



BASIC ARENA REFRIGERATION GOVERNANCE GUIDELINE

VERSION 1.0

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orfa.com



Building Community Since 1947

ONTARIO RECREATION FACILITIES ASSOCIATION INC.

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Vision

To be the leader in the recreation facility profession.

Mission

To provide leadership in the development and delivery of innovative training and education programs, value-added services, and quality products for the benefit of the recreation facility profession.

We Value

- Expertise in the recreation facility profession that comes from personal and organizational development
- Dedication to the professional, efficient and competent operation of recreation facilities
- Communication with our members
- Products and services that are responsive to membership needs
- Results based on business-centred principle

We Believe In

- Serving our members
- Strategic partnerships/alliances
- Advancement of the recreation facility profession
- Promoting safe, clean, sustainable, efficient and accessible recreation facilities
- Information management being the core activity of the Association
- Being an essential part of the recreation experience
- Building community

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BENEFITS OF ORFA MEMBERSHIP

The Ontario Recreation Facilities Association Inc. (ORFA) was incorporated in 1951 as a provincially recognized, not-for-profit, volunteer-driven recreation organization.

Today, the ORFA has over 7,000 members who operate and manage recreation facilities in municipalities, educational institutions, government agencies, First Nations communities, and in the private recreation sector. Members also include businesses and industries that support the recreation sector.

As a member-based organization, the ORFA provides leadership in training and development, and in products and services for the benefit of the recreation facility profession.

An ORFA membership entitles you to:

- A subscription to Facility Forum, the official magazine of the ORFA, published four times per year and mailed to each member or in the case of Group membership category, the identified primary facility contact
- Access to the ORFA Resource Centre and its recreation facility specific alerts, guidelines and best practices
- Access to ORFA's online discussion board
- Access to ORFA's online membership and products/services directory
- Attend the Annual Professional Development Program and regional training events at member rates
- Work towards an ORFA professional designation
- Access to "E-News" which provides recreation facility industry and association information
- Access to Corporate Members who provide recreation facility products and services
- Access to online job postings
- A committed board of directors and association staff dedicated to meeting member needs.

For complete membership information please visit www.orfa.com

MEMBERSHIP CATEGORIES

The ORFA has five classes of membership. All members of all classes shall be entitled to one vote at all meetings of members.

Individual Members shall be those individuals, who have filed an application for such membership with the ORFA and who have been appointed as individual members by the Board. The annual fee is \$160.00 plus 13% HST.

Group Members shall be those corporations or governments which are involved in the management and/or operation of recreation facilities, which have filed an application for such membership with the ORFA and which have been admitted as group members by the Board. The annual fee is \$750.00 plus 13% HST.

Student Members shall be those individuals who are currently enrolled in a post-secondary college or university, who have filed an application for such membership with the ORFA and who have been admitted as student members by the Board. The annual fee is \$50.00 plus 13% HST.

Corporate Members shall be those corporations which are involved in a business or profession which supplies goods or services to other members of the ORFA, which have filed an application for such membership with the ORFA and which have been admitted as corporate members by the Board. The annual fee is \$750.00 plus 13% HST.

Life Members shall be appointed by majority vote of the Board in appreciation of outstanding contributions made to the ORFA. Life members receive a complimentary ORFA membership.

For complete membership information please visit www.orfa.com

ONTARIO RECREATION FACILITIES ASSOCIATION PROFESSIONAL DESIGNATIONS

CIT • CAT • CGT • CBT • CARPT • CRFP



Kevin Gale, CIT, CAT, RRFS
Manager of Leisure Services
Town of Bradford West Gwillimbury

The Ontario Recreation Facilities Association's professional designation program is designed to assist members in developing competency to work effectively within the recreation facilities industry. Many members have been awarded ORFA professional designations, many of which are now requested by employers as part of the hiring process or used to assist in developing short- and long-term training plans.

Each designation requires Individual ORFA membership, a minimum Grade 12 education, completion of the requisite courses and confirmation of workplace-specific experience. Also, all ORFA designations entail a five-year recertification process. In addition to classroom-based courses, the ORFA continues to explore alternative course delivery formats (e.g. online, blended format, etc.) to provide accessible education to its members.

ONTARIO RECREATION FACILITIES ASSOCIATION PROFESSIONAL DESIGNATIONS

CIT • CAT • CGT • CBT • CARPT • CRFP

Certified Ice Technician (CIT)



To qualify for the CIT designation, you must:

- hold "Individual Membership" in the ORFA
- have a minimum Grade 12 education
- have a minimum of two years full-time work experience in refrigeration operations, ice making and maintenance
- have completed the following ORFA-approved courses with a minimum 60% passing grade:
 - Basic Arena Refrigeration (or Advanced Refrigeration Facility Operator or TSSA's Refrigeration Operator Class "B" Certification)
 - Ice Making and Painting Technologies
 - Ice Maintenance and Equipment Operations
 - Legal Awareness I - Supervising in a Recreation Environment

All CIT holders are required to recertify every five years. CIT designation holders may recertify by way of the following options:

- Collect and log a minimum of 50 professional development credits **OR**
- Participate in the CIT Recertification Course and write the exam **OR**
- Write the online CIT challenge exam.

