



ONTARIO RECREATION
FACILITIES ASSOCIATION INC.

**SUGGESTED GUIDELINES
FOR
ENTRY INTO
MECHANICAL ROOMS:
RECREATION FACILITIES**

MARCH 2002





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Note:

The information presented herein is, to the best of our knowledge, current at the time of printing and is intended only to assist practitioners with general compliance methods. This resource document is not a definitive guide to government regulations or to practices and procedures wholly applicable under every circumstance. The appropriate regulations and statutes should be consulted. Although the Ontario Recreation Facilities Association and the Municipal Health and Safety Program cannot guarantee the accuracy of, nor assume liability for, the information presented herein, we are pleased to answer individual requests for training and advice to assist operators in the safe and efficient operation of mechanical systems.

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SUGGESTED GUIDELINES
FOR ENTRY INTO MECHANICAL ROOMS: RECREATION FACILITIES

Introduction

Are the mechanical rooms of Ontario arenas and aquatic facilities considered to be “confined spaces” as defined in the Interpretation of the Industrial Regulations of the Occupational Health and Safety Act?

This particular question and clarification regarding the ramifications of the question have created significant concern to members of the Ontario Recreation Facilities Association (O.R.F.A.), the Municipal Health and Safety Program (M.H.S.P.) and the Refrigeration Trade Labour-Management Health and Safety Committee.

A confined space can be described as any place where entry and exit is limited by its condition, design or construction, and where dangerous equipment, activities or atmospheres may pose a hazard to health or safety.

By their very nature, mechanical rooms located within recreation facilities have the potential to become a confined space. Conditions may include oxygen deficiency or enrichment, toxic or explosive environments, electrical shock and temperature extremes.

What can be done to safeguard employees who may be required to access mechanical rooms in recreation facilities? Take the time to review the information contained within this document. The suggested three level guidelines for entry into mechanical rooms in recreation facilities should be included in your Corporate Health and Safety Policy and Procedure (section 25, 2-J of the Occupational Health and Safety Act). The Ontario Recreation Facilities Association, the Municipal Health Safety Association and the Refrigeration Trade Labour Management Health and Safety Committee recognize the potential danger associated with mechanical rooms and have jointly suggested the following guidelines for entry.

Occupational Health And Safety Act, Regulations For Industrial Establishments - Section 67 - 71 - Confined Space

In the Interpretation of the Industrial Regulations (extract from Section I), “confined space,” means a space in which, because of its construction, location, contents or work activity therein, the accumulation of a hazardous gas, vapour, dust or fume, or the creation of an oxygen-deficient atmosphere may occur.

For industrial establishments in Ontario, entry into confined spaces is covered by sections 67 to 71 of the Revised Regulations of Ontario 1990, Reg. 851 of the Occupational Health and Safety Act as quoted below:

67. The requirements of sections 68, 69, 70 and 71 apply, with all necessary modifications, to any confined space while a worker is in that space.

R.R.O. 1990 Reg. 851, s. 67.

68. Subject to section 70, a confined space shall be entered only where,
- (a) there is an easy egress from all accessible parts of the confined space;
 - (b) mechanical equipment in the confined space is,
 - (i) disconnected from its power source, and
 - (ii) locked-out;
 - (c) all pipes and other supply lines whose contents are likely to create a hazard are blanked off; and
 - (d) the confined space is tested and evaluated by a competent person who,
 - (i) records the results of each test in a permanent record, and
 - (ii) certifies in writing in the permanent record that the confined space,
 - a) is free from hazard, and
 - b) will remain free from hazard while any worker is in the confined space having regard to the nature and duration of the work to be performed.

R.R.O. 1990, Reg. 851, s. 68.

69. Subject to section 70, a confined space in which there exists or is likely to exist,
- (a) hazardous gas, vapour, dust or fume; or
 - (b) an oxygen content of less than 18 per cent or more than 23 per cent at atmospheric pressure, shall be entered only when,
 - (c) the requirements of section 68 are complied with,
 - (d) the space is purged and ventilated to provide a safe atmosphere;
 - (e) the measures necessary to maintain a safe atmosphere have been taken;
 - (f) another worker is stationed outside the confined space;
 - (g) suitable arrangements have been made to remove the worker from the confined space should they require assistance, and
 - (h) a person adequately trained in artificial respiration is conveniently available.

R.R.O. 1990 Reg. 851, s. 69.

70. A confined space in which there exists or is likely to exist,
- (a) a hazardous gas, vapour, dust or fume; or
 - (b) an oxygen content of less than 18 per cent or more than 23 per cent at atmospheric pressure, and which cannot be purged and ventilated to provide and maintain a safe atmosphere shall be entered only when,
 - (c) all the requirements of section 68 except that of sub clause (d) (ii) are complied with;
 - (d) the worker entering is using a suitable breathing apparatus and a safety harness or other similar equipment to which is securely attached a rope, the free end of which is held by a worker equipped with an alarm who is keeping watch outside the confined space;
 - (e) the worker entering is using such other equipment as is necessary to ensure their safety;
 - (f) the safety harness, rope and other equipment mentioned in clause (d) have been inspected by a competent person and are in good working order; and
 - (g) a person adequately trained in artificial respiration is conveniently available.

R.R.O. 1990 Reg. 851, s. 70.

