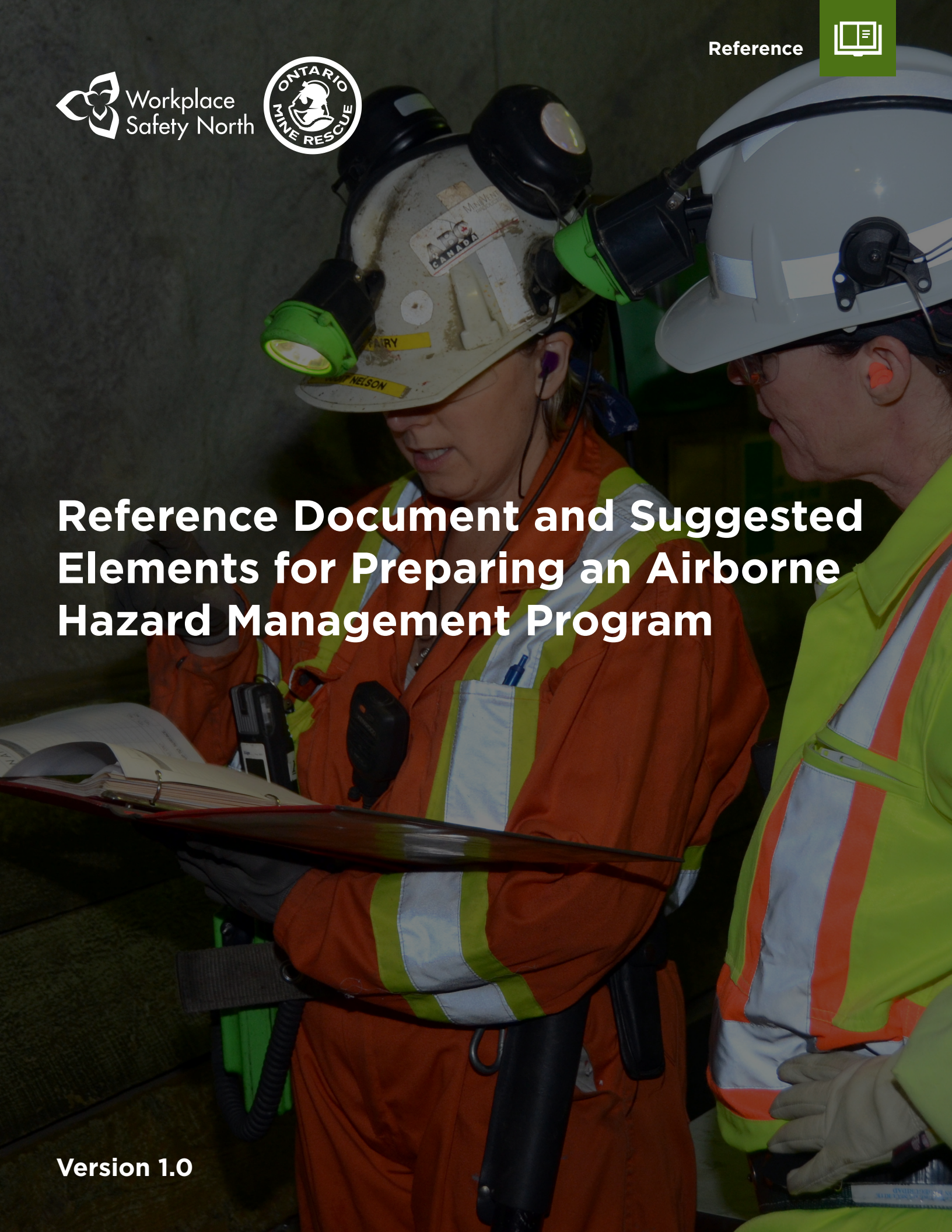
Reference

Workplace Safety North

ONTARIO MINE RESCUE



Reference Document and Suggested Elements for Preparing an Airborne Hazard Management Program

Version 1.0

Workplace Safety North Workplace Environment Technical Advisory Committee Recommendations:
Reference Document and Suggested Elements for Preparing an Airborne Hazard Management Program
Version 1.0

The information contained in this material is provided as a guide only. WSN recognizes that individual companies must develop health and safety policies and programs which apply to their workplaces and comply with appropriate legislation. It is generally current to the best of our knowledge, having been compiled from sources believed to be reliable.

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Foreword

The recommendations contained in this document are intended to assist Ontario mining companies, contractors and suppliers in developing a written airborne hazard management program (AHMP) required under Section 182 of Ontario's Regulation 854:Mines and Mining Plants.

This document is not an exhaustive listing; individual operations may choose to omit or add elements, to tailor to their AHMP requirements.

The document is prepared and reviewed by Workplace Safety North's (WSN's) Technical Advisory Committee on Workplace Environment. WSN gratefully acknowledges the contributions of all committee members and their sponsoring organizations.

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1. Introduction

Changes in Regulation 854 pertaining to mine ventilation and managing airborne hazards came into effect in September 2023. This includes the requirement for mines and mining plants to prepare and maintain a written Airborne Hazard Management Program (AHMP).

Workplace Safety North (WSN) and WSN's Workplace Environment Technical Advisory Committee (WE TAC) recognize the need for a reference document for mines and mining plants to prepare an AHMP. This warrants the preparation of a 'Reference Document for Preparing Airborne Hazards Management Program,' which is relevant and timely considering Ontario mines and mining plants are experiencing workers being exposed to variety of airborne hazards produced by mining and processing activities. The development of a reference document for preparing an AHMP is intended to prevent unwanted events associated with exposure to airborne hazards.

WSN and WSN's WE TAC recognize that individual companies must develop health and safety policies and programs which apply to their workplaces and comply with appropriate legislation. The information contained in this reference material is a guide to assist with developing those policies and programs.

