground where necessary to serve as a base for rescue and recovery work,at least 30 square metres (323 sq. ft.) in area, andequipped with a means for the supply of potable water and respirable compressed air to accommodate the workers to be assembled therein.
Fire suppression system	15.17	A fire suppression system consisting of sprinklers, foam or other suitable means of suppressing fire shall be provided <ol style="list-style-type: none">in an underground mine or project<ol style="list-style-type: none">on equipment containing more than 100 litres (22 gal.) of flammable hydraulic fluids,in every storage area where more than 500 litres (110 gal.) of oil, grease or flammable liquids are stored, andin every service garage, andon the surface, in a building or structure, except a fan house located above or adjacent to an opening to an underground mine or project.
Fire fighting equipment	15.18	(1) Firefighting equipment with appropriate extinguishing agents shall be provided <ol style="list-style-type: none">at a fire hazard area,where an electrical installation or equipment may be a fire hazard,in or about a headframe,

		(d) in a building or structure on surface where a fire might endanger the mine entrance,
		(e) at a shaft station underground,
		(f) at the surface of every underground mine or project,
		(g) at every surface mine or project, and
		(h) in a mining plant.
Inspection of fire fighting equipment		(2) At least once each month in an underground mine or project, a competent person shall inspect and record in writing the condition of
		(a) fire-extinguishing equipment,
		(b) fire suppression systems,
		(c) fire hydrants, and
		(d) fire doors.
Flammable refuse	15.19	(1) In an underground mine or project, in or about a headframe or shaft house, flammable refuse shall be
		(a) deposited in covered, fire-resistant containers, and
		(b) removed at least once a week from the mine, project, headframe or shaft house.
Scrap timber		(2) Scrap timber shall be safely disposed of or removed from an underground mine or project.
Area free of flammable refuse		(3) Each supervisor shall submit a weekly written report to the employer certifying that there is no accumulation of flammable refuse in his or her area of responsibility.
Flammable materials		(4) Oil, grease and other flammable material shall not be kept or stored in a shaft house or in a portal house.
		(5) Flammable liquids with a flash point below 38 degrees C (100 degrees F) shall not be taken into any underground workplace.
Flammable liquids		(6) When oil, grease, and flammable liquids with a flash point between 52 degrees C (126 degrees F) and 38 degrees C (100 degrees F) are being
		(a) used underground, they shall be transported and stored in metal containers or receptacles, or in portable plastic containers for Petroleum Fuels as specified in <i>CSA Standard B376-M1980, Portable Containers for Gasoline and Other Petroleum Fuels</i> , or other similar standard acceptable to the director, and
		(b) stored underground, they shall be restricted in quantity to the requirement for
		i. the current day's work in the case of flammable liquids, and
		ii. seven days in the case of oil and grease.
Acetylene generation		(7) No device for the generation of acetylene gas shall be used underground.
Volatile fuel		(8) No internal combustion engine that uses gasoline, propane or other volatile substance as a fuel shall be used underground.
Gaseous material		(9) Propane or other similar fuel that is heavier than air when in a gaseous state shall not be underground, except when used for burning or cutting.
Compressed gases		(10) When propane or other similar fuel that is heavier than air is being used underground for burning or cutting, the containers for the fuel shall not be larger than 5 kg (11 lb.) in capacity.
No fires	15.20	No person shall build, start or maintain a fire underground.
Fire resistant construction materials	15.21	(1) Every workshop and lunchroom underground shall be
		(a) constructed of material with at least a one-hour fire-resistance rating, and