Certified Aquatic Technician (CAT)

To qualify for the CAT designation, you must:

- hold "Individual Membership" in the ORFA
- have a minimum Grade 12 education
- have a minimum of two years full-time work experience in aquatic facility operations
- have completed the following ORFA-approved courses with a minimum 60% passing grade (75% passing grade in the NSPF® Certified Pool/Spa Operator® (CPO®) Certification Program):
 - NSPF® Certified Pool/Spa Operator® (CPO®) Certification Program*
 - Aquatic Facility Operations
 - Legal Awareness I - Supervising in a Recreation Environment

All CAT holders are required to recertify every five years. CAT designation holders may recertify by way of the following options:

- Collect and log a minimum of 50 professional development credits **OR**
- Write the online CAT challenge exam

Certified Grounds Technician (CGT)

To qualify for the CGT designation, you must:

- hold "Individual Membership" in the ORFA
- have a minimum Grade 12 education
- have a minimum of two years full-time work experience in parks/grounds operations
- have completed the following ORFA-approved courses with a minimum 60% passing grade:
 - Grounds Operations and Maintenance
 - Grounds Management and Operations
 - Legal Awareness I - Supervising in a Recreation Environment

All CGT holders are required to recertify every five years. CGT designation holders may recertify by way of the following options:

- Collect and log a minimum of 50 professional development credits **OR**
- Write the online CGT challenge exam.

Certified Building Technician (CBT)

To qualify for the CBT designation, you must:

- hold "Individual Membership" in the ORFA
- have a minimum Grade 12 education
- have a minimum of two years full-time work experience in a recreation facility
- have completed the following ORFA-approved courses with a minimum 60% passing grade:
 - Building Operations and Maintenance
 - Building Management and Operations
 - Legal Awareness I - Supervising in a Recreation Environment

All CBT holders are required to recertify every five years. CBT designation holders may recertify by way of the following options:

- Collect and log a minimum of 50 professional development credits **OR**
- Write the online CBT challenge exam.

Certified Arena Refrigeration Plant Technician (CARPT)

To qualify for the CARPT designation you must:

- hold "Individual Membership" in the ORFA
- have a minimum Grade 12 education
- have a minimum of two years full-time work experience in the care and control of a refrigeration plant
- have completed the following ORFA-approved courses with a minimum 65% passing grade:
 - Basic Arena Refrigeration
 - Advanced Refrigeration Facility Operator
 - Recreation Facility Environmental Systems
 - Legal Awareness I - Supervising in a Recreation Environment

All CARPT holders are required to recertify every five years. CARPT designation holders may recertify by way of the following options:

- Collect and log a minimum of 50 professional development credits **OR**
- Write the online CARPT challenge exam.

Certified Recreation Facilities Professional (CRFP)

The CRFP credential is designed for those members seeking administrative/managerial professional recognition.

To qualify for the CRFP designation, you must:

- hold "Individual Membership" in the ORFA
- have a minimum Grade 12 education
- have a minimum of five years full-time recreation industry work experience
- have completed the following ORFA-approved courses with a minimum 60% passing grade:
 - Legal Awareness I - Supervising in a Recreation Environment
 - Legal Awareness II - Managing in a Recreation Environment
 - Leadership Skills for Recreation Professionals
 - Events Planning and Management
 - Advanced Recreation Facilities Business Management I

Topics include:

- | | |
|-----------|--|
| Module 1: | Asset Management |
| Module 2: | Strategic Planning |
| Module 3: | Project Management |
| Module 4: | Budgeting and Financial Management and Project Funding |
| Module 5: | Policy and Procedure Development and Implementation |

- Advanced Recreation Facilities Business Management II

Topics include:

- | | |
|------------|---|
| Module 6: | Social Media Strategy |
| Module 7: | Supply Chain Management |
| Module 8: | Public-Private Partnerships |
| Module 9: | Customer Service and Patron Relations |
| Module 10: | Human Resources Management: Union and Non-Union Work Environments |

All CRFP holders are required to recertify every five years. CRFP designation holders are required to recertify by collecting and logging a minimum of 50 professional development credits.

COURSE EQUIVALENCIES The ORFA does not accept course equivalencies with the following exceptions.