Everyone who works in mines and mining plants must be aware of the effects of exposure to airborne related hazards and be able to implement controls to reduce the risks. This reference document will help ventilation and industrial hygiene personnel, and mine and mining plants workers recognize the need for identifying, assessing and managing airborne hazards, and potential airborne hazards, which may expose a worker to illness.

2. Scope of the Reference Document

The information contained in this reference document is a guide to assist Ontario underground mines and mining plants in developing an AHMP as per **Section 182 of Regulation 854**. The new section of the Regulation came into effect in September 2023. This document serves as a reference for the overall process or method of assessing airborne hazards to manage the risks to an acceptable level.

A Sample Airborne Hazards Control Program is provided in **Appendix A**.

3. Relevant Ontario Legislation

Section 182 of Regulation 854:Mines and Mining Plants reads as follows:

182. (1) An employer at a mine or mining plant shall, in consultation with the joint health and safety committee or health and safety representative, if any, develop and maintain a written airborne hazard management program. O. Reg. 69/23, s. 26.

(2) The program shall,

(a) set out the airborne hazards and potential airborne hazards that have been identified and assessed in a risk assessment conducted under section 5.1;

(b) list any measure developed and maintained under section 5.2 to eliminate or control the airborne hazards or potential airborne hazards;

(c) set out the number of samples to be taken and the frequency and locations of testing and monitoring;

(d) include measures and procedures to,

(i) maintain control systems and all of the components of such systems, and

(ii) monitor the effectiveness and measure the performance of those controls;

(e) identify the persons responsible for implementing the program, including the persons responsible for testing, monitoring or sampling; and

(f) set out information about the training and instructions that the persons responsible for implementing the program must complete.

(3) A copy of the program shall be provided to the joint health and safety committee or health and safety representative, if any, and be kept readily available at the mine or mining plant. O. Reg. 69/23, s. 26.

(4) Subject to subsections (5) and (6), the program shall be reviewed at least annually. O. Reg. 69/23, s. 26.

(5) The program shall be reviewed as soon as possible if there has been a change to,

(a) a mining process, work method or ventilation system that results in new airborne hazards or a change to existing airborne hazards; or

(b) the biological or chemical substances in the workplace that affect airborne hazards. O. Reg. 69/23, s. 26.

182. (6) If a review is required under subsection (5), the next annual review required by subsection (4) shall be within one year of the date of the review under subsection (5). O. Reg. 69/23, s. 26.

(7) For greater certainty, an employer's duty to provide information and instruction to a worker under clause 25 (2) (a) of the Act includes the duty to provide the worker with information and instruction that is appropriate for the worker on the contents of the airborne hazard management program.

The Ontario Ministry of Labour, Immigration, Training and Skills Development (MLITSD) has prepared three Health and Safety Guidelines related to mine design requirements described in Section 182 of the Regulations:

- The Health and Safety Guideline, *Airborne Hazard Management Program*, (Ontario MLITSD, October 13, 2023) will assist employers, workers, and other workplace parties in developing and implementing an airborne hazard management program (AHMP) as required by Section 182 of Regulation 854: Mines and Mining Plants, made under the Occupational Health and Safety Act (OHS Act).

4. Suggested Elements for Airborne Hazard Management Program

The suggested table of contents for a written Airborne Hazard Management Program (AHMP) is listed below (**Subsection 4.1**). Individual operations may customize the content of their AHMP program provided the document complies with the requirements specified in Section 182 of Regulation 854 and applicable guidelines. Descriptions of each of the elements are provided in **Subsection 4.2**.

Notes:

4.1 Suggested Table of Contents

4.2 Discussion of Individual Elements

The purpose of the reference document is to provide information as a guide to assist Ontario mining operations, contractors and suppliers to develop a written Airborne Hazard Management Program (AHMP). This document serves as a reference for the overall process or method of assessing airborne hazards and preparing control methods to manage the risks to an acceptable level. The reference document follows the same process of assessing health and safety hazards in the workplace as specified in Sections 5.1, 5.2 and 5.3 of Regulation 854. Individual operations may choose to omit unnecessary elements or include additional items to tailor the program to their requirements.

Airborne Hazard Management Program – Suggested Program Elements

Element	Description
APPROVALS	This contains the sign-off page which includes the names, titles, and dates of all personnel responsible for preparing, reviewing, and approving the Airborne Hazard Management Program.
REVISIONS	This page identifies the date of revision release, and a brief itemized description of the information modified in the latest version. Changes made to the AHMP since the last annual revision should be outlined on this page.
1 - INTRODUCTION	This element provides general information concerning the mine (location, history, etc.). Major airborne hazards, e.g., silica, etc., encountered by the operation may be provided in this element. *Note that this element should not include hazard Identification discussion as this is discussed in Element 3.*
2 - RESPONSIBILITIES IN AIRBORNE HAZARD MANAGEMENT	This element outlines specific responsibilities, accountabilities and required competencies of workers, first-line supervisors, industrial hygiene/ventilation personnel, other engineering personnel, upper management, and external consultants in the AHMP.

Notes:

Element	Description

3 - AIRBORNE HAZARDS	This element describes:
	• Airborne hazards and their associated hazards (hazard identification).
	• Hazard characterization (brief background on the hazard – state, description etc.).
	• Risk assessment process at minimum should consider recognizing, assessing, and controlling airborne hazards and associated risks to health, as specified in Regulation 854, such as:
	  • Section 183 (diesel-powered equipment used in underground mines)
	  • Section 183.1 (airflow where diesel-powered equipment is operated in underground mines)
	  • Section 183.2 (worker exposure to elemental carbon from diesel emissions in underground mines)
	  • Sections 183.3 and 183.4 (testing of diesel-powered equipment in underground mines)
	  • Section 184 (exhaust from engines installed in buildings on surface)
	  • Section 252 (ventilation systems in mines and mining plants)
	  • Section 254 (heat stress and cold stress procedures)
	  • Section 255 (unventilated areas of underground mines)
	  • Section 261 (ventilation of battery-charging stations)
	  • Section 266 (removing dust and other airborne hazards)
	  • Section 267 (surveys of potentially hazardous minor elements from feed streams and concentrations in mining plants)
	  • Section 268 (records of potentially hazardous chemical reagents used in mining plants)
	  • Section 269 (equipment to detect physical and chemical agents in mining plants)

