

MLITSD Inspection Initiative: Storage, Use, and Handling of Explosives in Surface and Underground Mines

July 21, 2022

Welcome to the webinar: MLITSD inspection initiative on storage, use, and handling of explosives in surface and underground mines

- Thank you for joining us!
- We will be getting started at **10:00 am ET**
- Please use the **Q&A** at the bottom of your screen for speaker questions and we will answer them at the end of the webinar.
- Please use the **chatbox** for commentary or technical questions.
- A link to the webinar recording, a copy of the presentation slides, and reference material will be emailed to registrants within a few days.

Webinar co-hosts

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Agenda

- Introduction
- Focus of the initiative and importance
- What MLITSD Mining Health and Safety Inspectors will be looking for during the storage, use, and handling of explosives hazards initiative in surface and underground mines
- Pertinent Legislation
- MLITSD resources
- Federal and Ontario requirements pertaining to storage, use, and handling of explosives in surface and underground mines workplaces (Occupational Health and Safety Act, Regulation 854)
- Q & A

MLITSD Initiative Overview

The purpose of the inspection initiative:

- Review training, knowledge, and experience of mine personnel on explosives storage, handling, use
- Reviewing and evaluating explosives storage, handling, use programs
- Review risk assessments to address hazards associated with storage, use, and handling of explosives
- Assess the effectiveness of mine policies, procedures, programs associated with storage, use, and handling of explosives
- Observe safe storage, use, and handling of explosives practices
- Review warning signs, or other safeguards used to protect workers from storage, use, and handling of explosives

Ministry of Labour, Immigration, Training and Skills Development

EXPLOSIVES

**Storage, use, and handling of explosives in
surface and underground mines**

Mining Health and Safety Program

Storage, use, and handling of explosives in surface and underground mines

Phase 1: Education, outreach and awareness

July 21, 2022 to September 30, 2022

Compliance support with Workplace Safety North

Phase 2: Inspection blitz

August 1, 2022 to September 30, 2022

Disclaimer

- The purpose of today's presentation is to assist the workplace parties in understanding their obligations under the Occupational Health and Safety Act (OHSA) and its regulations. It is not intended to replace the OHSA or the regulations, and reference should always be made to the official versions of the legislation.
- It is the responsibility of the workplace parties to ensure compliance with the legislation and the presentation does not constitute legal advice. If you require assistance with respect to the interpretation of the legislation and its potential application in specific circumstances, please contact your legal counsel.
- Ministry of Labour, Immigration, Training and Skills Development (MLITSD) inspectors will apply and enforce the OHSA and its regulations based on the facts as they may find them in the workplace. This presentation does not affect their enforcement discretion in any way.

Overview

- Why is the MLITSD conducting an explosives initiatives
- What to Expect During an Inspection
- Areas of focus and key priorities
- Resources

Storage, use, and handling of explosives in surface and underground mines

WHY IS THE MLITSD CONDUCTING AN EXPLOSIVES INITIATIVES?

- Where explosives are used, the potential for serious or fatal injury, as well as significant property damage is always present.
- The safe use of explosives requires that explosives are only used for their intended and designed purpose.
- Workers must be properly trained before being assigned to use and handle explosives safely.
- Explosives must be securely stored and accounted for at all times.
- Inspector feedback has indicated a need for a concerted review of field practices of explosive storage and handling.

Storage, use, and handling of explosives in surface and underground mines

WHAT TO EXPECT DURING AN INSPECTION

- While this presentation will reference specific sections of Regulation 854 which serve to highlight key focus areas for the safe storage, use and handling of explosives initiative, employers are reminded that all regulatory requirements in Regulation 854 Part VI EXPLOSIVES (Sections 121 to 154) require compliance.
- During the initiative, MLITSD inspectors will check for compliance with these regulation as well as any other applicable regulatory provisions such as the inclusion of the use of explosives in the site risk assessment as per section 5.1, 5.2 and 5.3 of Reg. 854.
- In addition to Reg. 854, MLITSD inspectors may also check for compliance with requirements as set out in the OHS Act such as training, procedures, supervision, etc.