The ORFA will accept TSSA's Refrigeration Operator Class B Certification as equivalent to ORFA's Basic Arena Refrigeration course.

The ORFA will accept either of the following two courses towards equivalency of ORFA's Legal Awareness I – Supervising in a Recreation Environment course: a) JHSC Certification Part 1 Program or b) Public Services Health and Safety Association's course in Health and Safety for Leaders

COURSE EXAMINATIONS AND PASSING GRADE Each course has a final exam. The passing grade for each ORFA-approved course is 60%, unless stated otherwise, and 65% for courses leading to the CARPT professional designation, and 75% for the NSPF® Certified Pool/Spa Operator® (CPO®) Certification Program. Individuals who are unsuccessful in meeting minimum grades will be required to repeat the course at the regular course fee. No challenge exams are permitted.

THE PROFESSIONAL DESIGNATION APPLICATION PROCESS

Please complete the appropriate professional designation application form, located at www.orfa.com/designations/categories, and forward it, along with supporting documentation to: ORFA Professional Designations, Ontario Recreation Facilities Association Inc., 1 Concorde Gate, Suite 102, Toronto, Ontario M3C 3N6. Email: info@orfa.com.

Applications are reviewed monthly and both approved and non-approved applicants will be notified.

If you require more information, contact the ORFA at tel: (416) 426-7299 or sdias@orfa.com.

Online Learning Courses

ORFA's online self-study courses are available 24 hours a day, 7 days a week allowing you to learn at your own pace and in your own environment. These courses provide you with easy access to course information, resource materials, videos, practice quizzes, assignments, grade postings, certificates, and transcripts. All self-study courses and their respective exams must be completed within 30 days upon course enrollment. Courses currently available include:

- Basic Arena Refrigeration
- Safe Ice Resurfacers Operator (SIRO)
- Safe Arena Refrigeration Plant Owner/Operator (SARPO)
- Recreation Facility Cleaning, Disinfection and Sanitization Principles
- Certified Ice Technician (CIT) Recertification Challenge Exam
- Legal Awareness I - Supervising in a Recreation Environment
- Certified Ice Technician (CIT) Recertification Course

Please visit www.orfa.com/events for course descriptions and registration information.

New online courses are in development and will be announced over the coming months.

www.orfa.com/online2021

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BASIC ARENA REFRIGERATION GOVERNANCE GUIDELINE

Introduction

The following supplement is provided to Ontario Basic Arena Refrigeration participants as an added value educational tool. The resource is designed give an overview of Regulations, Codes and Acts that guide safe plant operations. It should not be considered current or complete. Please review the full document for decision or application purposes.

Codes, Acts and Regulations

There are several Codes, Acts and Regulations that may govern safe ice arena plant operations. They include but are not limited to:

- Operating Engineers Regulation (OER) and Director's Orders
- Boiler Pressure Vessels (BPV)
- CSA B-52 Mechanical Refrigeration Code (MCR)
- Occupational Health and Safety Act (OHSA)
- Employment Standards
- WSIB Regulation 1101 – First Aid
- Ministry of Environment - Regulation 347
- Ontario Building Code
- Ontario Electrical Code
- Ontario Fire Code

Governing Authorities

The following organizations provide support through inspection for compliance as required.

Ontario Ministry of Labour (MOL)

The Ministry of Labour is responsible for labour issues in the Canadian province of Ontario. The Ministry of Labour and its agencies are responsible for employment equity and rights, occupational health and safety, and labour relations. Specific to ice arenas, the MOL governs the Occupational Health and Safety Act, CSA B-52 Mechanical Refrigeration Code, Employment Standards Act, and First Aid.

Ministry of the Environment, Conservation and Parks

The Ministry of the Environment, Conservation and Parks is an Ontario government ministry responsible for protecting and improving the quality of the environment in the Canadian province of Ontario, as well as coordinating Ontario's actions on climate

change. Specific to ice arenas, they govern the certification and inspection of waste generators under Regulation 347. This legislation controls hazardous wastes such as compressor oils. They would also investigate significant spills of secondary refrigerants or any significant release of primary refrigerants.

Ontario Building Code

The Building Code Act, 1992, governs the construction, renovation, change of use, and demolition of buildings. It also provides specific powers for inspectors and rules for the inspection of buildings and allows municipalities to establish property standard by-laws. New construction or renovations must comply to current building codes that are governed by local building inspectors. These developments must conform to current Fire Code, Electrical and Plumbing Codes as directed by the Building Code. Once construction is complete, the current Codes would be applied.

Fire Code

Specific to ice arena refrigeration plant compliance, all egress should be kept in proper working order, all fire suppression equipment must be properly maintained, good housekeeping must be applied, and emergency plans maintained and practices.

Building Code

Specific to ice arena refrigeration plant compliance, no changes to the structure should be attempted without proper authority byway of a permit.