4 - EXPOSURE ASSESSMENT AND SAMPLING STRATEGY	This element describes: • What agent • Sampling strategy (why, how, who, when) • Required trainingGuidance being followed (e.g., AIHA, BOHS/NL etc.) • Procedures on how testing (for the various airborne contaminants) are conducted • Occupational hygiene testing strategies (proactive?) – Reason for sampling

<table>
<tr><th>Element</th><th colspan="2">Description</th></tr>
<tr><td rowspan="4">4 - EXPOSURE ASSESSMENT AND SAMPLING STRATEGY (CONTINUED)</td><td>• Similar exposure groups (SEGs)</td><td>• Construction of SEGs – Example of SEGs:
NIOSH (National Institute of Occupational Safety and Health) recommended sample size
<table><tr><th>Size of SEGs</th><th>Recommended Number of Samples</th></tr><tr><td><6</td><td>All</td></tr><tr><td>6</td><td>5</td></tr><tr><td>7</td><td>6</td></tr><tr><td>8 - 11</td><td>7</td></tr><tr><td>12 - 14</td><td>8</td></tr><tr><td>15 - 18</td><td>9</td></tr><tr><td>19 - 26</td><td>10</td></tr><tr><td>27 - 43</td><td>11</td></tr><tr><td>44 - 50</td><td>12</td></tr><tr><td>50+</td><td>14</td></tr></table>• Assessment of SEGs</td></tr>
<tr><td>• Sampling methods</td><td>• Measures and procedures for testing
• What method (describe the occupational hygiene sampling and analytical method used for each of the airborne hazards)
• Personal samples, not area samples, to demonstrate compliance</td></tr>
<tr><td>• Sampling equipment</td><td>• How testing is completed
• Manufacturer’s instructions or operator’s manual, etc.
• Bump test
• Calibration records
• Expiry date on calibration gases, etc.
• Sampling duration
• The number of samples
• Information to collect for each sample (e.g., time, duration, tasks, job title, reason for sampling, etc.).</td></tr>
<tr><td>• Sample lab analysis</td><td>• Where?
• Accreditation requirements?
• QA/QC documents to keep for records?</td></tr>
</table>

Element	Description	
4 - EXPOSURE ASSESSMENT AND SAMPLING STRATEGY (CONTINUED)	• Data analysis and interpretation	• Assessed by someone with knowledge, training and experience. • How are results interpreted/used. • What are results compared to. • How is the extended shift calculated? • How to know if the personal sample is representative of worker exposure • How will compliance be assessed? (e.g., 95th percentile, AIHA risk groups?) • Any software or tools to be used?
	• Reporting	• With whom will the results be shared? How?
	• Record keeping	• Record to ensure compliance (e.g., EC, dust, silica, CO, NO2, etc.) • How long will records be kept? • Where will they be stored? • IT aspects (where is it saved? who has accessed it? Backups?)
5 - AIRBORNE HAZARD CONTROLS	This element describes the airborne hazards controls in place, such as: • Mobile equipment ventilation requirement • Description of ventilation system • Air flow measurement, undiluted gas test result evaluation • Any exposure control equipment description • Any administrative controls, for example diesel control board • Exposure control measures should be organized by the hierarchy of controls • Exposure control procedures • Follow Source-Path-Receiver (SPR) model • Any personal protective equipment • The approval process and interactions between mine personnel should be described (for example, product procurement).	

Element	Description
6 - QUALITY CONTROL/QUALITY ASSURANCE	This element describes: • Equipment calibration certification (annual) • Pre and post testing equipment calibration • Regularly reviewing worker training requirements • Establishing and documenting standard processes • Testing and validation • Continuous Improvement • Measuring effectiveness against internal, industrial and legislative standards
7- PREVIOUS PERSONNEL EXPOSURE OCURRENCES	Reference to: • The review of historical data should include an analysis of personnel airborne hazards exposure investigations. • A list of recorded personnel exposure to airborne hazards. If pertinent, external consulting company' reports, along with relevant data from adjacent sites (if applicable).
8 - EXCEEDANCE INVESTIGATION	This element should describe: • When and how investigation is conducted. • How overexposure corrected.
9 - MEDICAL SURVEILLANCE PROGRAM	This element should describe the medical surveillance program implemented by the operation.
10 - EMERGENCY RESPONSE PROGRAM	This element should describe the emergency response program implemented by the operation as it relates to worker exposure to airborne hazards at the workplace.
11 - WORKER TRAINING	This element should describe training for: • Designated substance and control program (all elements) • Respiratory protection program • Respirator fit tester training • Full training package hazard specific training • AHMP training elements
12 - JOINT HEALTH AND SAFETY COMMITTEE (JHSC) CONSULTATION	This element describes the consultation process with the JHSC, such as: • JHSC/Worker Health and Safety Representative communication • How and when the employer notifies interested parties such as JHSC, workers, and/or physicians related to airborne hazards.

Element	Description
GLOSSARY	This page contains definition of terms pertinent to the Airborne Hazards Management Program.
APPENDICES	Attach documents referenced in the Airborne Hazards Management Program, or include a list of available reports at the mine, such as: • Pertinent Regulations associated with Airborne Hazards Management Program (required under Regulation 854, 490, 833, etc.). • Risk assessment and risk registery pertaining to airborne hazards • Sample report on Industrial Hygiene (IH) sampling and analysis results (e.g., airborne hazards monitoring reports, third-party airborne hazards exposure investigation reports, etc.). • Process or procedure for communicating airborne hazards information (required under clause 25 (2) (a) of the OHS Act). • Sample testing procedures for all airborne hazards encountered at the operation (required under Section 183.4 of Ontario Regulations). • Sample quality control/quality assurance program for airborne hazards monitoring, and implementation and maintenance of controls. • Training programs associated with airborne hazards encountered at the workplace including maintenance and using PPEs (e.g., Airborne hazards information awareness, etc.). • Site-specific airborne hazards protocols (if applicable).