		(b) located and maintained so as to reduce the fire hazard to a minimum.
Noncombustible		(2) A structure housing a fan used in connection with a ventilation system for an underground mine or project shall be constructed of noncombustible material.
Fire hazard area	15.22	(1) A fire hazard area shall be identified by suitable warning signs. (2) Except where special precautions are taken and written instructions issued, no means of producing heat or fire shall be permitted in a fire hazard area.
Flammable gas encountered	15.23	(1) Where a flow of flammable gas is encountered in a drill hole underground or in an enclosed building housing a diamond drill on surface (a) the affected area shall be evacuated, (b) precautions shall be taken to prevent inadvertent entry of a person into the area, (c) a supervisor shall be notified immediately, (d) the air in the area shall be tested for explosive mixtures by a competent person, and (e) the area shall be designated as a fire hazard area. (2) In underground mines or projects where flammable gas is known to occur, workers underground and diamond drillers on surface shall be advised of (a) the probability of encountering a flow of such gas, and (b) the measures and procedures to be taken as prescribed in subsection (1).
Hot-work procedures	15.24	(1) Where welding, cutting or other hot-work equipment is used underground, or in a headframe, shaft house, or other surface building in which a fire may endanger the mine entrance or the underground workings, a procedure for the safe use of hot-work equipment shall be prepared in writing, signed by the supervisor in charge of the mine, and communicated to the workers.
Qualified person to do hot-work		(2) Only a worker who is a qualified person or is under the direction of a competent person shall use hot-work equipment.
Hot-work instructions		(3) In addition to the hot-work procedure required by subsection (1), written instructions shall be issued to the worker by a supervisor before the hot-work equipment is used respecting (a) the type of work, (b) the location of the work, (c) when the work is to be done, and (d) any special measures and procedures to be taken before, during and after the work.
Hot-work underground	15.25	Where hot-work equipment is used in a shaft, timbered area, or fire hazard area (a) the area adjacent to the particular workplace shall be wetted down, unless there is a hazard of freezing or the presence of electrical equipment i. before the work is begun, and ii. when the work is stopped and the worker using the hot-work equipment intends to leave, (b) the area adjacent to the particular workplace shall be examined for potential fire hazards i. before the work is begun, ii. when the work is stopped and the worker intends to leave the area, and iii. on at least one occasion approximately two hours after the work is stopped, (c) firefighting equipment suitable for extinguishing any potential fire shall be available, and

		(d) workers shall be protected from fumes, vapours or gases by <ol style="list-style-type: none"> i. ventilation, or ii. the wearing of respirators.
Escape exit underground	15.26	(1) Except during the initial stages of exploration and development of an underground mine or project, a separate escape exit shall be provided in addition to the opening through which workers are let into or out of the mine and the ore is extracted.
Escape exits		(2) The escape exit required by subsection (1) shall be <ol style="list-style-type: none"> (a) located more than 30 m (100 ft.) from the main hoisting shaft or ramp, (b) of sufficient size to afford an easy passageway, (c) provided with ladders, where necessary, from the deepest workings to the surface, (d) marked on all levels by signs and arrows pointing the way of exit to expedite escape, (e) made known to all underground workers who shall be instructed as to the route to the escape exit, and (f) inspected at least once a month by a competent person who shall give a written report of such inspection to the supervisor in charge of the mine or project.
Escape exit structure		(3) A structure covering the escape exit shall be constructed of material with at least a one-hour fire-resistance rating.
Boilers / engines	15.27	(1) A steam boiler or diesel engine shall not be installed within 30 m (100 ft.) of a shaft or other entrance to the underground mine or project.
Location of engines		(2) No internal combustion engine shall be installed, serviced, garaged or stored within 15 m (50 ft.) of the building housing the hoist or within 30 m (100 ft.) of a shaft or other entrance to the underground mine or project.
Fuel storage tanks		(3) No gasoline or liquid fuel shall be stored within 30 m (100 ft.) of a shaft or other entrance to the underground mine or project.
Water drainage		(4) The natural water drainage shall flow away from the shaft collar or other entrance to the underground mine or project.
Fire-resistant hoist structure		(5) Where a hoist is located above a shaft, the supporting and enclosing structures shall be constructed of material with at least a one-hour fire-resistance rating.
Procedures for fires	15.28	(1) Procedures in case of a fire shall be prepared by the supervisor in charge of the mine, project or mining plant, for <ol style="list-style-type: none"> (a) the surface of an underground mine or project, (b) a surface mine or project, or (c) a mining plant. (2) Written procedures required by subsection (1) shall be provided to all new workers, and posted in a conspicuous place where they will be obvious to workers.
Firefighting training		(3) A suitable number of workers at each mine, project or mining plant shall be trained in firefighting procedures, and <ol style="list-style-type: none"> (a) the names of such workers shall be posted in a conspicuous place, (b) such workers shall be tested for proficiency at least once a year, and (c) the results of these tests shall be recorded and the report kept on file.
Breathing air in hoist room	15.29	(1) In an underground or tower-mounted hoist room, where the normal air supply may become contaminated in an emergency, uncontaminated air shall be available to the hoist operator and cage tender by means of <ol style="list-style-type: none"> (a) an enclosed booth with a positive supply of uncontaminated air, or