Electrical Safety Authority (ESA)

ESA's primary activities include identifying and targeting leading causes of electrical safety risk; ensuring compliance with regulations; promoting awareness, education and training; and collaborating with stakeholders to improve the state of electrical safety in Ontario. ESA is a private, not-for-profit corporation with staff deployed across the province. They oversee Electrical Code compliance.

Specific to ice arena refrigeration plants, persons entering the plant room must be provided with electrical risk and hazard awareness training. Common risks include high voltage and water/electrical contact requiring GFCI protection. No operator should attempt any electrical work without direction from a qualified person.

Technical Standard and Safety Authority (TSSA)

Is a self-funded, not-for-profit corporation responsible for the administration and enforcement of the act and its regulations on behalf of the Government of Ontario. The Operating Engineers (OE) Safety Program registers, inspects and regulates the safety of plants in Ontario. TSSA is also responsible for the examination and certification of the professionals who manage, operate and maintain plants and the equipment within. Playing an important role in public safety, the TSSA's program ensures that OE and operators, also known as power engineers, have the skills and knowledge to run the plants that power Ontario with electricity, refrigeration, heating and cooling. Under the Act, [Ontario Regulation 219/01: Operating Engineers](#) and the corresponding [Director's Order](#) apply to operating engineers and operators in Ontario.

Specific to ice arenas, TSSA is responsible for overseeing the Operating Engineers Regulation (OER) and Boiler Pressure Vessels (BPV) through inspection and certification. The OER focuses on the human operational responsibilities while the BPV is designed for the related equipment in each plant. In addition, they may also apply the CSA B-52 Mechanical Refrigeration Code. In addition, they certify Boiler Inspectors who are primarily employed by insurance carriers. Boiler Inspectors will also attend ice arena refrigeration plants.

The following excerpts of the Technical Standards and Safety Act, 2000 Ontario Regulation 219/01

Operating Engineers is offered as an instructional tool to the ORFA Basic Arena Refrigeration training course. It should not be considered current or complete. The full Regulation should be reviewed or referenced for operational or compliance purposes. It is the plant owner's sole responsibility to review and apply all legislation applicable to the on-site equipment and its safe operation. The information is being used to inform new workers that have responsibilities in an Ontario ice arena refrigeration unattended, registered, guarded plant.

Technical Standards and Safety Act, 2000 Ontario Regulation 219/01 OPERATING ENGINEERS

Interpretation

1. (1) In this Regulation,

"accident" means a failure of equipment that causes personal injury or loss of life, or loss of or damage to equipment or property;

"altered" means that the maximum capacity or rating of a unit while in normal operation has been changed;

"attendance", in relation to shift coverage, means the physical presence of a person for the purpose of mandatory shift coverage by an operating engineer or operator for the operation of the plant as set out in this Regulation and "attended" has a corresponding meaning;

"automatic control", in relation to a plant, installation or unit, means that it is provided with devices and systems that can start, stop, restart and modulate the action of the plant, installation or unit without the intervention of a person;

"built up plant" means a refrigeration plant whose equipment including, compressors, condensers, receivers, evaporators and associated controls are site assembled as independent non-packaged units;

"CAN/CSA-B52" means the 1992 edition of Standard B52 Mechanical Refrigeration Code of the Canadian Standards Association, as amended from time to time;

"compressor plant" means an installation that is comprised of one or more compressors with prime movers and the equipment, pressure vessels and piping used in connection with it for compressing air or any other gas, but does not include a refrigeration plant;

"fail safe device" means a control or device that will stop the function of a unit where the preset operating parameters of the unit have been exceeded, sound an alarm and prevent restarting of the unit until the unit is reset by hand;

"field piping" means the transmission system of refrigerant beyond the enclosed refrigeration machinery room, but does not include connections to condensers, receivers or evaporators, which are external to the structure, and which may be located on the roof or property;

"guarded", in relation to a fail-safe device, means the controls and safety devices that safely limit the operation of the equipment that is being guarded to preset parameters, and that will cause an audible or visual alarm, or both, to the operator of the equipment, as the case requires;

“high pressure” or “HP” means a pressure of more than 15 psi (103 kpa);

“high pressure power plant” means an installation that is comprised of a high-pressure steam plant and one or more steam prime movers, compressors, refrigeration compressors, equipment and piping;

“HVAC” means heating, ventilation and air conditioning;

“local control”, in relation to an installation, means that the operation of the installation is controlled where the installation is located;

“low pressure” or “LP” means a pressure of 15 psi (103 kpa) or less;

“maintenance” means the inspection, testing, service or repair of a unit, equipment, plant or installation to ensure that it is safe and that it meets the requirements of its design and this Regulation, and “maintain” has a corresponding meaning;