References

Ontario Ministry of Labour, Immigration, Training and Skills Development (MLITSD) Health and Safety Guideline, *Airborne Hazard Management Program*, October 13, 2023
https://www.ontario.ca/page/airborne-hazard-management-program.

Notes:

Appendix A: Sample Airborne Hazards Control Program

Company XX

April 24, 20XX

1. Introduction

The management of Company XX is committed to providing a healthy and safe workplace to all employees. The exposure of our employees to hazardous dust, gases and mists will be minimized using engineering controls such as ventilation, product substitutions, and enclosures. Where these methods are not practical, personal protective equipment will be provided, and employees will be provided with training in the proper use and care of this equipment.

Assessment and monitoring programs will be conducted to determine the potential for exposure in various areas of the mine site and to determine the effectiveness of the personal protective equipment that is being used. This will be an ongoing process and will assist in determining which hazard control methods are most effective.

The Airborne Hazards Control Program defines personnel responsibilities within the program, airborne hazards exposure calculations, investigations, control methods, monitoring, medical surveillance and airborne hazards awareness training.

2. Scope

The purpose of the Airborne Hazards Control Program is to prevent adverse health effects among any employee who may be exposed to the hazards such as dust, gases, vapours or fumes, including radon progeny.

3. Program Description

Per Section 182. (1) of Regulation 854 (Mines and Mining Plants), "an employer at a mine or mining plant shall, in consultation with the joint health and safety committee or health and safety representative, if any, develop and maintain a written airborne hazard management program." Section 20. (1) of Regulation 490 (Designated Substances) reads: "The employer shall develop, establish, put into effect and maintain measures and procedures to control the worker's exposure to the designated substance; and Section 20. (1) (b) requires incorporation of "the measures and procedures described in clause (a) into a control program that satisfies the requirements of this section".

Where a change is made in a process involving airborne hazards, or in the methods and procedures in the use, handling or storage of the airborne hazards, and the changes could result in a significant difference in the exposure of a worker to the hazards, Company XX shall cause a further assessment (O.Reg.490/09, s 22(1&2)).

In order to facilitate collection of accurate exposure data, employees are required to periodically assist in data collection by wearing airborne hazard monitoring instruments.

4. Responsibilities

4.1 Program Administration

The Industrial Hygienist or Designate, with the assistance of the Ventilation Personnel, will be responsible for the overall administration of the program. The program's effectiveness will be evaluated on a yearly basis based on input from the Health and Hygiene Committee as well as users of the protective devices, and in consultation with others who are knowledgeable in occupational health, industrial hygiene and industrial processes.

The training department, through referrals by the worker's supervisor, will ensure that all people who wear Personal protective equipment (PPE) receive instruction in the selection, use and care of PPE. Supervisors are additionally responsible for ensuring that assessment and PPE fit tests are performed annually for each employee required to wear such devices.

4.2 Medical Surveillance Program

The Health & Hygiene Committee shall monitor the medical surveillance program to keep the program in good standing. The Occupational Nurse or Designate will communicate with the coordinating physician to ensure that all employees are maintained in the follow-up program administered by the coordinating physician. Methods of compliance must be tracked.

5. Exposure Calculation

All necessary measures shall be taken through the use of engineering controls, work practices and hygiene practices and facilities to ensure that the Time Weighted Average (TWA) of a worker to airborne hazards are not exceeded.

Table 1 provides an example to calculate the TWA for shifts longer than 8 hours, the following reduction Brief and Scala formula will be used:

Table 1 – Example TWA for shifts longer than 8 hours; calculation using the Brief and Scala formula.

Reduction Factor	Length of Work Period	$RF = \frac{8}{h} \times \frac{24 - h}{16}$ RF = Reduction factor h = Hours worked
0.7	10 Hours	
0.5	23 Hours	

Worker exposure shall be calculated according to " R.R.O. 1990, Regulation 490 (Designated Substances)."

6. Exposure Investigations

6.1 Example Exposure at Action Level for Silica

Table 2 provides examples of action levels for silica.

Table 2 – Examples of action levels for silica

0.05 mg/m^3	8-hour shift
0.035 mg/ m^3	10-hour shift
0.025 mg/ m^3	12-hour shift

In order to maintain compliance with prescribed exposure limits, action levels at 50% of the time weighted average exposure limit are used to initiate responses to elevated sampling results.

In the event that a sample exceeds the company action level, the following steps must be taken:

1. An email notification will be sent to the supervisor of the area or worker with the elevated result. (If the supervisor does not respond within five (5) working days, the email notification will be forwarded to the area general foreman and superintendent).
2. The supervisor will coordinate an investigation time with the worker, a Health & Safety Representative and the Industrial Hygiene Technician or Ventilation Technician.
3. The Industrial Hygiene Coordinator will review the daily activity log from the day the employee was tested and collect any other additional information to assist with the investigation process.
4. The worker shall be interviewed by the Industrial Hygiene Coordinator or Ventilation Technician in the presence of a Worker Health & Safety Representative or Worker Safety Inspector & the Supervisor.
5. The results of this investigation will be presented to the Departmental Superintendent in the form of a memo with copies to the Department General Foreman, Safety Department, Worker Safety Inspector, the Health and Safety Committee co-chairs and the worker.
6. Supervisors shall review the investigation results with their crews.
7. The area of concern will be re-tested as soon as possible, and engineering controls and work practices will be assessed.
8. The supervisor shall arrange a spot job observation to be conducted for the individual with the elevated result. Copies of the completed spot job observation will be forwarded to the Industrial Hygiene Coordinator for filing with the investigation report.
9. Investigation recommendations shall be tracked in the Industrial Hygiene Action Register and be presented to the appropriate Sub Committee.

