Mining webinar: New diesel exposure limit for underground mines in Ontario

September 7, 2023

1 888 730 7821 (Toll free Ontario)
workplacesafetynorth.ca

Welcome to the webinar: New diesel exposure limit for underground mines in Ontario

- 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.

Workplace Safety North

ONTARIO MINE RESCUE

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2023 Amendments to Regulation 854 (Mines and Mining Plants)

Ventilation requirements for diesel-powered equipment in underground mines

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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 this 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.

Amendments to Regulation 854

- On April 11, 2023, the Minister announced that amendments to Regulation 854 (Mines and Mining Plants) under the *Occupational Health and Safety Act* had been approved.
- Amending regulation O. Reg. 69/23 is posted on e-Laws and the amendments have been incorporated into Regulation 854 on e-Laws.

July 1, 2023	September 1, 2023
• Updates to standards in sections 1, 1.1, 30, 71, 119.1, 195, 228, and 251 • Changes to ground control sections (s. 6 and 72) • Ladderways on surface (section 48) • New section for IPCs (s. 51.1) and other hoisting updates (sections 226, 232, and 248) • Vehicles on rails (s. 103.1 and 103.2) • Modular training updates (s. 11.2.3 and 11.3) • Battery charging stations (s. 261)	• Management of change (section 5) • Supervisor duties (sections 63 and 64) • Seismic Risk Management (section 71.1) • Explosives (sections 121, 123, 124, 125 and 129) • Airborne Hazard Management (section 182) • Diesel-Powered Equipment, Air Flow and Elemental Carbon OEL (sections 183-183.4) • Ventilation & Heat/Cold Stress (s. 252-255, 286) • Reagents, Eyewash, Antidotes (s. 268-270, 282)

Main Topics:

- Changes to Regulation 854 for:
  - Managing airborne hazards in all mines and mining plants
  - The ventilation requirements for the use of diesel-powered equipment in underground mines
- Compliance considerations
- Services available to help support compliance (WSN)

Key amendments regarding the use of diesel-powered equipment include:

- **Section 182:** airborne hazard management program (all mines and mining plants)
- **Section 183:** general requirements for diesel-powered equipment used in underground mines
- **Section 183.1:** airflow rates where diesel-powered equipment is operated in underground mines
- **Section 183.2:** occupational exposure limit for elemental carbon from diesel emissions in underground mines
- **Section 183.3:** worker exposure testing in underground mines
- **Section 183.4:** tailpipe testing of diesel-powered equipment in underground mines

Airborne Hazard Management Program (Section 182)

Overview

- The AHMP requirement aims to protect the health and safety of workers by effectively managing and minimizing exposure to airborne contaminants and hazards in mining environments.
- The regulation requires that employers at mines and mining plants develop and maintain an airborne hazard management program (similar to existing requirements to have water management and traffic management programs).
- The program focuses on recognizing, assessing, and controlling airborne hazards and their associated risks to prevent occupational diseases caused by exposure to these hazards.
- The program needs to be developed in consultation with the joint health and safety committee or health and safety representative, if any, and set out measures to eliminate or control airborne hazards identified as part of the workplace risk assessment required under section 5.1 of Reg. 854 and address issues including testing, monitoring or sampling.
- The program must be reviewed periodically (at least annually) to ensure its effectiveness and workers need to be provided with appropriate information, instruction and training.

Airborne Hazard Management Program (Section 182)

Compliance Considerations

The airborne hazard management program complements other requirements, including risk assessment and management of change.