“manual control”, in relation to a plant, installation or unit, means that the plant, installation or unit, is started, stopped, restarted or otherwise controlled by the intervention of a person;

“owner” means the person to whom or which the plant is registered but does not mean the operating engineers or operators who operate, control or maintain the plant;

“pressure”, (psi.), means gauge pressure in pounds per square inch;

“pressure vessel” means any enclosed vessel that contains gas, vapour or liquid, the operating pressure of which may exceed 15 psi (103 kpa);

“prime mover” means a steam engine, steam turbine, gas turbine, internal combustion engine or electric motor;

“rating” means the registered authorized name plate energy rating of a plant, in kilowatts;

“refrigerant” means a liquid, vapour or gas that is used to extract heat by its expansion or evaporation;

“refrigeration plant” means an installation comprised of one or more refrigeration compressors, prime movers, equipment, pressure vessels and any associated piping;

“remote control”, in relation to an installation, means that the operation of the installation is not controlled where the installation is located;

“reset” means the manual resetting of a switch that allows the safety cut out control device to restart a unit or equipment that has been shut down on an alarm condition;

“self-contained”, with reference to a refrigeration plant, means a refrigeration plant that consists of a manufactured package of equipment, including compressor, condenser, receiver, evaporator and associated controls;

“training” means a formal and consistent process that is recorded and that includes technical guidance given to plant employees engaged in the operation, maintenance and service of a plant;

“unattended”, in relation to a guarded plant or guarded installation, means that the plant or installation may be operated,
(a) without the appointment of a chief operating engineer or chief operator, and
(b) without an operating engineer or operator on shift duty providing supervision;

“unit” means a single boiler, prime mover, compressor, refrigeration compressor or any energy producer or energy user that is a component of the plant;

“user” includes the person or persons in control of a plant as owner, lessee or otherwise, but does not include the operating engineers or operators who operate, control or maintain the plant;

General requirement for compliance

2. (1) Every person engaged in an activity, use of equipment, process or procedure to which the Act and this Regulation apply shall comply with the Act and this Regulation. O. Reg. 219/01, s. 2 (1).

Application

3. (1) This Regulation applies to the operation of all registered plants. O. Reg. 219/01, s. 3 (1).

(2) This Regulation does not apply to,
(a) a person who performs work in connection with a plant other than the actual operation of it;
(b) a person, other than an operating engineer or operator, engaged in installing, testing or repairing a plant;
(h) a compressor or refrigeration compressor that operates at a pressure of 15 psi (103 kPa) or less;

Plant registration

4. (1) No person shall use or operate a plant or cause a plant to be used or operated unless it is registered. O. Reg. 219/01, s. 4 (1).

(2) Unless determined otherwise by the chief officer, two or more plants of a user that are located on the same premises shall be registered as one plant. O. Reg. 219/01, s. 4 (2).

Contents of a plant certificate of registration

6. (1) A certificate of registration for a plant shall state,

- (a) the name of the plant user or users;
- (b) the name of the plant or the name the plant goes by;
- (c) the location of the plant;
- (d) the registration number;
- (e) the type of plant;
- (f) the number of units, type, rating and code of,
 - (iv) refrigeration compressors,
 - (v) total plant rating;
- (g) economizers and accumulators recorded in low water volume boiler plants;
- (h) the units sealed;
- (i) dual controls;
- (j) registered equipment operations limiting interlocks;
- (o) required maintenance programs;
- (p) level of operating staff and attendance required by.

Display of a plant certificate of registration

7. The user of a plant shall conspicuously display the certificate of registration for the plant in the office of the chief operating engineer or chief operator, the control room, boiler room, engine room or compressor room and on a visible inboard location O. Reg. 219/01, s. 7.

Changes to a plant registration

8. (1) Where the setting of a safety valve or rating of a registered plant is to be changed, the user of the plant shall notify the chief officer, in writing, within 15 days prior to the change and provide full particulars of the change. O. Reg. 219/01, s. 8 (1).

Log, registered plants

37. (1) Every user of a plant shall keep in the plant a log in the form of a book or electronic log. O. Reg. 219/01, s. 37 (1).

(2) Subject to subsections (3) and (4), the logbook shall be bound and constructed so that the pages are numbered and cannot be removed and shall be large enough to accommodate all the required entries. O. Reg. 219/01, s. 37 (2).

(3) Where a user keeps an electronic log, the user shall ensure that a dated paper print-out of the log is created at the end of each shift, is entered into the logbook and signed by the chief operating engineer or chief operator the next business day. O. Reg. 219/01, s. 37 (3).