AREAS OF FOCUS AND KEY PRIORITIES

- Requirements related to magazines located on surface.



MAGAZINES AND EQUIPMENT

123. (1) Explosives kept or stored on the surface shall be kept or stored in compliance with the *Explosives Act* (Canada) and the regulations under that Act. O. Reg. 272/97, s. 20.

(2) If a magazine is required, it shall be,

a) constructed in conformity with “Storage Standards for Industrial Explosives, May 2001” published by the Explosives Regulatory Division (ERD) of Natural Resources Canada”;

Note: Storage Standards for Industrial Explosives referred in Federal Explosives Regulations were updated, and are now the CAN/BNQ 2910-500 Magazines for Industrial Explosives

(b) located in conformity with the User Manual, Quantity Distance Tables published by the Explosives Regulatory Division of Natural Resources Canada”;

Note: The User Manuals Quantity Distance Tables for Industrial Explosives referred in Federal Explosives Regulations were updated, and are now the CAN/BNQ 2910-510 Explosives Quantity Distances

FEDERAL MAGAZINES AND EQUIPMENT

Effective security procedures designed to control access to magazines and their contents are essential to mitigate the risk of explosion and losses due to improper handling or theft.

Magazines used to store explosives should meet the following requirements:

- Protected against weather conditions.
- Protection from physical damage.
- Fire protection.
- Protection against theft.
- Protection from the effect of explosions occurring in adjacent magazines.

Note: The specific requirements for surface magazines are identified in **CAN/BNQ 2910-500 Magazines for Industrial Explosives**

MAGAZINES AND EQUIPMENT

Quantity-Distance Principles

The explosives Quantity-Distance Tables can be found in the National Standard of Canada - **CAN/BNQ 2910-510/2015 standard.**

This standard:

- Establishes the minimum separation distances to be used between potential explosion sites (PES) and exposed sites (ES) to reduce the risk to life and property.
- Applies to all locations in which a quantity of manufactured explosives are stored.

AREAS OF FOCUS AND KEY PRIORITIES

- Requirements related to underground explosive storage.



MAGAZINES AND TEMPORARY STORAGES

- Explosives stored underground must be stored in magazines or in suitable containers at locations removed from drilling and blasting operations where quantities are less than 160 kg. Mines will ensure all locations including temporary storages are identified on mine plans. The mine will ensure there are procedures for storage areas that are not magazines. (Reg. 854, Section 125).
- Suitable storage locations for underground explosive storages and magazines must be located 60 metres from the main access, key mechanical and electrical installations, refuge and other gathering areas, from fuel or flammable storages and protected against vehicle impact. Storage locations must be marked with a “**DANGER EXPLOSIVES**” sign (Reg. 854, Section 126)
- All magazines and storages must ensure dry conditions, good housekeeping and proper disposal of packaging and wrappings. (Reg. 854, Section 128)

EXPLOSIVES INVENTORY CONTROLS

- The oldest explosives if not defective within the magazine are used first. (*Reg. 854, Section 128*)
- Explosive that is unattended shall not be left in or about any working place but shall be returned to storage (*Reg. 854, Section 128*)
- Detonators and capped fuse shall be stored in a separate, suitable, closed storage container located at least eight metres from any other explosive. (*Reg. 854, Section 128*)
- Weekly inspection reports and magazine log books are completed and under the control of a competent person. (*Reg. 854, Section 127*)

DAMAGED EXPLOSIVES DISPOSAL

- Written procedures have been established for the safe disposal of damaged explosive products. (Reg 854, Section 128)
- Procedure for the safe disposal of damaged explosives communicated to workers. (OHSA, Section 25(2)(a))



EXPLOSIVES HANDLING

- Procedures for safe handling of explosive products have been developed. OHSА, Section 25(2)(a)
- Workers assigned to transport and handle explosives have been trained in explosives handling procedures. OHSА, Section 25(2)(a)
- Workers have the appropriate common core specialty modules for handling and using explosives. (Reg 854, Section 11)
- Precautions and procedures for transporting explosives with mobile equipment or shaft conveyance are communicated and enforced. (Reg 854, Section 133)
- Explosives are removed without delay from the shaft stations or other underground entrances to the magazine or use location by the safest direct route. (Reg 854, Section 134)