- (b) one or more units of self-contained demand air or oxygen breathing apparatus, together with a fully charged cylinder of compressed air of at least 8.5 cu. m (300 cu. ft.) capacity.
 - (2) Every hoist operator and cage tender that may be required to use demand-breathing apparatus shall be trained and qualified in its use.
- Fire doors** **15.30** Fire doors in an underground mine or project shall
- (a) be installed to close off the shaft or main entrance, and the openings directly associated with them,
 - (b) be installed to close off
 - i. service garages, and
 - ii. oil storage areas where a total of more than 500 litres (110 gallons) of oil, grease or flammable liquid are stored, and
 - (c) have at least a one-hour fire-resistance rating.
- Fire exits** **15.31** (1) Except for a magazine, in addition to the main exit a second exit shall be provided from a building at a mining plant, convenient to and having easy communication with all rooms regularly occupied by a worker.
- Fire resistant doors** (2) Tower stairs equipped with doors and hardware of at least a one-hour fire-resistance rating shall be installed at each storey of a mining plant, including the basement.
- (3) Metal or other noncombustible fire escapes consisting of exterior stairways with railings and with landings shall be provided at each storey connecting directly with the interior of the building of a mining plant through metal or other doors with at least a one-hour fire-resistance rating.
- Exits unobstructed** **15.32** (1) Fire doors in an underground mine or project shall be maintained in proper order and kept clear of all obstructions.
- (2) The means of exit from a plant building shall be unobstructed and no door to a fire escape, tower stair or other smokeproof enclosure shall be prevented from closing or remaining closed.
- Fuelling storage tanks** **15.33** (1) The fuel tank of an internal combustion engine installed in a building shall be installed so that
- (a) the transfer of fuel to the tank takes place at a point outside the building,
 - (b) the fuel is conducted to the tank in a tightly jointed pipe or conduit, and
 - (c) the tanks are electrically bonded.
- Air from fuel tanks** (2) The air displaced from the fuel tank shall be conducted to a safe point outside the building before being discharged into the atmosphere.
- Flammable material containers** (3) Any dangerous, flammable or explosive material or substance in a solid, liquid or gaseous state, or any combination thereof, that is kept, stored or handled in a mining plant shall
- (a) be kept in a container suitable for the nature and state of the material or substance,
 - (b) be kept in a container with a label identifying the material or substance and warning of any hazards,
 - (c) be kept apart or insulated from any source of ignition or from temperatures likely to cause combustion, and
 - (d) where the material or substance is not intended for immediate use, it shall be kept, stored or handled
 - i. outside any building,
 - ii. in a building not used for any other purpose, or
 - iii. in a well ventilated compartment with at least a one-hour fire-resistance rating which is located in conformity with clause (c).

- Processes producing flammable mixtures** **15.34** A process that is likely to produce a gas, vapour, dust or fume capable of forming a flammable mixture with air shall be carried out in an area that
- (a) is isolated from other operations,
 - (b) has a system of ventilation that removes the gas, vapour, dust or fume,
 - (c) has no potential sources of ignition, and
 - (d) has vents, baffles, chokes, dampers or other means to reduce the effects of any explosion, as may be required.
- Air compressors underground** **15.35** When installed underground, an air compressor driven by a prime mover exceeding 25 kilowatts (35 hp) shall be
- (a) designed and installed so as to minimise the hazard of fire or explosion due to the accumulation of carbonaceous material in the air system, and
 - (b) provided with protective devices that prevent its operation if
 - i. the temperature of the air at the discharge line is in excess of normal,
 - ii. the temperature of the compressor cooling water and cooling air is in excess of normal, or
 - iii. the flow and pressure of compressor lubricating oil is below normal.

MINE RESCUE

- Mine rescue station specified** **15.36** Mine rescue stations shall be established, equipped, operated and maintained at such places and in such manner
- (a) as a professional engineer or other competent person may certify,
 - (b) as the director may accept, and
 - (c) as a safety officer may direct as conditions in the mine change or as mining progresses.
- Training** **15.37** (1) A sufficient number of workers including supervisory personnel shall be trained and assigned to the mine rescue crews and related responsibilities.
- Trainer** (2) A competent person shall be appointed as a trainer for mine rescue teams.
- Team training** (3) The mine rescue team members shall be trained by the mine rescue coordinator or other mine rescue trainer.
- Training information** (4) Information regarding the mine rescue training and operation shall be provided upon request to the director, mine rescue coordinator or safety officer.
- Candidates** (5) A candidate for the mine rescue team shall possess physical qualifications and competency necessary for mine rescue work.
- Training facility** (6) Training facilities shall be provided by the mine or project owner and the workers shall be trained in mine rescue work at the owner's expense.
- Costs** (7) A mine rescue operation shall be under the direction of a supervisor in charge of the mine or project and the costs of the rescue operation shall be at the expense of the owner of the mine or project.
- Notice of rescue action** (8) As well as the notice required by the *Occupational Health and Safety Act*, notice shall be given immediately to the mine rescue coordinator and to the director when the services of a mine rescue crew are required.