(4) An electronic log shall include information relating to equipment used, information produced, form produced, back up ability, ambient operating limits, and authorized pass code entry by only the chief engineer, chief operator, shift engineer or shift operator, and shall be kept so that any substations have read-only ability. O. Reg. 219/01, s. 37 (4).

(8) Shift entries to the log shall include,

- (a) the date, the shift and the times at which the shift begins and ends;
- (b) the names of all shift engineers, shift operators, assistant shift engineers, assistant shift operators, other staff and operating assistants or trainees on a shift and their periods of duty on the shift;
- (c) any instructions for the shift operation or for staff, along with the name of the person giving the instructions;
- (d) any change from normal operating procedure and the time of such change;
- (e) any unusual or abnormal conditions observed in the plant and the time they were observed;
- (f) the starting or stopping times of primary equipment not recorded in other logs;
- (g) documentation of any repairs or maintenance, including that required under subsection

39 (9), to any part of the plant, the times the repair or maintenance took place, if they were completed and who attended at the repair or maintenance;

- (h) any malfunction of any item or equipment, the time of the occurrence and any remedial action taken to correct the malfunction;
- (i) any work performed by plant operating personnel outside the plant, the time spent and who attended at the work;
- (j) the entry of any unauthorized person to the plant, together with the purpose of the entry and the time of entry and leaving;

(9) All logbook entries shall be in ink and any corrections shall not be erased but crossed out, corrected and initialed. O. Reg. 219/01, s. 37 (9).

(10) No person shall deface, damage, destroy or, without the permission of the owner or user, remove the logbook from the plant. O. Reg. 219/01, s. 37 (10).

(12) The user shall ensure that the logbook is kept accessible in the plant for at least three years after the last entry is made and shall produce the logbook for examination upon the request of an inspector and, where an electronic log is kept by the user, the user shall retain the electronic log or hard copies for at least three years. O. Reg. 219/01, s. 37 (12).

Fail safe devices

39. (3) The user of a compressor in a guarded compressor plant shall provide the compressor with protective devices that will automatically prevent the supply of energy to the prime mover of the compressor when an abnormal condition occurs during the compressor's operation, including,

- (a) a high-pressure limiting device in the compressor discharge line;
- (b) a high temperature limiting device in the compressor discharge line;
- (c) a high temperature limiting device in the cooling-water discharge line; and
- (d) a low-pressure limiting device in the lubricating oil system. O. Reg. 219/01, s. 39 (3).

(6) Where the alarm system is not under local control, the user shall ensure that the alarm system actuates an electronic paging device. O. Reg. 219/01, s. 39 (6).

(7) Each protective device prescribed in subsections (1) to (5) shall,

- (a) not be capable of automatically restarting the plant; and
- (b) maintain the visual warning until the abnormal or unsafe condition is rectified. O. Reg. 219/01, s. 39 (7).

Unattended plants

42. (1) A user of a guarded installation under section 39 or 45 that is to be operated unattended shall ensure that the operating engineer, operator or other person in charge of the installation is instructed,

- (a) not to start the installation if a control, device or system required for it under those sections, as the case requires, is not functioning properly;
- (b) to bring the installation to a safe stop immediately if the installation is operating when it is discovered that a control, device or system required under those sections, as the case requires, has ceased to function properly; or
- (c) to restrict access to the unattended plant and to provide signs to this effect at all entrances. O. Reg. 219/01, s. 42 (1).

(2) A person operating an installation that is unattended under section 39 or 45 shall comply with clauses (1) (a) and (b). O. Reg. 219/01, s. 42 (2).

(3) If a refrigerant leak from an installation is indicated by the system required by subsection 45

(4), the user or the person in charge of the installation shall warn any person who may be endangered by the leakage, take immediate steps to stop it and such steps as are necessary in the circumstances to ensure public safety. O. Reg. 219/01, s. 42 (3).

(4) Despite subsections (1) and (2), if a control, device or system required under sections 39 and 45 for an installation ceases to function properly or if a refrigerant leak is indicated by a system required for an installation under section 45, the installation may be operated if the user ensures that,

- (a) the control, device or system can be repaired or replaced immediately, and the user takes immediate action to repair or replace it and has the installation attended constantly until such repair or replacement is made by a person competent to do so; and
- (b) an operating engineer or operator of a class who is qualified to operate the installation is in constant attendance at the installation and determines that the installation can be safely operated. O. Reg. 219/01, s. 42 (4).

Procedure manual

46. Every owner of a plant shall keep on the premises of the plant an up-to-date, detailed operating procedures manual designed by or acceptable to the chief operating engineer or chief operator of the plant that sets out the procedures relating to training and the operation of all equipment and systems of the plant and all emergency procedures. O. Reg. 219/01, s. 46.