71. (1) Subject to subsection 2, where the gas or vapour in a confined space is or likely to be explosive or flammable, the confined space shall be entered only where,
- (a) the concentration of the gas or vapour does not or is not likely to exceed 50 per cent of the lower explosive limit of the gas or vapour; and
 - (b) the only work to be performed is that of cleaning or inspecting and of such a nature that it does not create any source of ignition.
- (2) Hot work may be performed in a confined space which contains or is likely to contain an explosive or flammable gas or vapour where the concentration does not, and is not likely to exceed 10 per cent of the lower explosive limit of the gas or vapour.

R.R.O. 1990, Reg. 851, s. 71.

Taking Charge of your Mechanical Room

Each mechanical room obviously is different in design and operation and therefore a general statement cannot be made with respect to whether or not it may be deemed a “confined space”. It may not be deemed to be a confined space under normal operational circumstances, however, in the event of mechanical failure or human error, it could be deemed to be a confined space. Workplace Health and Safety Committees need to determine if circumstances may deem a particular mechanical room to be considered a confined space and act accordingly.

Mechanical rooms are generally regulated by federal and provincial standards which control the nature of the construction, equipment, and safety features incorporated at the time of the initial installation or when modifications are made to the system. In the particular case of mechanical refrigeration rooms, the construction, installation and modifications must comply with the CSA B52-99 Mechanical Refrigeration Code. The B52-99 Code is particularly concerned with ventilation requirements and other safety measures which, if followed, should prevent the mechanical room(s) from being considered a “confined space” as defined under Section I of the Regulations of the Occupational Health and Safety Act. If the mechanical room does not meet the requirements of the B-52 Code, it is likely to be deemed a confined space as defined under the Regulations of the Occupational Health and Safety Act. It is therefore strongly advised to ensure that all mechanical rooms are inspected to ensure compliance and to incorporate any required improvements to ensure regulatory compliance. Owners, operators, and employers of operators in recreation facilities with mechanical rooms would be diligent in ensuring that policies, procedures and training are developed for entry into mechanical rooms and that the mechanical rooms are properly equipped with the appropriate safety equipment.

All mechanical rooms should be equipped with:

1. Toxic (Ammonia/Freon/Chlorine), oxygen and explosive detection equipment, an audible alarm set up to start exhaust fans. Detectors should be equipped with a device, which will provide a precise indication of P.P.M. (parts per million) from outside the room.
2. Automatic alarm to be activated at the provincially accepted level of p.p.m. in order to protect employee health and safety. Please refer to “Level II” and “Level III” Entry.
3. Exhaust equipment must be automatically controlled and manual start switches must be provided at the entry point outside the mechanical room.
4. Acceptable lighting systems.
5. Free and unobstructed means of entry and egress.
6. Fire extinguisher(s); preferably dry chemical.
7. Log books that will be a permanent record of operating and entry atmospheres.
8. Procedural manuals, which are updated annually or as changes, occur.

Provision should be made for:

9. Appropriate Personal Protective Safety Equipment such as: breathing apparatus, protective face shields, dust mask, proper gloves and clothing - available outside of the room and workers trained in the proper use of all safety equipment. CSA B52-99 requires that the owner of any refrigeration system shall supply and maintain for its employees the Personal Protective Equipment required by the jurisdiction where the system is located. Please refer to Appendix C - Suggested Personal Protective Equipment for Recreation Facility Mechanical Room Emergency Response
10. Ongoing training for all staff and emergency response teams.
11. A chain of notification procedure according to p.p.m. accumulation (i.e., part-timer to shift operator to facility manager to department head, fire and police, etc.). Each to be designed according to facility operation procedures.

REGULAR ENTRY - LEVEL I.....(INSPECTION ONLY)
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Definition:

The intent of the competent person or any other authorized person entering the mechanical room is of the “Monitoring” nature ONLY. The person is NOT to do any procedure that may cause a release of a toxic substance to enter the atmosphere.

Procedure:

1. Check monitoring device to check the level of toxic concentration in the room. This procedure is to be performed from a location outside of the room prior to entry.
2. If within the safe range of P.P.M., the reading must be recorded in log sheet.

3. Ensure that the ventilation system is operating at all times when in the room.
4. The worker may proceed into the room to perform equipment checks and monitoring, making appropriate log entries.
5. Continuous monitoring of atmosphere.

WARNING:

- no one is to enter the mechanical room without checking and recording atmospheric levels
- be sure the exhaust equipment is in proper working order and is tested regularly.
- no other duties in relation to operating the plant are to be performed under Level I entry.
- unauthorized persons are not permitted access to the mechanical room at any time.
- check proper operation of exhaust equipment prior to working on mechanical equipment.
- the exhaust equipment should be manually operated in the event of a release.

“Competent Person” means a person who,

- i) is qualified because of his knowledge, training and experience to organize the work and its performance,
- ii) is familiar with the provisions of The Occupational Health and Safety Act and the regulations that apply to the work, and
- iii) has knowledge of any potential or actual danger to health or safety in the work place;

MAINTENANCE ENTRY - LEVEL II

Definition:

Under the Maintenance Entry-Level II, the worker is entering the mechanical room fully intending to perform regular operational procedures or maintenance on the equipment. This would include: adding oil to a compressor crankcase, draining oil from a chiller, changing chlorine cylinders, mixing chemical solutions, or opening, closing or adjusting any valve or control that may allow, by this action, toxic substance to escape into the room atmosphere.