6.2 Example Exposure at Time Weighted Average (TWA) Limit for Silica

Table 3 provides examples of TWA for silica.

Table 3 – TWA examples for silica

Concentration	Shift Length
0.10 mg/m^3	8-hour shift
0.07 mg/ m^3	10-hour shift
0.05 mg/ m^3	12-hour shift

In the event a sample exceeds the TWA, the following steps must be taken:

1. An email notification will be sent to the supervisor and general foreman of the area or worker with the elevated result. (If the supervisor does not respond within five (5) working days, the email notification will be forwarded to the area superintendent).
2. The supervisor will coordinate an investigation time with the worker, a Health & Safety Representative and the Industrial Hygiene Coordinator or Ventilation Technician.
3. The Industrial Hygiene Coordinator or Ventilation Personnel will review the daily activity log from the day the employee was tested and collect any other additional information to assist with the investigation process.
4. The worker shall be interviewed by the Industrial Hygiene Coordinator or Ventilation Personnel in the presence of a Worker Health & Safety Representative and Supervisor.
5. The results of this investigation are presented to the Departmental Superintendent in the form of a memo with copies to the Department General Foreman, Safety Department, Worker Safety Inspector, the Health and Safety Committee co-chairs and the worker.
6. Supervisor shall review the investigation results with their crews.
7. The area of concern will be re-tested as soon as possible, and engineering controls and work practices will be assessed.
8. The supervisor shall arrange a spot job observation to be conducted for the individual with the elevated result. Copies of the completed spot job observation will be forwarded to the Industrial Hygiene Coordinator for filing with the investigation report.
9. Investigation recommendations shall be tracked in the Industrial Hygiene Action Register and be presented to the appropriate subcommittee.

7. Controls

7.1 Engineering Controls for Underground

Refer to mine-specific Standard Operating Procedures (SOPs) for activities that are sources of airborne hazards underground, such as Working Environment; Mucking; Loading and Blasting; Crushing and Passing; Maintenance Procedures for airborne hazards controls, such as Wet Dust Collector; and other standard procedures.

Some engineering controls for underground airborne hazards are summarized below.

7.1.1 Dust Suppression

Automatic sprinkler or atomizing systems are used on shaft access and drip lines for the ramp system. Dust suppression is also achieved by sprays and atomizers at certain dust-generating locations such as drawpoints, stope overcuts, and orepass accesses. In areas where wetting of the muck is not permissible (i.e., paste fill/backfill, retreat stopes), a water curtain must be established to protect downstream workers.

Underground operations supervision will ensure controls for airborne hazards, such as dust suppression systems, are in place and functioning through the Five Point Safety System.

7.1.2 Dust Scrubbers

Wet dust collectors are used at underground crushing plants. Wet scrubbers must be used whenever ore or waste is crushed or dumped and must be maintained in good working condition. The Mine Department is responsible for the maintenance of the dust collectors at the crushers and ore pass scrubbers.

7.1.3 Ventilation

All workplaces are to be properly ventilated by general or auxiliary ventilation in such a manner to remove or dilute the free silica remaining in the air after dust suppression or duct collection has taken place. Muck and/or waste piles are not to be placed in proximity to vent or exhaust raises.

It is the Supervisor's responsibility to ensure the proper ventilation is maintained. The Ventilation Personnel will audit and maintain the underground ventilation system and keep the ventilation boards accurate.

7.2 Engineering Controls for Surface Plants and Other Operations

Refer to mine-specific Standard Operating Procedures (SOPs) for activities that are sources of airborne hazards in surface plants and other operations, such as PPE; Washing at Transfer Tower; Fume Hoods; Dusts, and Vapours; Crusher Operations; and others.

7.2.1 Dust Suppression

Dust suppression in the pit and on site roads is achieved with the use of a water truck during summer months and the application of a chemical dust suppressant in the fall to minimize airborne hazards, such as dust from becoming airborne during winter months. Pit operations supervision is responsible for these areas.

The washing down of mill circuits, transfer houses and conveyor galleries shall ensure that dust suppression is achieved and shall be carried out on a regular basis (or more often if dust conditions warrant such action). Mine and mill operations supervision are responsible for their respective areas.

7.2.2 Dust Collection

Bag-house type dust collectors facilitate dust removal and must be functioning when dust-generating operations are underway. Bag-house collectors are located at the surface crusher, transfer towers, assay lab, ore bin, effluent treatment plant, and paste plant. They are maintained by Plant Maintenance Foreman.

7.2.3 Ventilation

All workplaces must be properly ventilated by general or auxiliary ventilation in such manner to remove or dilute the airborne contaminants, such as dust and silica suspended in the air after dust suppression or dust collection has taken place. These systems are maintained by the fixed mechanical division of the Plant Department. Air flows are checked routinely by Ventilation Personnel.

7.3 Maintenance of Engineering Controls

All engineering controls must be inspected on a regular basis and maintained to ensure proper functioning. All damaged or defective equipment must be reported immediately to the Area Supervisor. Repairs must be made on all damaged or defective equipment. Inspection and maintenance records for all existing engineering controls shall be kept and maintained by the appropriate responsible personnel.

Routine safety and maintenance inspections shall include an assessment of engineering controls in the areas of inspection. These inspections will include – but are not limited to – Crew Health and Safety Tours, Planned Inspections, and preventative maintenance inspections.

Personnel must be advised of engineering controls in their work area. Those engineering controls are to be checked to ensure they are operational and are working as intended. The responsibilities to ensure that engineering controls are maintained are as follows:

> The shaft division of the mine department is responsible for the maintenance of the dust collectors at the crushers, while the construction division of the Mine Department is responsible for the maintenance of ore pass scrubbers.