EXPLOSIVE TRANSPORTATION

Mobile Equipment transporting explosives on surface and underground must:

- Mobile equipment be kept in sound mechanical condition;
- be conspicuously marked by red signals or flags easily visible from front, rear and both sides;
- have all metal parts that could come in contact with containers of explosives covered with wood, tarpaulin or similar non-sparking material;
- not be used to transport other goods or materials at the same time as explosives are being transported;
- be equipped with a type BC fire extinguisher;
- not be loaded in excess of its rated carrying capacity;
- have explosives secured or fastened so as to prevent any part of the load from becoming dislodged;
- transport detonators with other explosives only if the detonators are,
 - in a suitable container in a separated compartment, and
 - 5,000 or less in number;
- be attended at all times; and
- carry only those persons necessary for handling explosives.
- travel less than 10 km/h,
- have designated right of way

(Reg 854 Section 131, 132, 135)

BULK EXPLOSIVE HANDLING MOBILE EQUIPMENT UNDERGROUND

- A bulk explosives vehicle shall be provided with a fire suppression system that uses sprinklers, foam or some other suitable means of suppressing fire.
- Shall be parked in a suitable place designated as a safe parking place identified on mine plans when not in use.
- Shall not be parked in a magazine.
- There are procedures for inspection and cleaning frequency of bulk explosives vehicles equipment prior to servicing or repairs.

(Reg 854 Section 135.0.1)

REPORTING REQUIREMENTS TO THE MLITSD

- Employers have been and will continue to report to the MLITSD any occurrence of careless placing or handling of explosives as required. (*Reg 854, Section 122(3)*)
- Employers are submitting the required “Notice of Use or Storage” annually or prior to use as appropriate. (*Reg 854, Section 123(4)*)
- Employers have been and will continue to report to the MLITSD any occurrence of defective explosive products as required. (*Reg 420/21, Section 4 sets out the prescribed reporting requirements for section 53 under the OHSA*)

RISK ASSESSMENTS

Regulation 854 requires all employers to conduct risk assessments of the workplace for the purpose of identifying, assessing and managing hazards, and potential hazards, that may expose a worker to injury or illness. The risk assessment requirements are outlined in sections 5.1, 5.2, and 5.3.

Under these provisions, an employer must develop and maintain, in consultation with the joint health and safety committee and health and safety representative, if any, measures to eliminate, where practicable, or to control, where the elimination is impracticable, the hazards, and potential hazards, identified in the risk assessment.

This would include any measures the employer has put into place to mitigate the risks associated with the storage, handling and use of explosives. The results of these risk assessments should be considered in the development of measures to protect the health and safety of workers.

Additional Resource Material

- [Regulations for Mines and Mining Plants](#)
- [Final Report: Mining Health and Safety Prevention Review](#)
- [CAN/BNQ 2910-500 Standard for Industrial Explosives](#)
- [CAN/BNQ 2910-510 Explosives Quantity Distances](#)
- The MLITSD has developed a [Risk Assessment and Management for Mines and Mining Plants Guideline](#) to help workplace parties understand how to identify, assess, and control workplace hazards.

Workplace Health and Safety Snapshot for Ontario Mining Sector in 2021



24,971
Full-time employees

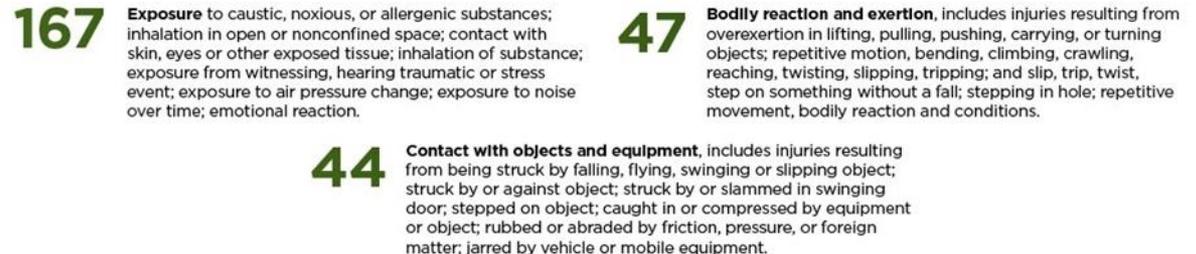
1 Injury Work-related fatalities
1 Disease*
1,267 Total Injuries
311 Lost-time Injuries
5.07 Total Injury rate per 100 workers
+10.65% Change in Injury rate from previous year**