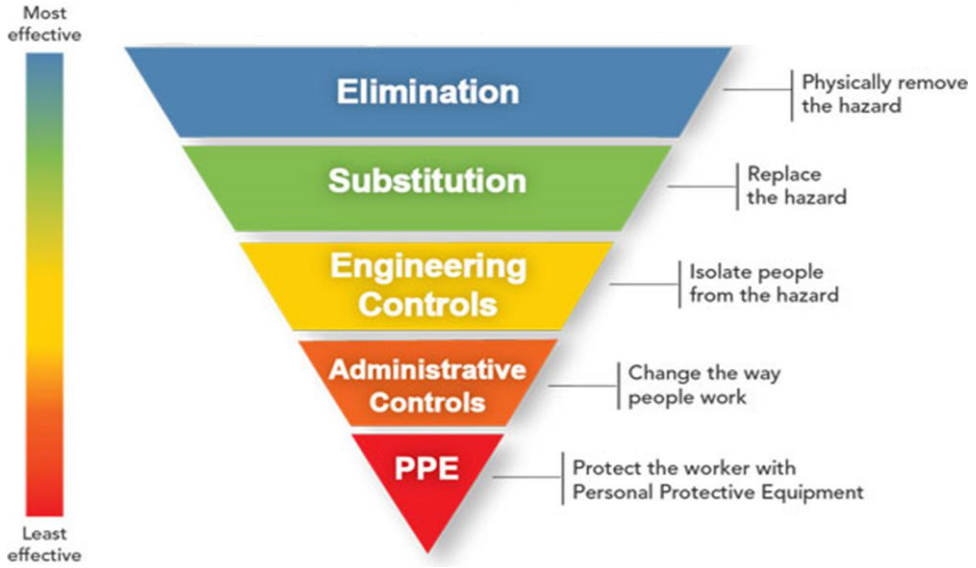
MLITSD Hygienists may assist Inspectors to assess compliance with the airborne hazard management and diesel exhaust requirements of Reg. 854, as they continue to assess compliance with other regulations that deal with occupational hygiene issues including the following:

- O. Reg. 833: CONTROL OF EXPOSURE TO BIOLOGICAL OR CHEMICAL AGENTS (ontario.ca)
- O. Reg. 860: WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) (ontario.ca)
- O. Reg. 381/15: NOISE (ontario.ca)
- O. Reg. 632/05: CONFINED SPACES (ontario.ca)
- O. Reg. 278/05: DESIGNATED SUBSTANCE - ASBESTOS ON CONSTRUCTION PROJECTS AND IN BUILDINGS AND REPAIR OPERATIONS (ontario.ca)
- O. Reg. 490/09: DESIGNATED SUBSTANCES (ontario.ca)

Airborne Hazard Management Program (Section 182)

Compliance Considerations

- Airborne hazard management is based on industrial hygiene science.
- MLITSD Hygienists may check to see that:
  - The workplace is aware of sources, components and health effects of airborne hazards
  - Testing has been done to assess the extent of exposure
  - Worker exposure is controlled in accordance with the hierarchy of controls



Ontario

CONTROLLING DIESEL PARTICULATE MATTER IN UNDERGROUND MINES

More effective | ELIMINATION | SUBSTITUTION | ENGINEERING CONTROLS | ADMINISTRATIVE CONTROLS | PPE | Less effective

PROACTIVE CONTROLS

Reduce or eliminate diesel particulate emissions before they enter the workplace air

Proactive controls — More effective

Alternative Energy

Involves replacing diesel equipment with alternatives such as electric. ↓↓↓↓

Replacing or repowering old equipment

Newer engines must meet much stricter emissions regulations. Replacing an engine or a piece of equipment with a newer model will significantly decrease emissions. The level of reduction depends on the old and replacement equipment. ↓↓↓

Rebuilding engines

Manufacturers often offer upgrade kits that can be incorporated into an engine rebuild to improve emissions. ↓

Aftertreatment systems

A variety of different aftertreatment systems are available. Emissions reductions depend on the type of filter chosen, as well as the engine and load. Particulate reductions can range from 20-95%. ↓↓

Idling technology

Idling technology works by automatically turning off the engine when the vehicle idles. The emissions reductions will be greater for equipment that spends a high proportion of time idling. ?

Preventive maintenance

Maintenance keeps all parts of the engine, as well as any emissions control systems, functioning optimally. Poorly maintained engines can produce significantly more emissions than an engine in good condition. ↓

Idling policies

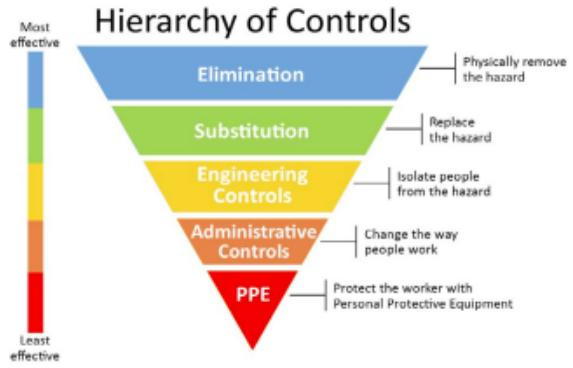
Idling increases both emissions and engine wear. Idling policies limit the amount of time an engine can be idled. ?