Procedure:

1. All the procedures listed in Regular Entry - Level I.
- AND**
2. Wear protective equipment: face shield and protective gloves and apron; nose & mouth dust mask with twin cartridge if mixing pool chemicals.
 3. Perform any lockout procedures as necessary to ensure that equipment being worked on is prevented from starting or releasing energy unexpectedly. Establish adequate lockout procedures as necessary.
 4. Have emergency equipment on hand. This includes appropriate breathing apparatus, acceptable protective clothing, rescue ropes and harnesses, ammonia test solution to detect small chlorine leakage, spare new lead washers and eye wash stations which are filled and operative.
 5. Have a “Competent” person stand by watching the worker’s actions. This person should also be trained in confined space rescue procedures, CPR and First Aid
 6. Continuous monitoring of the atmosphere while working on the machinery and equipment. This monitoring should be for any possible hazardous condition.

IMPORTANT:

- all of the above procedures will only be performed by fully competent personnel
- entry permits should be developed and utilized for entry at this level.

EMERGENCY ENTRY - LEVEL III

Definition:

Under the Emergency Entry - Level III entry should only be attempted to save lives. In all other situations, ENTRY MUST BE STRICTLY PROHIBITED. Level III is an emergency situation and involves dangerous concentrations of toxic substances.

Procedures:

1. Activate emergency response services
2. Evacuate the premises
3. Only properly trained individual should perform entry for rescue. Assess the problem and effect the rescue entry using:
 - properly fitting air breathing apparatus and full protective clothing including rescue equipment.
 - a stand-by person currently trained in First Aid, CPR and rescue procedures must be present and not enter for rescue purposes unless they have a back up person.
4. Monitor mechanical room's toxic explosive and oxygen (or CO₂) levels. Start plant's ventilation system if not already operating by automatic controls. Keep entrances to public access areas closed. Open equipment room exits to the outside. Care should be exercised to prevent other facility heating, ventilation and air control (HVAC) systems from contaminating the rest of the facility.
5. Shut-down necessary equipment following the correct shutdown procedures.
6. Properly trained staff and/or contractor should then actually do the repair using proper procedures and protective and safety equipment.

DO'S AND DON'TS

DO'S

- DO become trained in knowing what safety equipment is needed to do the job you are about to do and USE it.
- DO learn all safety procedures that must be followed to do the job you are about to do and OBEY them.
- DO plan the job you are about to do and plan it well to be prepared for any unexpected event.
- DO be alert and in good physical condition to do the job well.
- DO the job you are about to do safely in accordance with job related health and safety procedures and training.
- Do consult with a member of your Joint Health and Safety Committee to ensure compliance with procedures
- DO record all conditions, procedures, lockouts, atmospheric levels, and repairs in permanent readable logbooks.
- DO keep mechanical rooms clean and unobstructed.
- DO keep acids and disinfection chemicals well separated from each other in a cool, ventilated, proper storage area with floor drain and hose bib.
- DO keep entry to the mechanical room limited to competent persons who are adequately trained.

DON'TS

- DON'T work alone when you are performing operations that MAY release toxic substances into the room's atmosphere. Have a competent person standing by equipped for rescue.
- DON'T work on any equipment if you have not taken proper precautions to ensure it will not start up without your approval and implement all lockout procedures as required.
- DON'T enter the space without first checking the room's atmospheric condition for toxics (chlorine/ammonia), explosive atmosphere and oxygen levels.
- DON'T perform any maintenance work on any equipment that you have not been adequately trained to do so.
- DON'T use a mechanical room for storage of equipment and supplies.

- DON'T add mixing water to pool chemicals (e.g. soda ash, powdered chlorines, muriatic acid); rather add the chemical to the water in the proper storage or metering tank with lid.
- DON'T stack bags of filter powder, sodium bi-carbonate, sodium carbonate, calcium, or other chemicals more than four (4) bags high.

APPENDIX - A

SAMPLE CONFINED SPACE ENTRY PERMIT/CHECKLIST

This confined space entry permit, when properly authorized, allows the person to whom it is issued to enter the area specified. The work shall not be started until the authorized signatures have been obtained, all requirements met and any discrepancies corrected. The permit shall be retained in the facility in accordance with corporate policy.

Checklist	Yes	No	Not Applicable
(NOTE: all applicable terms must be marked yes for the permit to be valid.)			
1. Procedure provided, reviewed and enforced?			
a) all job procedures reviewed and understood? Training completed?	___	___	___
b) person on-site at all times to enforce all procedures?	___	___	___
c) Material Safety Data Sheet (MSDS) reviewed?	___	___	___
2. a) Welding, cutting, open flames present? Welding permit approved and posted?	___	___	___
b) Fire doors, explosive doors, sealed doors operative?	___	___	___
3. Confined space isolated?			
a) lock-out and tag procedure followed?	___	___	___
b) power sources "off"? Locked-out?	___	___	___
c) electrical hazards isolated, removed, tagged?	___	___	___
d) rotating equipment locked-out, removed or disconnected?	___	___	___
e) standby emergency lighting available?	___	___	___
4. Confined space atmosphere prepared and monitored?			
a) purged?	___	___	___
b) continuous ventilation provided?	___	___	___
c) oxygen level maintained over 19.5% but less than 23%?	___	___	___
d) continuous air monitoring equipment provided? Operational?	___	___	___
5. a) personal protective equipment provided? Specific instructions given for its use?	___	___	___
b) air lines, self-contained air breathing apparatus or other approved respirators provided?	___	___	___
c) safety harness with lifeline and rescue rope provided?	___	___	___
d) head, eye, hearing, hand, foot and body protection provided?	___	___	___
e) lighting equipment of approved type provided and grounded?	___	___	___
f) fire extinguishers readily available?	___	___	___
g) walking/working surfaces protected from slippage	___	___	___
h) Drench shower or eyewash operative?	___	___	___
6. a) attendant standing outside of space, trained and prepared to respond to emergencies as needed and instructed?	___	___	___
b) rescue equipment provided at the confined space?	___	___	___
c) emergency alarms and communications available to emergency response team?	___	___	___
d) Chlorine Institute 24 hour emergency number posted and location of nearest CYLINDER/TANK PATCH/ REPAIR KIT	___	___	___

NOTE: This list of items is not intended to be all-inclusive; certain jobs may require additional specifications.

