

## Legislation for Refrigeration Plant Rooms

There is no direct legislative requirement for self-contained breathing apparatus (SCBA) to be kept outside of a refrigeration plant room, but there are a variety of legislative obligations that must be given consideration as the refrigeration plant room owner determines what level of preparedness they wish to ensure is in place in case of an emergency involving a noxious gas.

A self contained breathing apparatus, or SCBA, sometimes referred to as a Compressed Air Breathing Apparatus (CABA), air pack, or simply Breathing Apparatus (BA) is a device worn by rescue workers, firefighters, and others to provide breathable air in an IDLH (Immediate Danger to Life and Health) Atmosphere.

A SCBA typically has three main components: a high-pressure tank (e.g., 2200 psi to 4500 psi), a pressure regulator, and an inhalation connection (mouthpiece, mouth mask or face mask), connected together and mounted to a carrying frame.



There are two kinds of SCBA: open circuit and closed circuit.

Open-circuit industrial breathing sets are filled with filtered, compressed air, rather than pure oxygen. Typical open-circuit systems have two regulators; a first stage to reduce the pressure of air to allow it to be carried to the mask, and a

second stage regulator to reduce it even further to a level just above standard atmospheric pressure. This air is then fed to the mask via either a demand valve (activating only on inhalation) or a continuous positive pressure valve (providing constant airflow to the mask).

The closed-circuit type filters, supplements, and re-circulates exhaled gas. It is used when a longer-duration supply of breathing gas is needed, such as in mine rescue and in long tunnels, and going through passages too narrow for a big open-circuit air cylinder.

Much focus is given to the necessity of SCBA but little discussion is placed upon the need for general respiratory protection by workers in a refrigeration plant room. Ammonia MSDS would indicate the need for face protection when handling the chemical. Many facilities fail to have the right PPE on hand while those that do most often fail to have the worker use it as required.

A **respirator** is a device designed to protect the wearer from inhaling harmful dusts, fumes, vapors, and/or gases. Respirators come in a wide range of types and sizes used by the military, private industry, and the public. Respirators range from single-use, disposable masks to reusable models with replaceable cartridges.

There are two main categories: the *air-purifying respirator*, which forces contaminated air through a filtering element, and the *air-supplied respirator*, in which an alternate supply of fresh air is delivered. Within each category, different techniques are employed to reduce or eliminate noxious airborne contents.

The following guideline brings the known legislative obligations together in hope that you may be able to develop an effective Standard Operating Practice (SOP) for your specific facility(s).

Consultation with the Technical Standards and Safety Authority (TSSA) in the past confirms that there is no such specific obligation under the Operating Engineer Regulation or Boiler and Pressure Vessels Act.

Additionally, there is also no direct requirement for SCBA within the CSA B-52 Mechanical Refrigeration Code which is the enforcement responsibility of the Ministry of Labour (MOL). In fact, the CSA B-52 Mechanical Refrigeration Code is intentionally vague when it comes to personal protective equipment. The requirements for protective equipment are general and not specific or detailed within the Code.

**Section 9.1.1. states:** *“The owner of a refrigeration system shall supply and maintain for its employees the personal protective equipment required by the jurisdiction where the system is located”.*

The CSA Technical Committee for B-52 intentionally left detailed requirements up to provincial and territorial jurisdictions, so as to avoid duplications and/or inconsistencies. Users of the Code should in the end contact their provincial jurisdiction for direction (i.e. TSSA 416-734-3300 in Ontario)

Owners must then interpret the general duties of *Sections 25 and 26 of the Occupational Health and Safety Act (OHSA) and how they might apply to this issue.*

#### **Excerpts from the OHSA**

##### **Duties of employers**

**25. (1)** *An employer shall ensure that, (a) the equipment, materials and protective devices as prescribed are provided; (b) the equipment, materials and protective devices provided by the employer are maintained in good condition; (c) the measures and procedures prescribed are carried out in the workplace; (d) the equipment, materials and protective devices provided by the employer are used as prescribed;*

*Idem*

**(2)** *Without limiting the strict duty imposed by subsection (1), an employer shall, (a) provide information, instruction and supervision to a worker to protect the health or safety of the worker; (d) acquaint a worker or a person in authority over a worker with any hazard in the work and in the handling, storage, use, disposal and transport of any article, device, equipment or a biological, chemical or physical agent; (h) take*