AVERAGE REDUCTIONS

Average particulate matter exposure reductions based on published data

- <50% ↓
- 50-85% ↓↓
- 85-99% ↓↓↓
- 100% ↓↓↓↓
- Varied/Unknown: ?

Reactive controls — Less effective



General ventilation

General ventilation dilutes emissions by bringing clean air into the area. The reductions vary depending on the volume of air provided. It also helps reduce ambient air concentration of non-diesel hazards, as well as helping with temperature control. ?

Enclosed cabs

When properly functioning, enclosed cabs protect the operator, but do not protect the surrounding workers. ↓↓

Tele-operating

Tele-operation allows the operator to be in a safe location, such as a filtered control room on the surface. Reductions in exposure can be up to 100% if the operator is completely removed from the site. Other workers may still be exposed if they enter the work area, or if emissions circulate to other areas of the mine. ↓↓↓

Operator training

Training can include driving skills, how to recognize maintenance issues, proper use of diesel control technologies, and the health effects of diesel exhaust. ?

Scheduling and site planning

Control the number of diesel engines operating in an area. Schedule workers during times when fewer diesel engines are working. ?

Monitoring emissions

An emissions monitoring program is critical for ensuring that diesel controls are functioning properly. ?

Respirators

PPE should be used as a last resort, and is not a replacement for other controls. The concentration of diesel exhaust in the air should still fall below the regulatory limit. When used, respirators should be fit-tested, and training should be provided to wearers. ?

REACTIVE CONTROLS

Remove diesel particulate emissions from the workplace air, or reduce the likelihood that workers will inhale particulate emissions

Occupational Cancer Research Centre

Towards a cancer-free workplace

www.occupationalcancer.ca/2017/controlling-dpm-in-mining

General Requirements for Diesel-Powered Equipment (Section 183)

Record Keeping

- Diesel-powered equipment first used in an underground mine after June 1, 1995, must meet the requirements established in *CSA M424.2-22 Non-Rail-Bound Diesel- Powered Machines for use in Non-Gassy Underground Mines*.
- Mines are required to maintain records for each piece of diesel-powered equipment used underground. At minimum, the records must contain the following information:
    - make, model and serial number
    - rated power, rated engine revolutions per minute (RPM), and maximum fuel injection rate
    - ventilation rate as certified in accordance with CSA M424.2-22
    - make, model and serial number of any emission control devices used with the equipment
    - capacity of both the fuel and hydraulic fluid tanks

General Requirements for Diesel-Powered Equipment (Section 183)

Ventilation Requirements

- Employers at underground mines must keep and maintain information about:
  - the volume of air flowing in haulage ways and workings where the equipment is operating; and
  - the total ventilation requirements for the equipment when it is operating in a single continuous course of air.
- This information must be provided directly to the operators or available in a readily accessible format.

Operator Information

- Section 183.1 (4) further requires that each piece of diesel-powered equipment must have the airflow posted in a location on the equipment that is visible to and readable by the operator.
- Although not defined in the regulation, a single continuous course of air is generally considered to be:
  - a continuous path where the same air remains between entrance and exit; or,
  - a continuous path where the same air remains until a new air source enters; or,
  - a path with a continuous source of air that has no addition from other sources.

General Requirements for Diesel-Powered Equipment (Section 183)

Fuel Requirements

- Diesel fuel used in underground mines must meet one of the three following Canadian General Standards for diesel fuel:
  - Canadian General Standards Board CAN/CGSB-3.517-2020 Diesel Fuel
  - Canadian General Standards Board CAN/CGSB-3.520-2020 Diesel fuel containing low levels of biodiesel (B1-B5)
  - Canadian General Standards Board CAN/CGSB-3.522-2020 Diesel fuel containing biodiesel (B6-B20)
- All diesel fuel used underground, regardless of what fuel standard applies, must have a **minimum flash point of 52°C.**

General Requirements for Diesel-Powered Equipment (Section 183)

Compliance Considerations

- Although no longer required, the ministry's "Notice of Diesel-Powered Equipment" form can still be used as a record keeping template.
  - The volume of air flowing in haulage ways and workings where the equipment is operating; and the airflow rate for each piece of equipment may be provided to operators in many ways such as:
    - at pre-shift line up meetings or safety huddles
    - through instruction from a supervisor
    - on pre-operational equipment inspection cards
    - by digital means, such as a phone or tablet
- Airflow rates posted on the equipment could include a placard mounted in the operator's cab or in a location visible from the operator's controls.