Table 4 provides a summary of who are responsible and accountable to ensure controls are implemented and operating for airborne hazards.

Table 4 – Summary of responsibility and accountability to ensure controls are implemented for airborne hazards.

Person Responsible	Person Accountable	Controls
Worker	Supervisor	Washing down workplaces and travel ways, using sprays and atomizers when necessary
Maintenance	Maintenance Foreman	Dust collectors
Ventilation Personnel, Mine Supervisors, Workers	Supervisor, Vent Tech	U/G ventilation systems
Worker	Supervisor	Washing down transfer houses, conveyors or galleries
Maintenance	Mill Maintenance Foreman	Bag-houses
Maintenance Ventilation Personnel	Plant Engineer	Surface ventilation systems
Maintenance and Mine Supervisors	Maintenance Foreman	Maintenance of other engineering controls

9. Respiratory Protection

It is the company's responsibility, through engineering controls, to reduce worker exposure levels to airborne hazards, including dust and silica, to an acceptable level. In the event that this cannot be attained, the company will supply personal respiratory protection equipment to workers. Employees who are provided with respiratory protection equipment will participate in an initial training session, as well as annual refresher sessions providing details on the selection, use, and care of respiratory protection equipment and best hygiene practices.

Per Section 18 (1) of Regulation 490/09, an employer shall provide a worker with respiratory equipment if these limits are not being attained because:

- an emergency exists,
- the measures and procedures necessary to control the exposure of a worker to airborne hazards such as silica are not reasonable or practical for the time or frequency of exposure, or the nature of the process, operation or work; or
- they are not effective because of a temporary breakdown of equipment.

9.1. Designation of RESPIRATORY PROTECTION Areas

If all efforts to reduce airborne hazards – such as silica levels – in the workplace have proven ineffective toward reduction below prescribed limits, the area will be posted with signs identifying it as a **RESPIRATORY PROTECTION AREA**. The wearing of appropriate respiratory protective equipment will be mandatory while dust-generating operations are underway.

All employees working in, or in close proximity to, the areas and/or activities listed in the MANDATORY AREAS categories must adhere to the proper protection required by wearing approved respiratory protection.

Refer to the Respiratory Protection Control Program for specific directives on mandatory/discretionary areas in addition to appropriate respirator selection.

10. Workplace Monitoring

Worker exposure to airborne hazards, such as dust and free silica, will be monitored using the gravimetric sampling method in compliance with the requirements of Regulation 490/09 respecting silica (under the Occupational Health & Safety Act). Every effort will be made to observe samples in the field and record details pertaining to work conditions and practices. Supervision will be required to perform a spot job observation and attach a copy to the dust field sheet. Collected samples are sent to a credited laboratory for analysis.

10.1. Monitoring Groups

The air monitoring will be performed on various identified groups:

1. **Development:** drillers, muckers, bolters and services.
2. **Production:** muckers, trammers, crusher operators, blockholers, drillers, blasters, & shaft crew.
3. **U/G Other:** level services, mine maintenance, heavy-duty mechanics, millwrights, electricians, construction, contractors, shotcrete operators, welders and pastefill patrollers.
4. **Mill:** assayers, sample prep operators, refiners, metallurgists, grinding, paste and solutions operators.
5. **Surface Other:** labourers, welders, pit operators.

10.2. Personal Sampling Frequency

A minimum of (*specify number based on similar exposure groups, SEGs*) gravimetric samples are to be taken per month. There will be an effort by the Industrial Hygiene Coordinator to have every employee who is exposed to the underground environment wear a silica sampler at least once every other year.

The Industrial Hygiene Coordinator shall compile sample results by job on a yearly basis and present an annual report to the Health and Hygiene Committee. This information shall direct future sampling and provide quantitative evaluation of existing controls.

10.3. Parameters Being Monitored

Airborne hazards to be monitored include Total Respirable Dust; Respirable Crystalline Silica (Quartz) and Respirable Combustible Dust; gases; fumes; and others.

The Industrial Hygiene Coordinator shall ensure that monitoring results are posted for a minimum period of fourteen (14) days in a place where they are most likely to come to the attention of the workers. They will be available to the Joint Health and Safety Committee and will be kept by the Company for a minimum of five years.

10.4. Employee Exposure Records

Occupations may be categorized according to similar exposure groups (SEGs) potential to airborne hazards such as free silica. The records of worker exposure to the airborne hazard in a workplace can be summarized by a TWA of the results of sampling on an individual worker and all others sampled in the area or category. Provision will also be made in the employee exposure records to monitor use of respiratory protection and its type.

11. Medical Surveillance

Employee Medical Surveillance will follow available codes for the airborne hazard: for example, the "Code for Medical Surveillance of Silica Exposure Workers" referenced in Regulation 490/09, Schedule 2, Part II(6) (under the Occupational Health and Safety Act).

The Medical Surveillance Program is intended to protect the health of workers by:

a. Identifying workers with conditions which may be aggravated by exposure to silica and establishing a baseline measure for determining changes in health,

b. Evaluating the effect of silica on workers,

c. Enabling remedial action to be taken when necessary, and

d. Providing health education.

Per Section 28 of the Occupational Health and Safety Act, participation in a medical surveillance program is voluntary and is at the discretion of the worker. Employees who choose not to participate in the program are asked to sign a document stating they were offered to participate and have declined. In the event an employee fails to sign the declaration, a registered letter shall be sent to the employee. Compliance tracking is required.

The Occupational Health Nurse will oversee the Medical Surveillance segment of the Airborne Hazards Control Program, including physical examinations and clinical tests, and will maintain any records pertaining to health monitoring as required by the regulations.

11.1. Program Content

The medical surveillance program shall consist of pre-placement medical examinations, periodic medical examinations, clinical tests, health education, and record keeping.