ELECTRICAL

- Standard** **15.38** (1) Unless otherwise noted in these Regulations, all electrical equipment shall be installed, maintained and operated in accordance with *CSA Standard M421-00, Use of Electricity in Mines* in conjunction with the *Canadian Electrical Code*, or other similar standard acceptable to the director.

Increasing capacity	(2) Prior to the introduction of electricity in a mine, or the increase in capacity of the existing installation by more than 500 kV, the director shall be advised and supplied with plans and specifications.
Plan preparation	(3) Plans and specifications shall be prepared by a professional engineer and contain <ul style="list-style-type: none"> (a) the proposed electrical installation and the areas in the mine to which the electrical energy is to be transmitted and used, and (b) the dimension of the mine openings in which the electrical cables will be installed and the clearance around the electrical equipment in the distribution centre where electrical energy is to be used underground.
Over 300 volts underground	(4) On all underground distribution systems over 300 volts, suitable instruments or devices to indicate the presence of ground faults shall be installed and maintained.
Ground faults	(5) If the system detects a ground fault, the fault shall be immediately located and disconnected at the source of the ground fault.
Emergency shut-off	(6) Where electrical energy is taken underground, provision shall be made so that the current can be cut off on the surface.
Control device for underground power	(7) A control device for underground electrical energy shall not be accessible to any other person except those in charge of such device and, if not located in a supply station, shall be in a separate room or screened-off enclosure.
Switch gear	(8) Switch gears installed underground shall be built of noncombustible materials and fixed in vertical position on a metal frame.
Switchboards	(9) Underground switchboards shall be recessed from haulage-ways and have a floor on which water cannot accumulate.
Submersible pumps	(10) A submersible pump that has power supplied by a portable trailing cable shall be provided with ground fault protection to limit ground fault current to a maximum of 25 amps and to automatically isolate the supply in the event of a ground fault.
Mobile equipment	(11) Supply systems for mobile electrical equipment shall be tested before being put into service, and at least once every 12 months thereafter, to prove the effectiveness of the ground fault tripping and the ground conductor monitoring circuits.
Test records	(12) A record of the tests required under subsection (11) shall be kept at the mine and available for examination by a safety officer.

SURFACE MINES, PITS AND QUARRIES

	15.39 Where clay, sand, gravel or other unconsolidated material is being worked or removed
Material removed	(a) the removal of such material shall not be done by undercutting or undermining that poses a hazard to workers at the face,
Working face	(b) no working face shall have a vertical height of more than 3 m (10 ft.), (c) where the material being removed from the face exceeds 3 m (10 ft.) in thickness, removal shall be done in terraces or benches, unless the material is maintained at a suitable angle to ensure the safety of workers in the area,
Vertical face	(d) the vertical face shall not be greater than the reach of the loading equipment where unconsolidated material may collapse,
Sloped face	(e) the height of the working face shall not be more than 1.5 m (5 ft.) above the reach of the equipment being used unless the working face is sloped at an angle that is stable, and