Entry Authorized By: _____

Entry Permitted Into: _____ By: _____

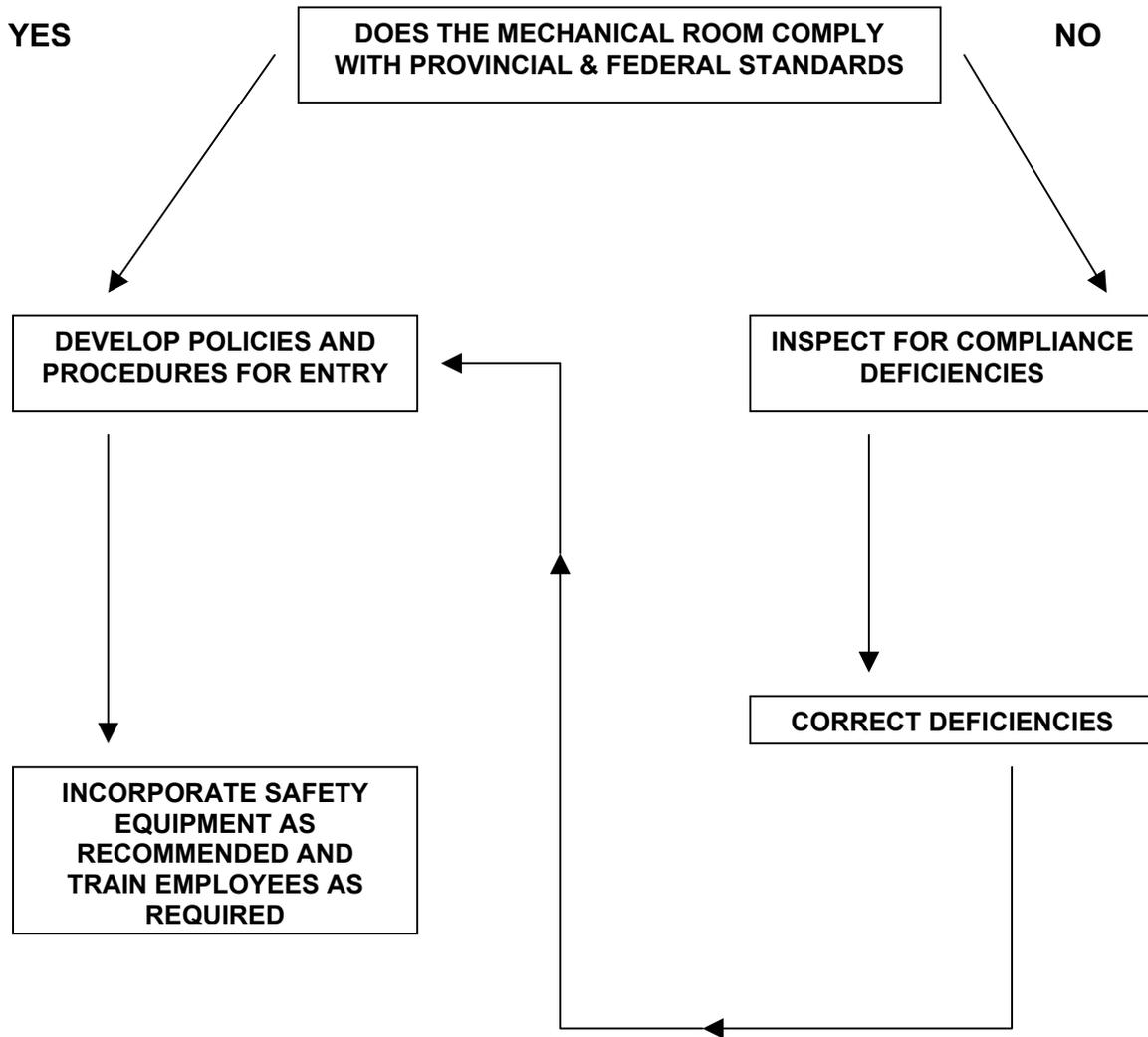
(Confined Space)

(Contractor/Employee)

Approved By: _____ Date: _____
(Name) (Position)

APPENDIX B

SUGGESTED PROCESS GUIDELINES FOR MECHANICAL ROOMS IN RECREATION FACILITIES



SUGGESTED PPE FOR RECREATION FACILITY MECHANICAL ROOM EMERGENCY RESPONSE

Introduction

Only by closely evaluating your current operations and continually preparing for potential emergency situations can a facility manager/operator successfully create a plan to ensure employee and patron safety. The Ontario Recreation Facilities Association (O.R.F.A.) is continually contacted for clarification on exact obligations for various pieces of employee Personal Protective Equipment as it might relate to mechanical room entry, specifically the need for Self Contained Breathing Apparatus (SCBA) as it relates to refrigeration and chlorine rooms. After much investigation and discussion with various official representatives, we have concluded, “the answer(s) to this question are as diverse as the recreation facilitation business itself.”