11.2. Medical Examinations

The examination shall include the following:

11.2.1 History

Initial medical occupational history includes inquiry for previous exposure to silica, personal habits (smoking) and history of present or past respiratory disorders (particularly tuberculosis). During periodic examinations, this history shall be updated to include the history of frequency and duration of exposure to silica since the previous examination. Inquiry will take place to detect signs and symptoms of respiratory disease (for example, dyspnea, cough sputum, hemoptysis, wheezing and chest pain).

Per section 27(1) of Regulation 490/09: "The employer shall provide a copy of the worker's personal exposure record to a physician who examines the worker or supervises clinical tests on a worker."

11.2.2. Physical Examination

A physical examination with particular attention to the respiratory system shall be performed. The frequency of the periodic examination will depend on the intensity and length of exposure to the airborne hazard and shall be decided by the examining physician. It need not be the same for all workers but should be done at least every two years.

11.2.3. Clinical Tests

Clinical tests aid in the assessment of a worker's fitness for continued exposure to airborne hazards. The x-ray and pulmonary function testing facilities shall meet the quality requirements of the Occupational Health Branch. The x-rays shall be interpreted by a radiologist or chest physician proficient in reading chest radiographs by the International Labour Office, 1980 Code.

11.2.4. X-Rays

A chest x-ray, posterior-anterior, shall be taken at least once every two years. A lateral x-ray is necessary only if required by the examining physician. At a pre-placement screening to avoid unnecessary x-rays, the examining physician shall, where practical, obtain the medical status from another facility if the worker has been previously examined within the past year. A careful scrutiny of radiographs shall be made for early signs of silicosis or other chest disease, especially at the pre-placement examination. When exposure is discontinued, the frequency of x-rays and the period of surveillance will depend on the intensity and duration of exposure and the findings in previous x-rays. The examining physician shall determine the duration and frequency of follow-up.

11.2.5. Pulmonary Function Tests

Pulmonary function tests shall be taken in conjunction with the chest x-ray. The instruments shall be calibrated to currently applied standards as published in the "Snowbird Workshop on Standardization of Spirometry", American Review of Respiratory Disease, Vol. 119, 931-838, 1979. The tests shall include the FEV1, FVC, FEV1/FVC% and mid flow rate such as FEF 25-75%. All relevant data shall be corrected to body temperature and blood pressure (BTPS).

11.2.6. Assessment of Action Levels

An assessment of fitness for work shall be based on clinical examination in conjunction with the clinical tests. For this reason, no specific action level is stated for the latter. If the examining physician determines that signs of illness – such as silicosis and other respiratory problems – are present, the worker shall be removed from being exposed to the airborne hazard. Decisions will be made upon consultation with the senior chest disease consultant of the Ministry of Labour, Immigration, Training and Skills Development (MLITSD) and a rehabilitation officer of the Workplace Safety and Insurance Board (WSIB). To qualify for compensation or rehabilitation, further assessment will be necessary. If respiratory problems such as silicosis are confirmed, the physician shall then determine whether the worker is fit, fit with limitations or unfit.

For miners, WSIB Form 86 - Miners Chest Examination Report - shall be completed at each examination and forwarded to the WSIB.

11.3. Health Education

At pre-placement and periodic examinations, all workers should be advised of airborne hazards exposure at the workplace, and examination results must be discussed. A worker, upon leaving employment, shall be advised to inform the person's family physician of previous airborne hazard exposure whenever examined.

11.4. Medical History and Examination Records

The physician of a worker examined for airborne hazards exposure shall maintain health records for each worker examined. Records should include:

- Name (in full) of worker
- Maiden surname of mother
- Date of birth
- Sex
- Social insurance number
- Occupation or job titles
- Date occupation or jobs commenced
- The kinds of operations or processes in which the worker is exposed
- Use of respiratory equipment
- Date of visits to physician's office
- Medical examination reports
- Health assessment
- Results of clinical tests (for example, chest x-ray and pulmonary function tests)
- Copies of Forms 7 and 8 to the WSIB (if completed)
- All relevant correspondence concerning health and any information with actions taken in response to abnormal clinical tests

The examining physician shall keep the worker's health records in a secure place for:

a) A period of forty years from the time such records were first made: or

b) A period of twenty years from the time the last of such records were made whichever is the longer.

Where the examining physician (or the physician's successor) is no longer able –or willing – to keep the records, the records shall be forwarded to the provincial physician of the MLITSD who shall keep them in a secure place.

11.5 Advice of the Physician

Per Section 29(2) of Regulation 490/09, the physician who conducts the medical examination or supervises the clinical tests shall advise the worker and the worker's employer on whether the worker has an occupational illness because of exposure to a designated substance, and whether the worker is fit, fit with limitations or unfit to continue working in exposure to the designated substance. On advising the worker and the worker's employer that a worker is fit with limitations or unfit to continue working in exposure to a designated substance, the physician shall also advise the JHSC, in writing and on a confidential basis, and in giving the advice shall indicate opinion as to the interpretation to be placed on the advice. O. Reg. 490/09, s.29(7).

12. Training

12.1. Contents of Program

The airborne hazards exposure training program shall include two separate programs:

1. Airborne Hazards Awareness

The Airborne Hazards Awareness training shall include a discussion on the presence of airborne hazards – such as silica – at the mine; the health hazards of the airborne contaminant; processes creating the contaminant; control of contaminant; and medical surveillance. This will be done on an annual basis by the Industrial Hygiene Coordinator or other competent person familiar with the contents of the Airborne Hazards Control Program. Airborne hazards training sign off sheets must be forwarded to the Employee Services Administrator for entry into the Company database.

2. Respiratory Protective Equipment Training

This program includes the use and care of respiratory protective equipment and best hygiene practices. Annual refresher training will be available for all employees wearing respirators. This training is provided by the Training Department or other competent person familiar with the contents of the Respiratory Control Program.