Airflow Rates (Section 183.1)

- Where diesel-powered equipment is operating in an underground mine, a mechanical ventilation system must produce a flow of air in accordance with the following rules:

Rule 1: Certified Airflow Rate (CSA M424.2-22)

- A piece of diesel-powered equipment that is certified in accordance with CSA Standard M424.2-22 must have an airflow rate equal to the rate posted on its certificate of homologation.
- The certified rate is determined by CanmetMINING through comprehensive laboratory testing of engine emissions, including CO_2, CO, NO, NO_2, and DPM.
- CanmetMINING List of certified engines

Airflow Rates (Section 183.1)

Rule 2: Engine Power x 0.06 m^3/s per Kilowatt

- Diesel-powered equipment that has not been certified in accordance with CSA Standard M424.2-22 follows this rule:
    - The airflow must be at least equal to the engine power multiplied by the unit airflow requirement of 0.06 m^3/s per kilowatt.
- Known informally as the "100 CFM per brake horsepower rule."

Airflow Rates (Section 183.1)

Example: Certified Ventilation Rates

Engine Manufacturer: **Caterpillar**
Engine Model: **Caterpillar C13 (R1700K), PN 549-6935, Tier 4 Final**
Governing Standard: **CSA M424.2-16 (Non-Gassy Mines)**

Certificate Number	Engine Rating and Fuel Rate at Sea Level	Fuel Sulphur Fuel - ppm	Ventilation Prescription	
			CFM	m^3/s
1304	345 HP (257 kW) @ 2050 RPM, 128.3 lb/h	15	12, 500	5.90

Airflow Rates (Section 183.1)

Rule 3: After-Treatment Device without Certified Airflow Rate

- Applies when equipment is fitted with an after-treatment device without a certified or recertified airflow rate.
- Employer determines suitable airflow rate in consultation with the Joint Health and Safety Committee (JHSC) or Health and Safety Representative (HSR).
- Considerations include pre-modification rates, good engineering practices, and testing results.
- This rule accounts for changes caused by after-treatment devices, maintaining effective ventilation even with modifications.

Airflow Rates (Section 183.1)

Compliance Considerations for Determining Suitable Airflow Rate using Rule 3

Consultation with JHSC or HSR:

- Engage in meaningful consultation with the JHSC or HSR.
- Consultation ensures informed decisions, considering both technical and safety aspects.

Pre-Modification Airflow Rates:

- Begin by considering the original airflow rate of the equipment before fitting the after-treatment device.
- Evaluate how the addition of the after-treatment device affects the overall emission profile.

Airflow Rates (Section 183.1)

Compliance Considerations for Determining Suitable Airflow Rate using Rule 3

Good Engineering Practices:

- Employ recognized engineering practices to determine the suitable airflow rate.
- Consider industry standards and guidelines for after-treatment device integration.
- Ensure modifications do not compromise overall safety or emission controls.

Testing Results and Emissions Data:

- Utilize emission test results obtained before and after installing the after-treatment device to make any adjustments needed for adequate ventilation.
- Assess how the device alters emissions, especially focusing on contaminants like CO, NO_2, and DPM.

Airflow Rates (Section 183.1)

Compliance Considerations for Determining Suitable Airflow Rate using Rule 3

Historical Certification Rates:

- Refer to previous CSA M424.2 certifications for the engine (with or without after-treatment devices), if any.
- Compare historical emission data to determine suitable airflow adjustments based on changes.

Record Keeping:

- Record all calculations, testing results, consultations, and decisions regarding the suitable airflow rate.
- Update operator information and equipment placards with the new ventilation rate.
- Keep these records readily available at the mine for reference and regulatory compliance.