Events resulting in lost-time injury or illness

Injury or illness severe enough to require one or more days lost from work



Most common lost-time injuries



Top 3 Occupational Diseases

Based on approved WSIB claims for healthcare, being off work, loss of wages, or permanent disability



*Disease fatality claims with a fatality effective date of 2021. Source: Workplace Safety and Insurance Board Enterprise Information Warehouse as of March 31, 2022. NAICS codes: 10200, 212220, 212232, 212233, 212299, 212314, 212315, 212316, 212317, 212326, 212392, 212393, 212394, 212395, 212397, 212398, 213117, 213119. WSN June 2022.
 ** The number of lost-time injuries increased from 150 in 2020, to 311 in 2021, due to 157 COVID-19 approved claims.

Mining Health and Safety Infographic

The traumatic fatal injury of a worker was a result of a run of muck.

Construction and Inspections of Surface Magazines and Equipment

- **Are explosives and detonator magazines on surface been designed and constructed in compliance with relevant legislation and using proper engineering standards?**
 - Federal Requirements (Explosive Act Canada - current to May 16, 2022, Explosive Regulations, 2013 - Amended on November 2, 2018, and current to June 1, 2022)
 - Construction must meet the requirements under the Explosives - Magazines for Industrial Explosives Standard of Canada CAN/BNQ 2910-500/2015 (R 2022) - materials shall conform to the *National Building Code* of Canada
 - Location of Surface Magazines - must meet requirements under the Explosives for Quantity Distances CAN/BNQ 2910-510 (R-2022)

Construction and Inspections of Surface Magazines and Equipment (continued...)

- **Surface magazines (explosives and detonators) physical inspection by competent persons on an established frequency (set out in terms and conditions of license), considering the following:**

- Notifications/Licenses
- Capacity/quantity
(Type 1, Type 4, Type 9, Type 12)
- Security
- Housekeeping
- Signage
- Stock rotation
- Electrical hazards
- Compatibility of product
- TACN (Tetraamine Copper Nitrate)



Type 4 (left) and 9 (right) magazines (source: PROTEXPLO)



TACN formation (source: Ministry of Energy, Mines and Low Carbon Innovation, BC)

Construction and Inspections of Underground Mine Magazines and Equipment

- **Underground explosive and detonator (cap) magazines and storage area location (Section 126 of Regulation 854) and construction compliant with legislation and using proper engineering standards:**
 - Construction/Location - 60 m from
 - Main access to the mine (shaft or ramp)
 - Key mechanical and electrical installations
 - Refuge station or other areas of congregation
 - Areas of fuel and other potential source of fire (battery charging station)
 - Future development
 - Security
 - Surrounding area
 - Access

Construction and Inspections of Underground Mine Magazines and Equipment (continued...)

- **Underground explosive and detonator (cap) magazines and storage areas inspection by competent employees as per Section 127 of Regulation 854, considering the following?**
 - Condition of the magazines, and the explosives and detonators
 - Housekeeping
 - Signage
 - Electrical Hazards
 - Ventilation
 - TACN (Tetraamine Copper Nitrate)
 - Quantities of explosives stored
 - Capacity/Quantity
 - Detonators
 - Stock rotation
 - Product compatibility
 - Reports/records kept for a period of at least six months

Construction of Surface and Underground Mine Magazines and Equipment

- **Protection from Sources of Ignition:**
 - Are storage areas designed and built with the appropriate standards ensuring all sources of possible inadvertent initiation have been identified?