Worker near face		(f) a worker on foot shall come no closer to the working face of a pit than 1.3 times the height of the working face unless the working face is <ol style="list-style-type: none"> i. maintained at a suitable angle to ensure safety, or ii. benched to limit the vertical height of the working face to not more than 1.2 m (4 ft.).
Material near rim of face	15.40	(1) All trees and other vegetation, clay, earth, sand, gravel, loose rock or other unconsolidated material lying within 2 m (7 ft.) of the rim of a working face or wall in a surface excavation shall be removed to a distance that ensures the material will not fall into the excavation.
Sloped material		(2) All the unconsolidated material beyond 2 m (7 ft.) of the rim of a working face or wall shall be sloped to an angle less than the natural angle of repose.
No overhangs		(3) No part of a face or wall of a surface excavation shall be allowed to overhang.
Material on bench or berm	15.41	(1) Where metallic or non-metallic rock is being removed from a surface excavation, no loose rock or soil shall be allowed on a bench or a catchment berm in a manner that poses danger to the workers below.
Cleaning berms		(2) Where loose rock or soil has accumulated, posing danger to workers on lower benches or berms, and access cannot be gained to clean the catchment, a safe work procedure shall be developed and used to remove the material.
Restricted access to pit		(3) Every pit or quarry, dangerous by the reason of its conditions or depth, shall be securely fenced or otherwise protected against inadvertent access.
Excavation near property line	15.42	(1) Excavation in sand, clay, or gravel or other unconsolidated material shall not be carried on within a setback distance of 5 m (16 ft.) horizontal from the vertical plane of the property boundary.
Excavation at toe of face		(2) Material excavated from the inside edge of the setback shall be cut so that the slope is not steeper than 1.5 horizontal to 1.0 vertical, and any material that sloughs in this area shall be left in place.
Haul-road width	15.43	(1) A haulage road shall be designed, constructed and maintained to provide <ol style="list-style-type: none"> (a) a travel width <ol style="list-style-type: none"> i. not less than three times the widest haulage vehicle used where dual lane traffic exists, or ii. not less than two times the widest haulage vehicle used where only single lane traffic exists, and (b) a shoulder barrier or berm <ol style="list-style-type: none"> i. at least three quarters of the height of the largest tire on any vehicle hauling on road, ii. located and maintained along the edge of the haulage road wherever a drop-off greater than 3 m (10 ft.) exists, and iii. incorporating breaks that do not exceed the width of the blade of the equipment constructing and maintaining the breaks to allow for drainage and snow clearance.
Haul-road berm		(2) The width of the shoulder barrier referred to in subsection (1)(b) is not included in the width required in subsection (1)(a).
Runaway lane		(3) Clearly marked emergency runaway lanes or retardation barriers shall be provided and maintained at suitable locations and be capable of safely bringing a runaway vehicle to a stop, where the road grade exceeds 5%.
Dump area	15.44	(1) A dump or stockpile on the surface shall be examined either by the supervisor or other competent person

- (a) before materials are dumped where no dumping has been carried out for four hours or more,
 - (b) at least at an interval of not more than four hours during each shift when material is being dumped,
 - (c) with the examination results entered in a record book kept for that purpose, and any report from the dump person shall also be recorded in the record book, and
 - (d) with any abnormal and hazardous findings communicated verbally to the dump person and others in the area.
- Bumper clock** (2) Where material is dumped from a vehicle over a bank or bench, a bumper clock or a ridge of material shall be provided to act as an effective stop block.
- Dump stability** (3) Material shall not be dumped from a vehicle over a bank or bench where the ground at the dumping place may fail to support the weight of a loaded vehicle.
- Material removal at dump** (4) Material from the bottom of a dump or stockpile shall not be removed if there is reason to believe that a worker may be injured due to the removal.
- Barrier at dump opening** (5) Where dumping is from a vehicle into a bin, raise or other opening, a barrier of sufficient size and strength shall be provided and anchored to prevent the vehicle from entering inadvertently into the raise, bin or opening.
- Dump warning signs** (6) A barrier shall be placed and a sign installed across the entrance saying "No entry for dumping purposes" to effectively prevent access where any dumping is prohibited or hazardous.
- Dump from moving truck** (7) Where material is to be discharged from the elevated box of a moving haulage truck, a safe working procedure shall be prepared and followed.
- 15.45** No worker shall drive or operate a haulage vehicle in such a manner as to
- Stable dump** (a) dump from a vehicle at a location where there is reason to believe that the ground is not capable of supporting the loaded vehicle, and
- Backing onto dump** (b) move the vehicle backward to the dumping position or begin dumping until receiving verbal directions or standard visual signals or audible signals from the dump worker
- i. except where the bank is more than 3 m (10 ft.) high and the dumping position is 3 m (10 ft.) from the dump berm crest, or
 - ii. where an effective berm of sufficient size and strength has been provided to prevent the loaded vehicle from overturning.

UNDERGROUND MINES AND PROJECTS

- 15.46** (1) A workplace in an underground mine or project shall
- Water in work area** (a) be kept free from accumulations or flow of water that might endanger a worker in the area, and
- (b) have a drainage system to conduct excess water to a pumping system capable of pumping the water to surface for disposal.
- Water accumulation** (2) Where accumulations of water are likely to be present
- (a) a borehole shall be drilled at least 6 m (20 ft.) ahead of the working face to protect against a sudden breakthrough of the water, and
 - (b) precautions shall be taken to control the flow of water.
- Water pump** (3) A positive displacement water pump shall be equipped with a relief valve or system.