Reporting accidents

47. The user shall notify the chief officer, by telephone or other direct means, as soon as is practicable of any accident, injury or death, but no more than eight hours after the accident, injury or death, as the case may be, and shall within 48 hours after the accident, injury or death, send the chief officer a written report of the occurrence where,

- (a) a person is seriously injured or killed from any cause; or
- (b) an accident occurs involving property damage. O. Reg. 219/01, s. 47.

The following excerpts of the Occupational Health and Safety Act, R.S.O. 1990, c. O.1

is offered as an instructional tool to the ORFA Basic Arena Refrigeration training course. It should not be considered current or complete. The full Regulation should be reviewed or referenced for operational or compliance purposes. It is the plant owner's sole responsibility to review and apply all legislation applicable to the on-site equipment and its safe operation. The information is being used to inform new workers that have responsibilities in an Ontario ice arena refrigeration unattended, registered, guarded plant.

Occupational Health and Safety Act, R.S.O. 1990, c. O.1

"competent person" means a person who,
 (a) is qualified because of knowledge, training and experience to organize the work and its performance,
 (b) is familiar with this Act and the regulations that apply to the work, and
 (c) has knowledge of any potential or actual danger to health or safety in the workplace;

"designated substance" means a biological, chemical or physical agent or combination thereof prescribed as a designated substance to which the exposure of a worker is prohibited, regulated, restricted, limited or controlled

"employer" means a person who employs one or more workers or contracts for the services of one or more workers and includes a contractor or subcontractor who performs work or supplies services and a contractor or subcontractor who undertakes with an owner, constructor, contractor or subcontractor to perform work or supply services;
 "industrial establishment" means an office building, factory, arena, shop or office, and any land, buildings and structures appertaining thereto
 "supervisor" means a person who has charge of a workplace or authority over a worker

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;
 and

(e) a building, structure, or any part thereof, or any other part of a workplace, whether temporary or permanent, is capable of supporting any loads that may be applied to it,
 (i) as determined by the applicable design requirements established under the version of the Building Code that was in force at the time of its construction,

(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;
 (c) when appointing a supervisor, appoint a competent person;
 (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;
 (i) post, in the workplace, a copy of this Act and any explanatory material prepared by the employer

Duties of supervisor

27 (1) A supervisor shall ensure that a worker,
 (a) works in the manner and with the protective devices, measures and procedures required by this Act and the regulations; and
 (b) uses or wears the equipment, protective devices or clothing that the worker's employer requires to be used or worn.

Additional duties of supervisor

(2) Without limiting the duty imposed by subsection (1), a supervisor shall,
 (a) advise a worker of the existence of any potential or actual danger to the health or safety of the worker of which the supervisor is aware;
 (b) where so prescribed, provide a worker with written instructions as to the measures and procedures to be taken for protection of the worker; and
 (c) take every precaution reasonable in the circumstances for the protection of a worker. R.S.O. 1990, c. O.1, s. 27.

Duties of workers

28 (1) A worker shall,
 (a) work in compliance with the provisions of this Act and the regulations;
 (b) use or wear the equipment, protective devices or clothing that the worker's employer requires to be used or worn;
 (c) report to his or her employer or supervisor the absence of or defect in any equipment or protective

device of which the worker is aware and which may endanger himself, herself or another worker; and
 (d) report to his or her employer or supervisor any contravention of this Act or the regulations or the existence of any hazard of which he or she knows.

(2) No worker shall,

(a) remove or make ineffective any protective device required by the regulations or by his or her employer, without providing an adequate temporary protective device and when the need for removing or making ineffective the protective device has ceased, the protective device shall be replaced immediately;

(b) use or operate any equipment, machine, device or thing or work in a manner that may endanger himself, herself or any other worker; or

(c) engage in any prank, contest, feat of strength, unnecessary running or rough and boisterous conduct.

Notice of death or injury

51 (1) Where a person is killed or critically injured from any cause at a workplace, the constructor, if any, and the employer shall notify an inspector, and the committee, health and safety representative and trade union, if any, immediately of the occurrence by telephone or other direct means and the employer shall, within forty-eight hours after the occurrence, send to a Director a written report of the circumstances of the occurrence containing such information and particulars as the regulations prescribe. R.S.O. 1990, c. O.1, s. 51 (1); 2011, c. 1, Sched. 7, s. 2 (7).

Preservation of wreckage

(2) Where a person is killed or is critically injured at a workplace, no person shall, except for the purpose of,

(a) saving life or relieving human suffering;

(b) maintaining an essential public utility service or a public transportation system; or

(c) preventing unnecessary damage to equipment or other property,

interfere with, disturb, destroy, alter or carry away any wreckage, article or thing at the scene of or connected with the occurrence until permission so to do has been given by an inspector. R.S.O. 1990, c. O.1, s. 51 (2).