Management of Surface and Underground Mine Magazines and Equipment

- **Weekly Inspection Reports/Records** - Underground mine magazine requirements are specified under Regulation 854 - *Mines and Mining Plants*:
 - Are inspection reports/records written
 - Are they kept for at least six (6) months (Section 127. (3) of Regulation 854)
 - Are checklists used for inspections
 - Are deficiencies recorded and corrected in timely fashion
 - Is there a classification system for identified deficiencies

Surface mines are covered under Federal Regulation such as the Explosive Act Canada and Explosive Regulations.

- **Are there special storage requirements for trial products?**
- **Is there a program in place to prevent unauthorized use of trial products?**

Management of Surface and Underground Mine Magazines and Equipment (continued...)

- **Inventory and Control - Explosive Products and Equipment:**
 - Is there an inventory of all equipment that is used with detonator and explosives products?
 - Is there a formal procurement policy for the purchase and commissioning of equipment related to explosives and their use?
 - Are records kept for explosives received and issued?
 - When explosive products are received, are checks made to ensure purchase order specifications are met?
 - Have any issues with compatibility between new and existing product been identified prior to a product being introduced on surface or underground?
 - When establishing trials for explosive products has a formal risk assessment been completed identifying the scope and timeframes associated with the testing?

Management of Surface and Underground Mine Magazines and Equipment (continued...)

- **Inventory and Control - Explosive Products and Equipment (continued...):**
 - Have all personnel been made aware of the testing of new product including end user's maintenance, emergency response and supervision?
 - Have mill, dry/custodian, security, maintenance personnel been made aware of reporting/handling procedures?

Management of Surface and Underground Mine Magazines and Equipment (continued...)

- **Disposing of old and /or Damaged Explosive/Detonator Products:**
 - Has a risk assessment been done on the hazards of disposing of old or discarded detonators and explosive products?
 - Has a procedure been developed regarding the safe disposal of damaged explosive products?
 - Is the standard procedure implemented, communicated and enforced?
- **Administration:**
 - Has the Joint Health and Safety Committee been involved as the Regulations prescribe?
 - Are explosives magazines in the control of a competent person?

Management of Surface and Underground Mine Magazines and Equipment (continued...)

- **Maintenance of Explosives Related Equipment:**
 - Is there a preventative maintenance program in place for equipment related to explosives and blasting?
 - Has a procedure been developed for the pre-inspection of equipment to be serviced on site or sent off site for service?
 - Is there a formal program in place to ensure all supplier notifications are shared with appropriate user and maintenance personnel?
 - Is there a formal maintenance program for the central blast system that includes isolation from detonating cables, power lighting and communication cables and pipes, rails and other continuous metal circuits?

Management of Explosive Products in Surface and Underground Mines

■ **Transportation and Handling:**

- Are written procedures established for employees transporting explosive materials:
 - On surface
 - In the shaft
 - Underground
- Are written procedures established for the guarding of blasts for:
 - Surface
 - Underground
- Is there a written procedure for post-blast examination following all blasts?

Standard Operating Procedures for Surface and Underground Blasting

- **Are written procedures established for following:**
 - Preparation of face/bench
 - Drilling in face and/or bench
 - Secondary blasting
 - Misfires or misfired holes
 - Frozen holes (cap detonated but the not the explosive column)
 - Signage
 - Barricades
 - Fly rock
 - Remote drilling
 - Squeeze slashes
 - Construction projects
 - Air traffic
 - Wind direction/speed

Standard Operating Procedures for Surface and Underground Blasting (continued...)

- **Are written procedures established for secondary blasting at the following location:**
 - Chutes
 - Crushers
 - Passes
 - Hang-ups
 - Grizzlies
 - Draw points
 - Oversize muck
 - Storage bins

Standard Operating Procedures for Surface and Underground Blasting (continued...)