Airflow Rates (Section 183.1)

Rule 4: Cumulative Airflow Rate for Multiple Equipment

- Used when multiple pieces of diesel-powered equipment operate in a single continuous course of air.
- Total airflow rate should be equal to the cumulative ventilation rates calculated under either Rules 1, 2, or 3 (as applicable).
- Ensures that overall ventilation meets requirements when multiple pieces of equipment contribute to emissions.
- Prevents concentration of contaminants in the shared airflow path.

Airflow Rates (Section 183.1)

Rule 4: Cumulative Airflow Rate for Multiple Equipment

Example:

- **In an active heading at a remuck you have an LHD loading 2 Trucks**
- **The LHD requires 35k CFM and each Truck requires 40k CFM**
- **Total Vent Required: 115k CFM**

Ontario

Exposure Limits to Diesel Particulate Matter (DPM) (Section 183.2)

- DPM emitted by diesel engines is mostly of respirable size, which reaches the deepest part of the lungs, and is composed of:
  - **Soot Particles**
  - **Carbon**
  - **Ash**
  - **Polycyclic aromatic hydrocarbons**
  - **Metallic abrasion particles**
  - **Sulfates and silicates**
- Currently, the best way to assess worker exposure to DPM is to measure airborne elemental carbon concentrations in the ambient atmosphere.
  - Elemental carbon is used as a surrogate for measuring DPM levels because it can be accurately measured at low concentrations and diesel engines are likely the only source of submicron elemental carbon in underground mines.

Exposure Limits to Diesel Particulate Matter (DPM) (Section 183.2)

- The time-weighted average (TWA) exposure of a worker to **elemental carbon shall not be more than 0.12 milligrams per cubic meter (mg/m^3) of air.**
  - Prior to September 1, 2023, the TWA limit was 0.4 mg/m^3 total carbon (or elemental carbon x 1.3)
  - Total carbon = elemental carbon + organic carbon
  - The TWA airborne concentration of a biological or chemical agent to which a worker may be exposed is calculated based on an eight-hour workday or 40-hour work week.

Worker Exposure Testing (Section 183.3)

- Employers at underground mines must conduct testing of the volume of air flowing in underground haulageways and workings where diesel-powered equipment is operating at least weekly.
- A worker may request that the employer test the personal exposure to carbon monoxide (CO), nitrogen dioxide (NO_2), or elemental carbon.
- The results of the tests must be:
  - recorded and maintained
  - readily available
  - shared with the JHSC or HSR, if any, on request

Worker Exposure Testing (Section 183.3)

Compliance Considerations

- MLITSD Hygienists may check to see that the methods used for sampling and monitoring airborne concentrations comply with the requirements of Reg. 833.

A workplace must:

- Follow sound industrial hygiene practice, for example, with respect to sampling and analysis strategy, procedures, equipment, quality assurance measures, documentation, accreditation, data assessment, interpretation and management as required by subsection 6(1) of Reg. 833.
- Use standard methods, defined as methods published by one of the agencies listed in section 1 of Reg. 833. For elemental carbon, the standard method is USA National Institute for Occupational Health (NIOSH) "Method #5040 DIESEL PARTICULATE MATTER (as Elemental Carbon)". **Direct reading instruments for elemental carbon are not available.**
- When direct reading instruments are used, for example for CO and NO_2: operate, calibrate and maintain the instruments according to the manufacturer's instructions, as required by subsection 6(2) of Reg. 833.

Evaluating Test Results (Section 183.3)

- If worker exposure tests indicate a worker has been exposed to CO or NO_2 in excess of the limit as set out in section 4 of Regulation 833 (Control of Exposure to Biological or Chemical Agents), or elemental carbon in excess of limit set out in section 183.2, subsection 183.3 (4) requires the employer to:
  - investigate the cause and take remedial action, if possible, to prevent recurrence.
  - notify the affected worker(s) and the JHSC or the HSR, if any, of the exceedance.
  - re- test and confirm that the concentrations do not exceed the applicable limits.

Evaluating Test Results (Section 183.3)

MLITSD Hygienists may review air sampling data and calculations.