12.2. Workers to be Trained

All workers who have the potential for exposure to airborne hazards shall be retrained on the Airborne Hazards Training Program at least every year.

13. Role of the Joint Health and Safety Committee

13.1. Monitoring Results

The Joint Health and Safety Committee (JHSC) shall receive and review all monitoring results at each quarterly meeting. They shall make recommendations based on the results of the monitoring as required.

13.2. Medical Surveillance Reporting

The Occupational Health Nurse shall receive written medical advice from the examining physician when a worker has been declared fit with limitations or unfit for exposure to silica as described in section 11.5 of this document. The Occupational Health Nurse shall ensure quarterly reporting of medical statistics, including compliance with bi-annual medical examinations, x-rays and PFTs; the number of results suggesting occupational lung disease; and the number of declarations submitted. The quarterly report shall be presented at Industrial Hygiene Meetings. A year end review should be submitted to the Industrial Hygiene Coordinator each January of the following year in preparation for the annual program audit.

13.3. Audit of Control Program

The Industrial Hygiene Coordinator shall ensure that an audit of the Airborne Hazards Control Program is conducted annually. A written report shall:

a) Determine compliance to program objectives per the Airborne Hazards Control Program Audit Checklist.

b) Make recommendations for revisions to the control program as required to either improve the program or to take process changes into account.

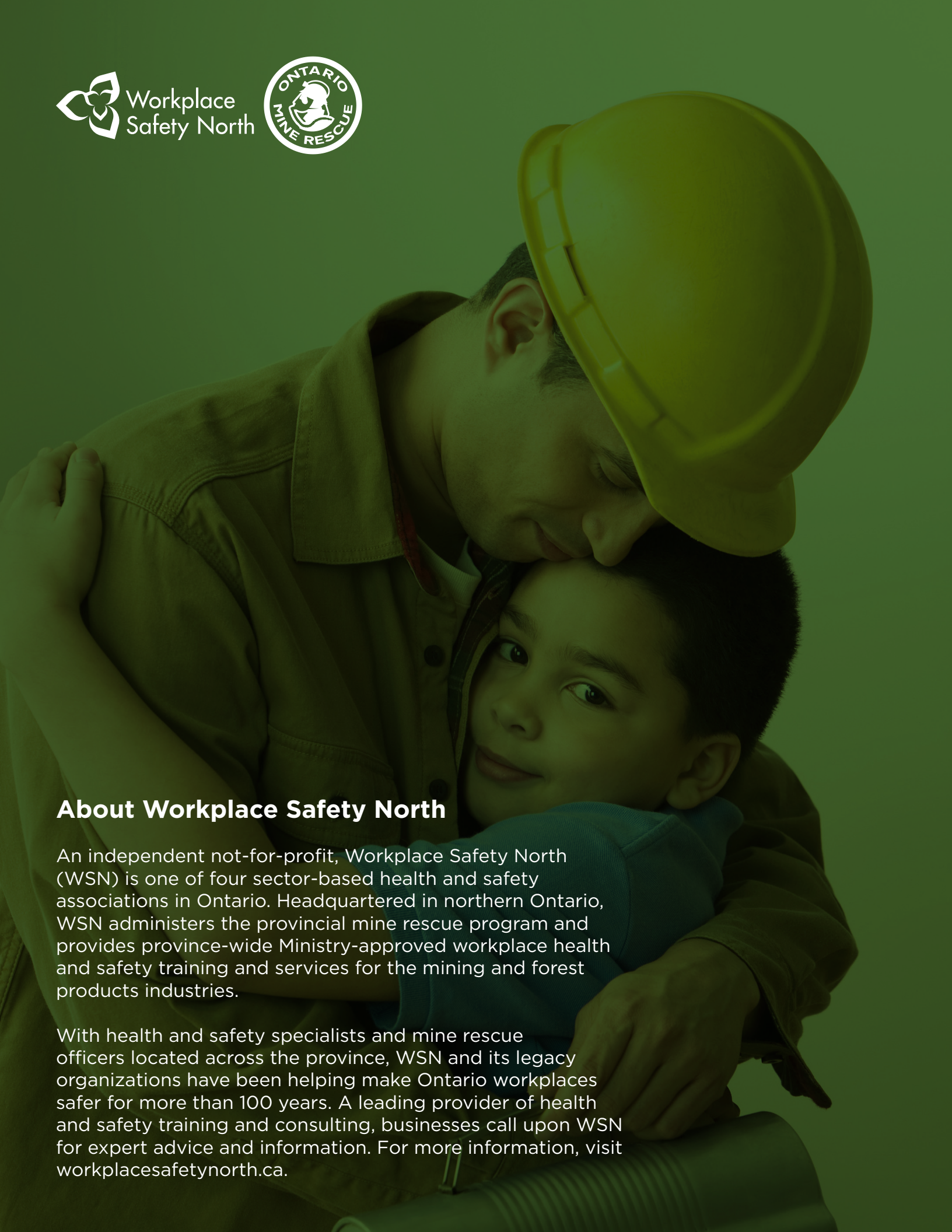
c) Outline the effectiveness of the program.

13.4 Program Approval

The JHSC may revise the Airborne Hazards Control Program at any time.

The undersigned have read, understood and accepted the contents of the (**Date**) Airborne Hazards Control Program.

Notes:



About Workplace Safety North

An independent not-for-profit, Workplace Safety North (WSN) is one of four sector-based health and safety associations in Ontario. Headquartered in northern Ontario, WSN administers the provincial mine rescue program and provides province-wide Ministry-approved workplace health and safety training and services for the mining and forest products industries.

With health and safety specialists and mine rescue officers located across the province, WSN and its legacy organizations have been helping make Ontario workplaces safer for more than 100 years. A leading provider of health and safety training and consulting, businesses call upon WSN for expert advice and information. For more information, visit workplacesafetynorth.ca.