“It is our intent however, to provide some guidance on the subject of PPE for recreation employees in emergency situations involving mechanical rooms, but it will be the facility manager’s responsibility to individually evaluate current operations to ultimately ensure employee and patron safety as well as keeping up to date on any changes to legislated responsibility”.

It is important to recognize that the use of respirators and SCBA are only one element of being properly prepared for an emergency situation involving a noxious gas. **“First**, an efficient evacuation plan from your immediate environment should be the primary focus of every facility manager. **Second**, is the concern for individual safety? **Third**, only by regularly practicing the “plan” through mock disasters and constant evaluation, will facility staff be adequately prepared for a “real” emergency”.

Recreation facilities are equipped with sophisticated monitoring and pre-emergency control devices. Regrettably, most staff are inadequately prepared to assess a situation that causes an alarm to activate. All too often staff immediately assumes a malfunction of equipment has occurred, causing a “false alarm” and as such, they fail to mentally prepare for the real task at hand. A general lack of preparedness, in regards to emergency evaluation, and evacuation procedure is evident within Ontario’s recreation facilities.

“Recreation facility staff must be trained to take each facility alarm situation seriously and to evacuate under clear guidelines brought forth by management”.

Further, most facilities lack a defined (documented) plan for emergency equipment inspection. A quick and easy assessment of your current operations for its preparedness in an emergency situation can be as simple as touring the facility and visually inspecting exit light, emergency lighting and exit door condition. Facilities that have burnt bulbs in exit lights, emergency lights that are broken as well as blocked or poorly functioning exit doors will in all likelihood lack preparedness for emergency response situations.

“Recreation facility staff must regularly inspect, adjust and log all emergency equipment on a regular basis”.

Recreation facilities are known to contain hazardous substances to enable them to function. Artificial ice pads to multi-use facilities may contain a single noxious gas or a combination of gases, which might include vapours from propane, natural gas, gasoline, Freon, ammonia or chlorine. Emergency situations may occur due to combination of potential exposures to workers and/or patrons.

Facility staff must be prepared to quickly assess any noxious gas release and react in the best interest of themselves, their co-workers and the people who use the facility. Self Contained Breathing Apparatus (SCBA) may play a role in the approach an employee may take during an emergency situation. It is important that each facility understand the legal requirements for SCBA use as well as the required maintenance and training involved with such equipment.

Employee Training

The Occupational Health and Safety Act (OHSA) clearly places the onus on the employer to provide training in any workplace. The OHSA states that an employer must *a) take every reasonable precaution to ensure the workplace is safe b) must train **every** employee about potential hazards and c) must supply and maintain personal protective equipment and ensure all employees know how to use the equipment safely and properly.*

The Ministry of Labour will refer to this document as well as other legal documents directly related to specific operations when evaluating incidents or accidents.

(Source: OHSA Section 25))

Technical Standards and Safety Authority (TSSA)

Recent changes to legislation no longer have TSSA administering the SCBA requirement in recreation facilities. This requirement has been shifted to the “local authority” with no clear definition of whom this might include. Examples may have the local Joint Health and Safety Committee, Fire Department or other agency recommending the need of SCBA to be on site. Please feel free to contact the TSSA at (416)-325-2168 for further information and or clarification.

Ministry of Labour (MOL)

The Ministry of Labour may also be involved with assessing the need for SCBA in recreation facilities. Past discussions with official MOL representatives clarified that they would not seek such a requirement during a routine inspection however, individual inspectors may supersede this statement should they feel it is in the best interest of any operation.

An Employer’s Role in Health and Safety

Employers are reminded that they may never reduce any legislated responsibility under any condition. Regardless of set legislated responsibility, employers are reminded that at anytime they may set in place any health and safety measure they might feel are in the best interest of employee safety.

At minimum, an employee **must** wear approved safety footwear when working in a recreation facility. The use of low-cut safety shoes, which do not protect the ankle, may not be acceptable in the recreation workplace. Such shoes are designed for low risk work areas, such as painting.

An all too often over looked piece of PPE is the use of hearing protection. Machine rooms, equipment such as edgers and ice resurfacers, lawn mowers, vacuum cleaners, leaf blowers etc. may, over time, reduce the hearing of a worker. A noise audit of the workplace may help determine where and when hearing protection should be required.

Ladder safety in machine rooms is a must! A ladder, which will not conduct electricity, is essential to worker safety. Workers, performing duties over the height of 6-feet require fall restraint equipment and fall arrest training. Ladder safety training for all employees should be considered.

An employer must make available a copy of the Occupational Health and Safety Act to all employees.

Tolerance Levels

It is important to recognize that all workers may not have the same tolerance to exposure levels. One employee who shows a high tolerance to ammonia or chlorine may experience a violent reaction to the same levels at a subsequent exposure. As such, each employee requires individual evaluation to noxious gas exposure. Workers are cautioned that regardless of past experiences, all workers when encountering possible reduced oxygen levels from any source must exercise extreme caution. Further, workers who seem to have a high tolerance to any substance exposure may not show any immediate short-term effects however, long-term effects, such as severe health problems may develop years later.