Water in raise		(4) Precautions shall be taken to guard against an accumulation of water in a chute or raise where the material in the chute or raise may block drainage.
Intersected drill holes marked	15.47	When drilling in a diamond drill hole in an underground mine or project is discontinued or an intersection with the drill hole is made (a) intersected drill holes shall be clearly marked at the collar and any points of intersection or breakthrough with a single capital letter "H" that is i. located within 1 m (3 ft.) of the collar or intersection, and ii. at least 0.3 m (1 ft.) by 0.3 m (1 ft.) in size,
Drill holes guarded		(b) drill holes shall have the approach to the collar or to any intersection or breakthrough securely closed off or guarded, i. when mining is in progress towards the hole, and ii. when blasting is to be done within 5 m (16 ft.) of an intersection of the hole, and
Drill holes on plans		(c) drill holes shall be shown on the plans of the underground mine or project.
Underground support	15.48	(1) Every adit, tunnel, stope, or other underground opening, where a worker may be exposed to the danger of rock fall or rock burst while working or passing through, shall be supported by wooden or steel support structures, casing, lining, rock-bolts or combination of any of these to make the openings secure and safe.
Potential rock burst		(2) Where ground condition indicates that a rock burst or uncontrolled fall of ground may occur, the condition and the corrective action taken shall be recorded in writing in the daily log book and signed by the shift supervisor.
Work areas examined		(3) A competent person shall examine all working sections of an underground mine or project at least once during each shift.
Non-work areas examined		(4) Non-working sections of an underground mine or project that are not barricaded or to which access is not prevented shall be examined at least once a month.
Scaling tools		(5) An adequate quantity of properly dressed scaling bars, gads, and other equipment necessary for scaling shall be provided in working sections.
Manways unsafe		(6) All entrances to a manway shall be closed off or signs placed indicating the manway is unsafe to travel through when it is being repaired or the condition inside is unsafe.
Dust suppression		(7) An accepted method of dust suppression shall be used in any tunnel or shaft where dust creates a hazard to workers.
Ladders, platforms	15.49	(1) Where ladders are installed underground or in a headframe in conjunction with a shaft, and the ladders are inclined at more than 70 degrees from horizontal (a) the manway shall be provided with substantial platforms at intervals not greater than 7 m (23 ft.), (b) the ladders shall be offset at the platforms, (c) platforms shall be fully enclosed, except for openings to permit the passage of a worker, and (d) the ladders shall be placed over the openings of the platforms below if installed in a shaft manway.
Ladders in angled manway		(2) Where a manway is inclined at less than 70 degrees to horizontal, and the ladders are continuous, the provisions of subsections (1)(a) and (c) shall be adhered to. (3) Where a manway is inclined at less than 50 degrees to horizontal, there shall be a platform at the point of ladder offset.

- Manway size** (4) Where a manway is the only means of access for mine rescue purposes, the opening shall be large enough for such purpose.
- Conveyors underground** **15.50** An underground conveyor shall have
 (a) devices that guard against excessive slip between the belt and the drive pulley, and
 (b) a fire suppression system at the driven end, unless fire retardant belting is used or the conveyor is continually attended by a worker.
- Connecting headings** **15.51** (1) A connection between active workings shall not be made until a competent person has thoroughly examined both workings.
 (2) Where possible, no connection between an advancing heading and an abandoned heading shall be made until both workings have been examined.
 (3) The point of connection shall be guarded as an entry when blasting within 9 m (30 ft.) of a breakthrough.
- Buildings near underground entrance** **15.52** (1) Any portion of a building within 15 m (50 ft.) from a headframe or an entrance to any underground workings, whether or not attached to them, shall be constructed of noncombustible materials.
 (2) The remaining portion of a building described in subsection (1) shall be made of noncombustible construction or separated by a firewall of four-hour fire-resistance rating.
- Fire doors** (3) Every adit, tunnel or incline covered by a building shall have a fire door
 (a) made of metal or metal covered,
 (b) suitably hung at a place not more than 15 m (50 ft.) from the mouth, and
 (c) arranged so that it can be closed from inside and outside of the building by a pull wire or cable.
 (4) Other fire doors shall be installed where considered necessary by a safety officer.
- Snowsheds** (5) Snowsheds connecting the entrance of an underground mine or project to surface buildings shall not be built unless the construction is such that a fire at a surface building will be prevented from reaching the entrance.