Example: TWA exposure for a 12-hour shift

If a worker has a measured elemental carbon exposure of 0.09 mg/m^3 over ten hours underground and an exposure of 0 mg/m3 is assumed over the remaining two hours of the shift working on the surface, then the worker's TWA exposure is calculated using the method from Reg. 833 Schedule 1, as follows:

$$\boldsymbol{Daily\ TWA\ Exposure} = \frac{\boldsymbol{C1T1 + C2T2 + \ \ldots CnTn}}{\boldsymbol{8}}$$

Where: C is the measured concentration, and T is the time the worker is taken to be exposure to that concentration

$$Daily\ TWA\ Exposure = \frac{10\ hrs\ x\ 0.09 mg/m^3 + 2\ hrs\ x\ 0\ mg/m^3}{8}$$

$$Daily\ TWA\ Exposure = 0.11\ \text{mg/m}^3$$

The calculated Daily TWA exposure of 0.11 mg/m3 is below the Reg. 854 TWA exposure limit of 0.12 mg/m^3.

Evaluating Test Results (Section 183.3)

Compliance Considerations

The MLITSD Hygienists may verify that correct occupational exposure limits and calculations are used.

- Reg. 833 occupational exposure limits are posted on Ontario.ca
  For example, the TWA limit for CO is 25 ppm and the TWA limit for NO_2 is 3 ppm.
  The TWA limit for elemental carbon in underground mines where diesel equipment is used, of 0.12 mg/m^3, is in Section 183.2 of Reg. 854.
- For some agents, rather than calculate the worker's 8-hour daily or the 40-hour weekly TWA exposure, it is possible to ADJUST the occupational exposure limit based on the shift length.
  - MLITSD accepts use of the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST) Quebec Model online tool for this purpose.
  - Take care to use the tool correctly. Be aware of the limitations. Be prepared to do the math if the Quebec OEL for a substance is different from the Ontario OEL. NEVER adjust short term or ceiling exposure limits.
  - There is no Quebec Model adjustment for elemental carbon.
  - OEL adjustments made using the Brief and Scala model are not acceptable.

Evaluating Test Results (Section 183.3)

Example: Use of the Quebec Model

Consider the case of 12-hour workdays and 84-hour work weeks, on a two in- two out rotation (average 42 working hours per week), with carbon monoxide exposure.

If, on one day, a worker is exposed to 25 ppm CO (i.e., at the value of our OEL) for a duration of 12 hours, the worker's daily TWA exposure, calculated according to Reg. 833, would be 37.5 ppm.

$$Daily\ TWA\ Exposure = \frac{12\ hrs\ x\ 25\ ppm}{8} = 37.5\ ppm$$

This would be considered an overexposure, since the calculated daily TWA exposure of 37.5 ppm is greater than the Ontario OEL of 25 ppm.

The Quebec Model gives an adjustment factor for this situation of 0.67, and an adjusted OEL of 17 ppm.

This would be considered an overexposure, since the measured 12-hour exposure of 25 ppm is greater than the adjusted OEL of 17 ppm.

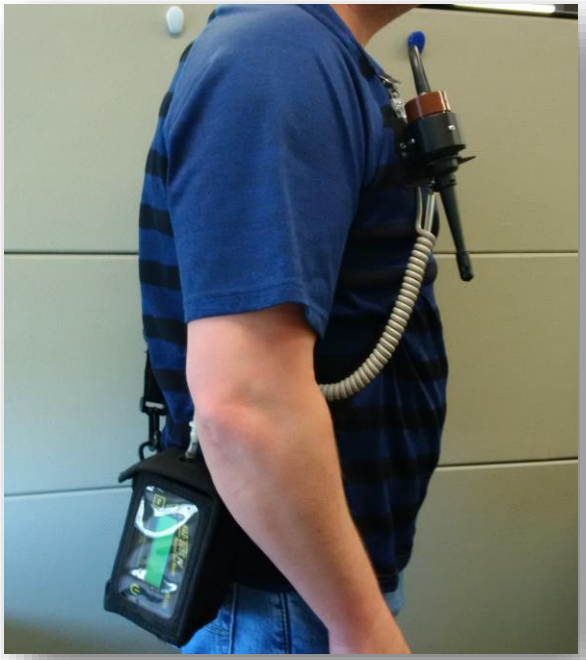
So, either method gives the same result- identifying that the worker is overexposed!