Asphyxiation

Many of the gases in a recreation facility will not kill a human however, the displacement of air will. When a gas reduces oxygen content in any area, breathing support is required. Workers are reminded that tested areas may quickly increase in concentration of gases causing an area with a small leak that seemed safe to quickly become unsafe for human occupancy.

Respirators or Cartridge Gas Mask (CGM)

Sometimes referred to as “escape” masks - they were designed to get a worker out of the contaminated area to a “safe place” where either a SCBA was installed and the worker re-entered; or the facility was evacuated until the situation was cleared. A respirator/CGM is a mask-styled apparatus which, is fitted with a filter cartridge(s) to reduce toxin levels from being drawn in through the breathing process however, it does not provide protection from toxins being drawn in through mucus membrane areas such as eyes or open sores/cuts. There are also “canister” masks with full -face protection available, that can be used for slightly higher concentrations of gas.

In both styles, cartridge or canister masks, the exposure limits are usually marked on the container. Filters must be constantly changed to ensure maximum protection is maintained. Such equipment should only be used at low-level exposure and in conjunction with other Personal Protective Equipment (PPE) and under strict employee Confined Space Entry guidelines.

Emergency Showers and Eyewash Stations

It is essential to look beyond the use of goggles, face shields and procedures for using personal protective equipment. The first 10-15 seconds after exposure to a hazardous substance, especially a corrosive substance are critical! Emergency shower and eyewash stations provide on-the-spot decontamination. They allow workers to flush away hazardous substances that can cause injury and effectively extinguish clothing fires.

The need for emergency shower and eyewash stations is based on the properties of the chemicals that the worker may be using or exposed to. A job hazard analysis can help evaluate the potential risk of exposure in various work areas. It is recommended that installation of such units be within 10-seconds of any hazard location. Joint Health and Safety Committees should be involved with the review and determination for safety equipment. Emergency showers, also known as drench or deluge showers, are designed to flush the workers head and body. They should not be used to flush the workers eyes because the high rate or pressure of water flow could damage the eyes. Eyewash stations are designed to effectively and safely flush the eye and face area.

Flushing fluids are described as any potable water source, preserved water, preserved buffered saline solution or any other medically accepted solutions. Local laws may govern what must be used. At minimum, 15-minutes of flushing must occur to any body part, which has been exposed to a hazardous chemical. However, studies have shown that most flushing lasts less than 5-minutes because of the users extreme discomfort using cold water. Caution: tap water may contain contaminants that may aggravate the human body when combined with some hazardous chemicals.

Eyewash bottles require continual inspection to ensure they are filled. The primary purpose of the eyewash bottle is to provide immediate flushing capability to the worker, so that they may get to a shower or eyewash station. They cannot be installed in lieu of a permanent shower/eyewash system.

Factors that should be considered when selecting and installing shower/eyewash systems:

- Potentially hazardous substances in the immediate work area
- Number of workers in the area of the hazardous substance
- Isolated workers (An audible or visual alarm may need to be installed to advise when a shower/eyewash system has been activated)
- Comfort and warmth
- Quality of flushing fluid

- Neutralizing solutions

Currently there are no Canadian standards for design or placement of emergency showers or eyewash stations (Source: CCOHS web-site January 3, 2002). As such, facility operators are advised to seek the most current legislated requirement from local occupational health and safety agencies.

Spontaneous Ignition Sources

Workers are reminded to consider possible “spontaneous ignition sources” when entering areas that may contain high levels of explosive materials/gases/vapours. All sources of potential electrical contact points which automatically start through pre-programmed switches need to be deactivated immediately. They should only be reactivated once the area is deemed to be completely clear of the detected substance. MSDS needs to be referred to in such situations.

Self Contained Breathing Apparatus (SCBA)

SCBA are commonly referred to as a “Scott Air Pak” as these are the most common brand available on the market. The system contains a full face mask and air tank which when properly fitted and strapped to the back of a human will provide a limited supply of air in areas that are deficient in oxygen content. Such equipment is considered to be high maintenance in both equipment upkeep and employee training requirements.

Facilities, which determine that SCBA are required, must be prepared to “regularly” train all staff on the use of such equipment. Actual practice with the equipment is mandatory. Training only some individuals may not allow for a reasonable response time should these trained persons not be on site during a crisis.

One (1) SCBA is unacceptable. Entry into a confined space is only permissible providing that “back-up” support by a prepared competent individual with SCBA and a life-line attached.

SCBA require regular attention for up-keep. Purging of supplied air and re-charging is mandatory. Check with local requirements and manufacturer’s recommendations for such activity.

Employee facial hair may be an issue for use of SCBA. Supplier’s information of such requirements should be reviewed and strictly adhered to. If there is any doubt, the time to find out if facial hair, or in some cases, facial bone/flesh structure will prevent a complete seal of the facemask of the apparatus is not at the instant of emergency. All prospective users should determine this in practice situations.

Personal Protective Equipment

Beyond respirators and SCBA equipment, other PPE such as over-garments that cover the entire body including the head, boots and gloves may also be required. Extreme conditions may call for complete body suits to be used. The cost involved with such equipment may be prohibitive in having and maintaining them.

Fire Department Tour/Evaluation

Facility managers should take a lead role in introducing their local fire departments to the potential hazards related to their operations. A tour of the facility with key individuals of the fire department outlining emergency equipment, devices and plans, which are currently on site, as well as, the noxious gas inventory of the facility, is essential to community safety. The fire department may be better served in preparing for an emergency situation by having the recommended body suits in their inventory of response equipment.