UNDERGROUND HAULAGE

- 15.53** Except for motor vehicles propelled by compressed air, every locomotive, engine, trolley or motor vehicle used above or below ground shall be equipped with
- Audible signals** (a) a suitable audible signal
 i. maintained in proper working condition, and
 ii. that shall be sounded when starting and at other times as a warning of danger, and
- Lights** (b) headlights and taillights maintained in proper working condition unless they are being used in adequately lighted buildings or areas.
- Operator seat** **15.54** (1) The locomotive operating platform shall be provided with a suitable seat and an adequate guard for the protection of the motor operator.
- Deadman control** (2) Every storage battery and trolley locomotive shall be equipped with a deadman control switch and a control lever so installed that the lever cannot be removed when the power is on.

FOPS		(3) Each trackless vehicle employed underground shall be fitted with a falling object protective structure (FOPS).
No unauthorized riders	15.55	(1) In mechanical haulage on any level, drift or tunnel in or about an underground mine or project, no unauthorized person shall ride on any vehicles.
Transporting workers		(2) Only vehicles approved for transporting workers shall be used to transport workers.
Operator at controls		(3) Every storage battery and trolley locomotive, when manually operated, shall be operable only when the operator is in the proper position at the controls.
Haulage-way clearances	15.56	(1) Where mechanical track haulage is employed underground, a clearance of 0.3 m (1 ft.) on one side and 0.6 m (2 ft.) on the other side shall be maintained between the sides of the haulage-way and the cars, and a safety station provided every 30 m (100 ft.). (2) Where trackless equipment is employed underground, a minimum clearance of 1.5 m (5 ft.) shall be maintained between the sides of the haulage-way or workings, and the haulage equipment. (3) On all levels where track or trackless haulage is employed, all backs of haulage-ways and lips of draw points shall be constructed so they provide a minimum of 0.3 m (1 ft.) clearance to (a) the top of the FOPS, or (b) motor operators when they are sitting in the normal operating position.
Travelways		(4) All regular travelways shall be maintained clear of debris or obstructions that are likely to interfere with safe travel.
Safety stations		(5) On levels regularly used for pedestrian traffic and trackless haulage, where there is a minimum clearance of less than 2 m (6 ft.) between the sides of the haulage-way and equipment, clearly marked safety stations shall be cut at intervals not exceeding 30 m (100 ft.). (6) A safety station consists of a recess in the wall of a haulage-way and shall be at least (a) 1 m (3 ft.) in depth, in addition to any existing clearance between the vehicle and the wall, (b) 2 m (6 ft.) in height, (c) 1.5 m (5 ft.) in width, (d) clearly marked, clean and free of obstruction, and (e) cut as close to perpendicular as is practical to the haulage-way.
Unattended equipment	15.57	(1) No electric haulage locomotive shall be left standing unattended unless the brakes have been set and the control lever placed in the neutral position. (2) When a storage battery haulage locomotive or trackless equipment is left unattended, the main switch shall be placed in a non-operating position.
Track switches		(3) Every switch in a track, either above or below ground, on which cars are moved by mechanical power, shall have its frog provided with a guard block of wood or iron if the track is not laid out to reduce the hazard of a worker's foot getting caught.
Diesel equipment standard	15.58	(1) Trackless diesel-powered equipment for underground mines, other than coal mines, shall comply with <i>CSA Standard M424.2-M90, Non-Rail-Bound Diesel-Powered Machines for use in Non-Gassy Underground Mines</i> , or other similar standard acceptable to the director.
Application for diesel		(2) Before using a diesel engine in any underground mine or project, an