***every precaution reasonable in the circumstances for the protection of a worker;***

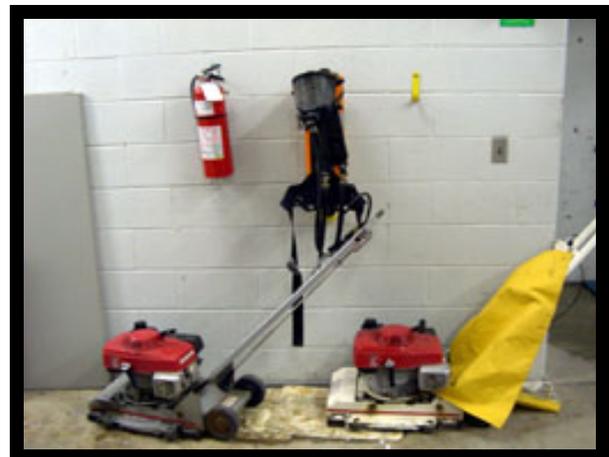
##### **Additional duties of employers**

**26. (1)** *In addition to the duties imposed by section 25, an employer shall, (f) monitor at such time or times or at such interval or intervals the levels of biological, chemical or physical agents in a workplace and keep and post accurate records thereof as prescribed; (g) comply with a standard limiting the exposure of a worker to biological, chemical or physical agents as prescribed; (k) where so prescribed, provide a worker with written instructions as to the measures and procedures to be taken for the protection of a worker; and (l) carry out such training programs for workers, supervisors and committee members as may be prescribed.*

Additionally, OHS Regulation 833 *Control of Exposure to Biological or Chemical Agents* requires some review and interpretation by the owner to ensure complete compliance is being met.

[http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_900833\\_e.htm](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900833_e.htm)

Once the owner has made the necessary PPE selection the guiding requirement maybe then shifted to Section 79 of the Industrial Regulations which states: *“A worker that is required to wear or use any protective clothing, equipment or device shall be instructed and trained in its care and use before wearing the protective clothing, equipment or device. R.R.O. 1990, Reg. 851, s. 79.”*



### Ammonia Exposure Risks

Ammonia or NH<sub>3</sub> is one of the most highly produced chemicals in the world. Ammonia has a sharp, distinct, penetrating odour detectable at very low concentrations. At moderate levels of concentration, ammonia can irritate the eyes and respiratory tract; at high concentrations, it can cause ulceration to the eyes and severe irritation to the respiratory tract. Ammonia is toxic to humans at low ppm levels and as such the need for an effective detection solution is identified at a maximum level of 300ppm at which time an alarm must sound. (Refer to CSA B-52 Mechanical Refrigeration Code). Upon hearing the alarm facility staff **must** be adequately prepared to respond.



### Ammonia and Health Hazards

Ammonia is a significant respiratory hazard for workers who experience long-term exposure to this gas in constant average values greater than 25 ppm.

In addition to respiratory effects, ammonia can cause skin and eye irritation and displace oxygen in the bloodstream. Long-term exposure to ammonia can cause pneumonia.

It is important to respect tolerance levels of all workers. Some workers may encounter health effects at lower concentrations than others in the same work environment.

Health Effects of Ammonia	
Concentration (ppm)	Health Response
24 - 50	Nose and throat irritation after ten minutes of exposure.
72 - 134	Irritation of nose and throat after five minutes exposure.
700	Immediate and severe irritation of respiratory system.
5,000	Respiratory spasms, rapid suffocation.
Above 10,000	Pulmonary edema, potentially fatal accumulation of fluid in lungs and death.

### Self-Contained Breathing Apparatus for Refrigeration Mechanical Rooms

There is a misconception that SCBA is a requirement for refrigeration plant rooms. This confusion may have been the result of an increased awareness of the risks associated with ammonia use. A second contributor to this mistaken belief may have stemmed from the requirement for personal protective equipment in aquatic operations that use chlorine gas.

Whatever the reason for the misunderstanding many ORFA members in the 70's-80's using ammonia reacted by installing SCBA outside of the refrigeration plant room in an effort to ensure staff was prepared for a leak. These installations created a false sense of worker safety.

The equipment was often installed with owners and users failing to understand the need for regular ongoing maintenance and upkeep of the SCBA equipment. This failure placed many workers at an increased potential risk of injury if emergency entry to the plant room was required.

The selection and use of Personal Protective Equipment (PPE) in a refrigeration plant room will depend on the chemicals and risk of injury associated with the work in a specific environment.

The first point of understanding must always be the Material Safety Data Sheet (MSDS) associated with the specific chemical(s). These documents clearly identify the associated risks and recommended precautions to be taken.

Ultimately, the protection of workers in these situations should be planned through a workplace Job Hazard Analysis (JHA) or Standard Operating Procedure (SOP). Referring to Section 26 of the OSHA specific to chemical exposure is an essential part of the internal JHA/SOP development process.

### Understanding Respiratory Protection Systems

There a variety of respiratory protection systems available in today's market place to help protect workers from elevated levels of ammonia gas. When properly selected and fitted they will help provide respiratory protection from ammonia, methylamine and other particulates concentrations.