Noxious Gas Inventory

Most recreation facilities have no exact record of what toxins and what amounts are being stored on site. Beyond the canisters used for replenishing purposes, facility managers must be able to accurately advise on how much noxious gas might be held in their specific systems on any given day. (Example: Toxic (noxious) gas inventory -in the case of refrigerants, this is a requirement of CSA B52-99.)

An extreme caution is given to employees in aquatic facilities. Untrained individuals who enter into areas housing lithium, calcium, stabilized powder, tablet or granular chlorine compounds, and who accidentally introduce common items such as coffee, soda, cleaning solutions, acid or oils to these stored sanitizing products, may result in an explosion and/or spontaneous combustion, releasing an undetermined amount of chlorine gas.

Gas Monitoring Equipment

Many variations of gas monitoring devices are made available to today's recreation practitioner. Hard-wired systems to individual portable monitoring devices can be an enhancement to the safety of any operation.

In aquatic facility operations, a sensor must be located in the room where the gas(es) is located. However, the alarm/signal/monitor panel should be located in a safe remote area. It is important to note that where the signal wire passes through a wall, the hole must be completely sealed with a suitable caulking and not placed in a conduit, as the conduit will allow for released gas to escape through the wall.

In Ontario the CSA B-52 Refrigeration Code governs ammonia refrigeration systems, which requires systems to provide an audible and visual alarm in an area normally, supervised by the facility operator. These units must alarm at the LEL (Lower Explosive Limit). For ammonia system installations, the limit is 300 PPM.

Again, proper training of all staff on how to use, calibrate and interpret the information from such equipment is vital to keeping everyone safe. Contact equipment suppliers to provide you with adequate documentation to make an informed decision on the right equipment for your operations.

Confined Space Entry

The release of any noxious gas into a room may result in the creation of a "confined space" situation. Confined Space Entry is very clearly regulated under the Occupational Health and Safety Act. The procedures to be followed mirror the same type of requirements for mines, construction projects and industrial establishments.

The object of these provisions is to ensure that as far as possible, confined spaces are made hazard free- particularly with regards to hazardous gases, vapours and dusts.

In all cases, a confined space must be tested and evaluated for hazards prior to entry by a competent person. Permanent records of such situations must be kept on file.

If a confined space is likely to hold a flammable or explosive gas, it may be entered only if concentration does not exceed 50% of lower explosion limit. Only cleaning and inspection work may be done. Special precautions apply to areas, which contain self-starting electrical equipment.

The O.R.F.A. has a complete document to help recreation facility managers create a Confined Space Entry policy. Please feel free to contact us at 1-416-426-7062 for more information.

(Source: ABC's of the OHSA Page C-35, December 1997)

Competent Person

A "competent person" means a person who,

- Is qualified because of knowledge, training and experience to organize the work and its performance;
- Is familiar with the Act and the regulations that apply to the work, and
- Has knowledge of any potential or actual danger to health and safety in the workplace.

(Source: ABC's of the OHSA Page C-22, December, 1997)

Conclusion

Only through regularly analysis of operations and equipment can a facility manager be properly prepared for a crisis. Knowing the equipment and employee limitations is an important first step to compliance. At minimum, managers should immediately advise staff who are unprepared to safely enter areas that may hold noxious gases that "they are not to enter under any circumstance". Further training must be provided to all staff to recognize when a situation has developed that requires that the facility be evacuated immediately in the event of an uncontrolled release of gas.

Employer Emergency Preparedness Checklist

- Is there an up to date emergency evacuation plan in place?
- Is the plan regularly reviewed and kept up to date?
- Does all staff regularly practice the plan?
- Is there adequate PPE available to staff for emergency situations?
- Are there regularly scheduled inspections of emergency equipment and exits doors?
- Is there an existing inventory of toxic gases and substances available?
- Is all staff current with their WHMIS training?
- Are all MSDS sheets current (less than 36-months old)?
- Is staff trained in "confined space entry"?
- Are all potentially toxic gases and substances safely stored?
- Have you discussed your preparedness with other EMS personnel?

CANADIAN STANDARDS ASSOCIATION (CSA) B52-99 MECHANICAL REFRIGERATION CODE

The Canadian Standards Association Code B52-99, approved January 2000 is the most recently amended form of the Code, which was developed by consensus of representatives of a cross section of the industry. The committee was comprised of members such as representatives of manufacturers, safety associations, government ministries, professional associations and insurers. Enquiries regarding the Standard can be made directly to CSA.

The purpose of the Code is to provide minimum standards for the design, construction, installation, and maintenance of all refrigeration systems with few exceptions that are described in the Code. It also applies to the premises in which a refrigeration system is located. The Code refers to other CSA standards and standards of other regulating bodies that pertain to refrigeration system components such as vessels, piping tubing, refrigerants etc.

Some of the requirements of the code are determined by the occupancy of the premises, refrigeration system classification, and refrigerant classification. Other requirements have to do with the design and construction of equipment, including drawings, specifications, data reports, materials, design pressures, pressure vessels, piping, other components, design provisions for service, and system testing and certification.