- **Are written procedures established for blasting in the vicinity of diamond drill holes?**
- **Is there a written standard established that controls and/or restricts the use of radio transmitters around detonators, magazines and blast sites?**
- **Have workers been provided instruction on the dangers of handling explosives?**
- **Is there a program established for the monitoring of lightning and electrical storms?**
 - Surface
 - Underground

Training Requirements

- **Have appropriate employees received formal training involving the use of explosive materials including:**
 - Transporting/handling
 - Storage
 - Loading
 - Inspections
 - Fly rock- prevention of damage to surroundings, protection of blaster and site personnel.

- **Is refresher training provided to employees involved in the handling and use of explosive materials?**

Training Requirements (continued...)

- **Have all personnel/public, who may be at risk of exposure, been identified and trained in hazard identification related to explosive products?**
 - New workers, young workers and temporary/contractual workers
 - Security
 - Maintenance personnel

Emergency Preparedness

- **Has an emergency preparedness risk assessment been completed, looking specifically at explosives?**
- **Has the findings of this risk assessment been formalized in the policies and procedures at the site?**
- **Have the workers/staff/emergency responders received training on emergency measures to be taken in case of fire/flood/fall of ground, etc.?**
 - Location of fire extinguishers and instructions as per use, explosive fire how will a fire be handled.
- **Has the emergency response plan been communicated to other responders Mutual Aid agreements etc. Surface Fire Brigades?**

Investigation / Reporting Requirements

- **Have standards been established to comply with explosive legislative requirements including?**
 - Notices
 - Licenses
 - Inspections
 - signage
- **Are incidents involving explosive materials formally investigated?**
- **Is there a process to ensure that recommendations arising from an investigation are dealt with in an established time frame?**
- **Are appropriate agencies notified when incidents occur?**

Investigation / Reporting Requirements (continued...)

- **Is there a system in place to ensure identified deficiencies are corrected in a timely manner?**
 - Notices
 - Licenses
 - Explosive legislative requirements
 - Training
 - Inspections
 - Transporting of explosives
 - Blasting vicinity of diamond drill holes
 - Radio transmitters around detonating materials
 - Incident investigation
 - Storage requirements - surface and underground
 - Purchasing/delivery of explosives

Investigation / Reporting Requirements (continued...)

- **Is there a system to regularly report on reasons why deficiencies are not corrected in the time frame established?**
- **Is there a system to implement recommendations made in various program activities including?**
 - Incident investigation
 - Formal training
 - Refresher training
 - Transporting of explosives
 - Engineering standard modifications

Investigation / Reporting Requirements (continued...)

- **Is there a system to regularly report on the reasons why JHSC recommendations may not be implemented?**
- **Are audits conducted of the “explosives” program element at least every two years? Part of your Management Health and Safety Program.**

Information and Resources (Free Download)

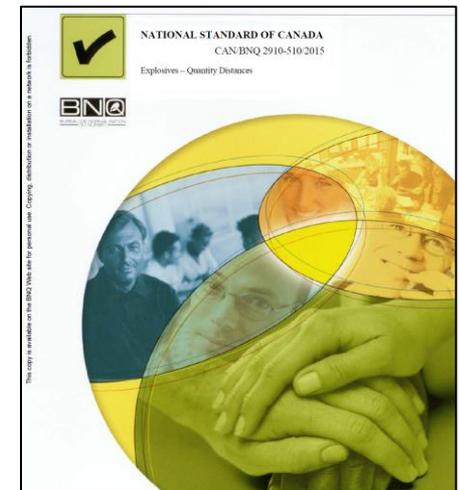
1. **Explosive Act Canada** - current to May 16, 2022, last amended on February 26, 2015, <https://laws-lois.justice.gc.ca/eng/acts/E-17/page-1.html>

2. **Explosive Regulations, 2013** - Amended on November 2, 2018, and current to June 1, 2022, <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2013-211/page-1.html>



Information and Resources (Free Download)

- 2. Explosives Standard of Canada - CAN/BNQ 2910-500/2015 (R 2022),**
<https://www.bnq.qc.ca/en/standardization/protection-and-safety/magazines-for-industrial-explosives.html>
- 3. National Standard of Canada - CAN/BNQ 2910-510/2015 Explosives - Quantity and Distances,**
<https://www.bnq.qc.ca/en/standardization/protection-and-safety/explosives-quantity-distances.html>





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