**Note: The following information is an introduction to ammonia protection options only. Readers should carefully research their personal ammonia exposure protection needs.**

### Selecting the Right Protection for Entry into Areas where Ammonia is in the Air:

*ABBREVIATIONS: SAR = supplied-air respirator; SCBA = self-contained breathing apparatus; IDLH = Immediately Dangerous to Life or Health*

### What are the Options for Ammonia Protection?

#### Up to 250 ppm

- Chemical cartridge respirator with cartridge(s) to protect against ammonia
- SAR

#### Up to 300 ppm

- SAR operated in a continuous-flow mode
- powered air-purifying respirator with cartridge(s) to protect against ammonia
- full-face piece chemical cartridge respirator with cartridge(s) to protect against ammonia
- gas mask with canister to protect against ammonia
- full-face piece SCBA
- full-face piece SAR

### Emergency or Planned Entry into Unknown Concentrations

- positive pressure, full-face piece SCBA
- positive pressure, full-face piece SAR with an auxiliary positive pressure SCBA

**Note:** Employers must research what type of protection is available and select the equipment that best meets the needs of their environment. Know the limitations of each style of protection. Consideration must also be given to specific personal needs of individual workers. Some types of respirators do not require a face seal, and usually can be worn by bearded employees", extreme caution must be exercised with the use of ammonia. If a tight fitting respirator is chosen, the user must be clean shaven where the face piece meets the skin. Fit testing must also be conducted. Refer to the *CSA Standard Z94.4-02 Selection, Use, and Care of Respirators.*)

### Beyond Respiratory Protection

At elevated levels of ammonia workers may require additional PPE to be worn. The MSDS may recommend that chemical protective gloves, coveralls, boots, and/or other resistant protective clothing be worn.

At extreme levels a chemical resistant full-body encapsulating suit and respiratory protection maybe required.

As recommended in the B-52 Mechanical Refrigeration Code a safety shower/eye-wash station should be readily available in the immediate area of the plant room.

### ORFA Recommendation

So, is there a need to store and maintain self-contained breathing apparatus in an arena environment? **Although there is not a specified requirement in the OSHA or Industrial Regulation for SCBAs employers must develop an emergency plan to deal with ammonia leaks.**

If an employer's emergency plan calls for the arena personnel to enter the ammonia room after the alarm has sounded then the staff must have SCBAs which must be maintained and for which training is provided.

If the arena's plan was such that they did not allow any of their staff to enter the room until levels were below the levels where SCBAs were required, then SCBAs at the site may not be necessary. The emergency plan would have to cover how all staff

was to evacuate and who would enter the room if the ammonia needed to be turned off.

SCBA has a potential role for refrigeration operations only if the persons using it have been adequately prepared and properly trained to do so safely. Any person designated to use SCBA during an emergency situation must be educated on the limitations of exposure limits for this PPE.

At elevated levels ammonia will impact exposed human skin and as such full body protection may be required. When a worker is placed in a position to consider entry into a mechanical room using SCBA the entry most likely will be guided by Confined Space Entry guideline requirements. Permits for entry may need to be completed in advance of entering the area.

MOL Inspectors will ask workers/supervisors about emergency plans or how leaks will be handled. If the worker/supervisor is unsure or unable to articulate the plan, inspectors will address the issue and may write an order for SCBAs and the attendant training and maintenance.

The ORFA's position on the topic is that an elevated level of any chemical in a recreation environment places workers and facility users at risk. Many recreation facilities often do not have the human or financial resources to purchase such equipment or to provide the necessary training on the proper use and as such it should be avoided.

In place of SCBA a more concentrated effort toward training staff to effectively respond to emergencies by evacuating the building would be a better investment in preparedness and worker/occupant safety.

Staff should be adequately trained and confident in their actions to begin evacuation procedures anytime there is a noxious gas leak. Calling 911, activating the facilities alarm system and implementing evacuation procedures is essential to protecting human life. It is better to be safe than sorry!

Consideration on this topic should also be given when working with the Joint Health and Safety Committee (JHSC) and local EMS professionals. This collaborative effort will assist facility managers develop an effective response plan; one that

includes all key first and secondary responders to emergency situations with high concentrations of noxious gases.

### Conclusion

Entry into areas that have elevated concentrations of any noxious gas should only be attempted by competent trained individuals.

Understanding the proper use, care and limitations of all on-site PPE is each worker's obligation under the Internal Responsibility System (IRS). Many workers believe that high levels of noxious gases can kill. The fact is that it is that a lack of understanding of the potential hazards and risks associated with any chemical that can contribute to a worker's injury or death.

**When considering the use of self-contained breathing apparatus refer to the CSA Standard Z94.4-02 Selection, Use, and Care of Respirators. This Standard sets out requirements for the proper selection, use, and care of respirators and for the administration of an effective respiratory protection program in the workplace.**

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