The information that follows is not intended to be a replication of the Code. Since much of the Code deals with requirements for the manufacture and installation of systems, those parts are omitted here, as most practitioners will not be faced with those prospects. That is not to say that those parts of the standards are not applicable, only that in the normal operation of a refrigeration system the practitioner will not likely be confronted with the necessity of first hand knowledge. Where changes to an existing system, or new installations are planned, owners need to consult the code and their inspector to ensure compliance with the Code, Boilers and Pressure Vessels Regulation, Operating Engineers Regulation, and the Technical Standards and Safety Act. All practitioners are encouraged to obtain a copy of B52-99 and to review it thoroughly. Here then are some of the requirements of the Code that operators of refrigeration plants should become familiar with, and ensure compliance as required.

Section 3: of the Code shows how the occupancy of the building, the type of system and the refrigerant combine to determine some of the requirements of the Code. The information to determine the classification under occupancy, type of system, and refrigerant is supplied, and by applying that information the requirements of that system according to the Code can be determined.

Section 4.11.1: of the Code deals with marking and labeling requirements:

- 4.11.1** states that permanent, securely attached, legible and readily accessible signage identifying the installer, refrigerant and amount, lubricant and amount, horsepower rating and tonnage capability, and field test pressure must be installed.
- 4.11.2** indicates that each unit system and separate condensing unit, and each compressor sold for field assembly must have a name plate identifying the manufacturer, the test pressure, and refrigerant to be used
- 4.11.3** Systems containing more than 100 lbs. (45 kg.) of refrigerant require signage of specific size lettering identifying main disconnect and control switches, pressure limiting devices, and each pressure vessel and their shutoffs, and all refrigeration piping and whether the refrigerant is at high or low pressure and liquid or vapour state.
- 4.11.5** indicates the owner's responsibility to post a card in the plant giving operational and emergency instructions that include emergency and service contact information, and contact information for the nearest "regulatory authority"

Section 5.2: describes the requirements for machinery rooms. Of particular interest are the requirements for doors, vapour detection equipment, explosion protection, and ventilation, including the need to provide protection against freezing.

- A machinery room must be of a size to make all equipment in the Room easily accessible for proper service, maintenance, and operation.
- Access to machinery rooms must be restricted to authorized personnel only
- A machinery room must have door(s) that open outwards and adequate in number that would provide ease of escape in an emergency. Doors that open into the building must be tight fitting. Doors must not open into public areas of the building.
- No open flames or equipment to produce an open flame can be installed in a refrigeration room using anything other than carbon dioxide as a refrigerant unless special requirements of the code are met.
- (Combustion air must be ducted from outside the room and the combustion chamber sealed to prevent refrigerant vapours from entering, and a refrigeration vapour detector that will shut down the appliance upon sensing a leak must be installed). **In the case of arenas with ammonia systems, absolutely no flame-producing device or hot surface over 427 C or 800F can be installed in the room.**
- Machinery rooms must be ventilated to the outdoors. Mechanical ventilation must meet minimum standards of flow capacity as set out in the code for normal operation as well as for emergencies. Provision of outdoor makeup air to replace exhausted air must be provided. Exhausted air must be to the outside where it will not be re-introduced to the building or cause any danger.
- Fan switches must be installed inside and outside the equipment room; those outside the room will be capable of starting, but not stopping the ventilation
- Supplementary heating to maintain a temperature of no less than 5 degrees C. must be installed where danger of freezing could occur.
- All refrigeration rooms must have a refrigeration vapour detector that will sound an alarm and start the ventilation equipment at vapour concentration levels specified in the Code (**300ppm for Ammonia**) for the refrigerant being used.

- All ducting must be sealed and have provisions for preventing the escape of refrigerant vapours into other areas of the building

IN ARENAS HAVING INDIRECT AMMONIA SYSTEMS:

- The room shall have at least one door that opens directly to the outer air, and other exits to the building shall be through a vestibule with tight fitting fire doors
- The machinery room envelope must be of tight construction and not less than one hour fire rating
- Exterior openings must not be under fire escapes or open stairways
- All piping passing through the walls must be tightly sealed to the wall
- Air ducts passing through the room must be tightly sealed and have no openings to the room
- A remote pilot control for the purpose of emergency shutdown of the equipment except for ventilation equipment (which must be on an independent circuit) must be installed immediately outside the room.

Section 7: Deals with maintenance of the system

7.1 - 7.3 Deals with the charging, withdrawal, and storage of refrigerant.

Containers not in use cannot be left connected to the system.

Refrigerant withdrawn must be transferred only to acceptable containers in the amount specified by the regulations of the Canadian Transport Commission. The maximum amount of refrigerant that can be stored is 136 kg. (300lbs.) and if it is to be stored outside the machinery room, approval must be obtained from the regulatory authority having jurisdiction.

- sets out minimum maintenance requirements for all refrigeration systems with few exceptions:
 - pressure limiting devices must be tested at least once annually
 - pressure relief valves must be replaced or re-certified at least every 5 years
 - all other safety devices must be tested at least once annually
 - leak detectors must be tested according to manufacturer's specifications, not less than once a year, and all functions of the alarm must be proven or corrective measures taken
 - all safety related maintenance recommendations of the manufacturer must be followed
 - all electrical and control terminals and connections must be checked annually and kept tight
 - periodic visual checks for developing problems must be undertaken as required by the equipment
 - periodic testing for refrigeration leaks must be conducted
 - each component tested above must be tagged with the test date and tester's name.
 - the owner is required to maintain all refrigeration systems in a clean and accessible condition

Section 8: Deals with Precautions, and requires that owners of refrigeration systems supply and maintain personal protection equipment for the staff, and installation and service personnel are required to be equipped with the personal protective equipment as required by the authority having jurisdiction.