Evaluating Test Results (Section 183.3)

Compliance Considerations

MLITSD Hygienists may look at other aspects of occupational hygiene sampling and exposure controls, for example:

- **Sampling instruments** – equipment, sampling media, calibration records, and ask for demonstrations of use
- **Records** – results, laboratory certificates, data trends
- **Overexposures** – how are these communicated, investigated and addressed
- **Physical agents** – how are heat stress and noise assessed and controlled
- **Respirators** – if used, there must be a Respiratory Protection Program that meets the requirements of Reg. 833 or Reg. 490 as applicable



Additional considerations for determining underground airflow rates

- Regulation 833 (Control of Exposure to Biological or Chemical Agents) requires that employers take all measures reasonably necessary in the circumstances to protect workers from exposure to a hazardous biological or chemical agent because of the storage, handling, processing or use of such agent in the workplace.
- **There will be situations where airflow rates based solely on diesel-powered equipment may not be sufficient for managing other airborne hazards in the workplace, such as silica, blasting contaminants, or heat.**
- All mines and mining plants are required to have a comprehensive airborne hazard management program under section 182 of Reg. 854 to manage airborne hazards, including diesel exhaust.

Air Quality vs Air Quantity

Tail Pipe Testing Undiluted Exhaust (Section 183.4)

- Tailpipe emission testing is critical to ensure engines and after-treatment devices are operating as designed.
- Employers must develop and implement safe measures and procedures for testing undiluted exhaust from diesel-powered equipment.
    - These measures and procedures must be developed in consultation with the JHSC or HSR, if any.
- Each piece of diesel-powered equipment must be tested under consistent conditions and testing must be carried out under a full load, as far as is practical.
- Exhaust testing must be performed both routinely, such as once per month, or more frequently if required by the OEM and after any repairs are made to the engine or exhaust system.
- Employers must ensure that **undiluted exhaust from diesel-powered equipment contains less than 600 parts per million by volume of CO and less than 60 parts per million by volume of NO_2.**

Tail Pipe Testing Undiluted Exhaust (Section 183.4)

- All testing equipment should be used following manufacturer's recommendations.
- Use equipment which prevents condensation in the sampling line when testing for NO_2 as water can affect the sensor readings.
- To ensure tailpipe test consistency, tests must be conducted:
  - at normal engine operating temperature
  - at stabilized CO/CO_2 levels
  - while the engine is under full load as far as is practical
- Engines which fail to meet prescribed limits should be:
  - removed from service
  - inspected to determine the cause of the failure
  - repaired where required
  - re-tested to ensure compliance
- The results of all testing must be recorded and kept readily available at the mine site.

Tail Pipe Testing Undiluted Exhaust (Section 183.4)

Compliance Considerations

- Tailpipe test devices are also direct reading instruments.
- MLITSD Hygienists may verify that the devices are used, calibrated and maintained according to the manufacturer's instructions, as required under subsection 6(2) of Reg. 833.
- MLITSD Hygienists may also request test records for specified diesel-powered equipment.

Ontario

Consultation

Joint Health and Safety Committee or Health and Safety Representative, if any

Genuine consultation with the Joint Health and Safety Committee (JHSC) or Health and Safety Representative (HSR) is essential.

Collaborative input from the JHSC or HSR enhances decision-making and ensures worker safety.

Meaningful consultation goes beyond information sharing and involves incorporating recommendations into actions.

Sampling for diesel particulate matter

What to sample

- ✓ Air flow volume
- ✓ Carbon monoxide
- ✓ Nitrogen dioxide
- ✓ Elemental carbon
- ✓ Additional agents (if required)

Support

- ✓ Help develop sampling strategy and results interpretation
- ✓ Oversee sampling and or aid in sample collection
- ✓ Educate, mentor onsite personnel regarding basic IH best practices

CAUTION: Airflow rates cannot be based solely on diesel-powered equipment. Other physical and chemical hazards must also be managed.

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Resources

Reducing diesel particulate matter in underground mines: Two successful examples – Workplace Safety North (WSN)

Health effects of diesel exhaust in mines – WSN

Diesel Particulate in Mines – Current Knowledge and Solutions - WSN

Review of Diesel Particulate Matter Control - Methods in Underground Mines – ResearchGate

Controlling Diesel Particulate Matter in Underground Mines – Occupational Cancer Research Centre (OCRC)

Diesel Engine Exhaust - OCRC

Thank you for attending today's webinar and helping make workplaces safer.

Questions?

For additional information, please contact:

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