		application form as prescribed by the director shall be completed and submitted.
Information on diesel equipment	(3)	For each piece of diesel-powered equipment operating underground, a record containing the following information shall be maintained: <ul style="list-style-type: none"> (a) the company identification number, (b) the make and model of the piece of equipment, (c) the prescribed ventilation rate in cubic metres per second required, (d) the maximum rated load in kilowatts, (e) the maximum speed at the maximum rated load in revolutions per minute, and (f) the maximum fuel injection rate at the maximum rated load and speed in kilograms per hour.
Ventilation for diesel equipment	(4)	A chart shall be maintained, with the procedures for the use and operation of diesel-powered equipment, that sets out <ul style="list-style-type: none"> (a) the actual volume of air flowing in the underground haulage-ways and workings where the equipment is operating, and (b) the total ventilation requirements for the equipment when it is operating normally in a single continuous course of air.
	(5)	The chart shall be posted in a location where it is clearly visible and readily accessible to the operator of the diesel-powered equipment.
Diesel logbook	15.59	(1) A logbook shall be provided to record the particulars of each diesel engine including all prescribed requirements.
Diesel fuel standard		(2) The fuel for a diesel engine shall conform with <i>CAN/CSGB Standard 3.16-99, Mining Diesel Fuel</i> , or other similar standard acceptable to the director.
Volatile fuels	15.60	(1) Internal combustion engines that use gasoline, propane or other volatile substances as a fuel shall not be used in an underground mine or project.
Engine shut-off		(2) A piece of mobile diesel equipment shall not be left unattended underground while the engine is running.
Brakes set		(3) A piece of mobile diesel equipment shall be parked with brakes set and secured against inadvertent movement.
Cool down for diesel		(4) When a piece of mobile diesel equipment is parked, it shall be allowed to cool down as established by the manufacturer's specifications.
Equipment master switch		(5) Where an operator leaves a piece of equipment, the master switch shall be turned off.
	15.61	Prior to the operation of diesel-powered equipment in an underground mine or project
Refuelling station construction		(1) Any underground refuelling station shall be properly constructed and equipped.
Ventilation requirement		(2) The ventilation system shall be mechanically controlled, and capable of supplying to the operating area an air current <ul style="list-style-type: none"> (a) of sufficient volume to dilute all the exhaust gases of the equipment to a concentration that does not exceed the permissible levels as in the <i>Occupational Health Regulations</i>, (b) of at least 0.06 cubic metres per second for each kilowatt (100 cfm/brake HP) of power of the diesel-powered equipment operating in the workplace, (c) that will reduce the time-weighted average exposure of a worker to airborne respirable combustible dust to not more than 1.5 milligrams per cubic metre of air.

- Carbon monoxide from diesel** (3) The undiluted exhaust gases from a diesel engine shall contain less than 1,000 parts per million by volume of carbon monoxide.
- Carbon monoxide testing** (4) Tests shall be made to determine
- (a) at least weekly, the volume of air flowing in underground haulage-ways and workings where diesel equipment is operating,
 - (b) the carbon monoxide content of the undiluted exhaust discharging to atmosphere
 - i. at least weekly, and
 - ii. immediately following repairs to the engine which may have altered its combustion characteristics,
 - (c) at least weekly, the carbon monoxide content of the atmosphere at the operator's position,
 - (d) at least weekly, the nitrogen dioxide content of the atmosphere at the operator's position, and
 - (e) at least every three months, the aldehyde content of the atmosphere at the operator's position.
- (5) Tests shall be made at least weekly to determine the methane content or flammable gas content of the atmosphere in underground haulageways and workings where diesel equipment is operating and where methane or other flammable gases exceed 10% of the lower explosive limit.
- (6) The results of each test performed shall be entered in a book which is available to a safety officer and the joint health and safety committee or the health and safety representative.
- Haulage-way grades** (7) No haulage-way grade shall be greater than 15 degrees.
- Diesel equipment requirements** (8) The locomotive or equipment shall be equipped with
- (a) an efficient headlight and means for giving audible warning signals,
 - (b) an efficient non-toxic fire extinguisher placed within easy reach of the operator, and
 - (c) an efficient scrubber for the exhaust gases.
- Diesel fuel quality** (9) The fuel for a diesel engine shall have
- (a) a flash point greater than 52 degrees C (125 degrees F) when tested by a closed cup method, and
 - (b) a sulphur content less than 0.25 percent by weight.
- Starting fluids** (10) Gasoline or other volatile fuel shall not be used in the starting mechanism of a diesel engine.
- Service garage, fuelling station** **15.62** (1) A service garage or fuelling station underground shall
- (a) be designed and protected to prevent inadvertent entry of an uncontrolled motor vehicle,
 - (b) be located so that in the event of fire or explosion in the service garage or fuelling station, there will be a minimum effect on working areas of the mine or project, or on underground installations including shafts, magazine, refuge stations, transformer and other installations,
 - (c) have a concrete floor without service pits in the floor, and
 - (d) be equipped with a system to contain spills of oil and grease.
- Service garage size** (2) A service garage shall accommodate the longest and widest vehicle that will use the station, with adequate clearance to permit safe performance of all work therein.

Fuelling station location

(3) A fuelling station shall be established before a heading has advanced 250 m (820 ft.) from the ramp or shaft, unless vehicles can be fuelled at another fuelling station.

(4) A fuelling station shall be separate from a service garage.

Mobile fuel tank

(5) Where a mobile fuelling supply tank is used, the tank shall be clearly labelled with "No Smoking" signs.

Fuelling vehicles

15.63 (1) A vehicle shall be fuelled only at a fuelling station.

Fuel spills

(2) Any spillage of oil or fuel shall be cleaned up at once, deposited in a fireproof receptacle and removed from the mine without undue delay.

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