Ontario Ice Arena Registered Refrigeration Plant Compliance Guideline

VERSION 1.0

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orfa.com



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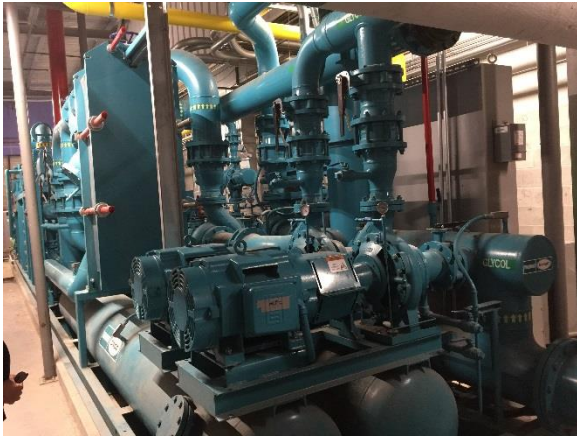
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Introduction

The following information is provided as a general overview of compliance obligations and operational best practices for registered refrigeration plants in Ontario. It is intended to provide basic information and should not be considered a complete directive to safe plant operations. The ORFA reminds that compliance remains the sole responsibility of the plants owner and the designated operator.



Public Safety

Ice arenas invite large numbers of the public to participate in recreational activities as both participant and spectator. Those entering the facility do so in most part under occupier's liability and the diligence of the owner of the building. Most who arrive at these public buildings are generally oblivious to the risks of operation. There is an expectation and a legal obligation that the owners are continually striving to ensure that the building is safe and serviceable through ongoing maintenance, operation and training of operations staff.

Refrigeration Plant Risks and Hazards

Under normal operating conditions, properly maintained and operated ice arena refrigeration equipment have low risk. However, Ontario's recreation infrastructure is aging, and the care and control of these plants are under the responsibility of operators who have varied backgrounds and in some cases, limited practical knowledge of its operation. All who enter a refrigeration plant room must respect the high voltage required for the primary movers; the high pressure noxious gases and liquids required as part of the heat removal and transfer process, and the associated dangers with equipment that will start at any time without notice.

In the interest of both worker and public safety, the ORFA is calling for a renewed commitment by all workplace parties to ensure compliance to all regulatory obligations and industry best practices.

Registered Refrigeration Plant Regulatory Compliance Obligations

Safe registered refrigeration plant operations are guided by several key regulations. They include, but are not limited to:

1. The Operating Engineers Regulation (OER) – Technical Standards and Safety Authority (TSSA).

Note: at the time of release, the TSSA is undertaking a comprehensive review of the Operating Engineers Regulation and as such, the information contained within this document may become dated.

2. CSA B-52 Mechanical Refrigeration Code (B-52) – Canadian Standards Association
3. Boilers and Pressure Vessels Regulation (BPV) – TSSA
4. TSSA Director's Orders
See:

[Operating Engineers Regulation](#)

[Boilers and Pressure Vessels Regulation](#)

[TSSA Plant Safety Series 11 – Periodic Plant Inspections](#)

[Basic Compliance to the B-52 Mechanical Refrigeration Code](#)

5. Occupational Health and Safety Act (OHSA) – Ministry of Labour
6. Regulation 347 – Ministry of Environment
7. Ontario Electrical Code – Electrical Safety Authority
8. Ontario Building Code – Local Building Inspectors
9. Ontario Fire Code – Local Fire Department and Ontario Fire Marshals Office

Often, where compliance confusion begins is when the reader fails to understand that each document cannot be read and then applied in isolation. Acts, Regulations and Director's orders must all be cross referenced prior to applying them in the field. It is

also important to take advantage of the OE and BPV Technical Advisors at TSSA for clarification and/or direction specific to each plant's compliance and operational obligations. Refrigeration partners looking to improve current levels of operation should start at Section 27 (c) of the OHSA which states that a supervisor shall "take every precaution reasonable in the circumstances for the protection of a worker".

Refrigeration Plant Registration

It is important to understand that every refrigeration power plant in Ontario is, or must be, registered with the Technical Standards and Safety Authority (TSSA). The registration must be posted at the entry into the refrigeration plant room. The plant registration indicates the name of the facility and owner and what, if any, certified attendance is required. This registration is the first point of contact towards operational compliance.



Upon notice of a new plant, the installation of new equipment, or a plant retrofit, a TSSA Power Plant Inspector will attend the location. Part of the process will involve the adding together of all equipment that is identified in the Operating Engineers Regulation to determine the final operating requirements.

What is the Total Plant? If HVAC, dehumidification and refrigeration systems are all on site, they will be included in the total plant registration to determine the Regulation operating requirements. Under the Regulation, the collective risk still exists and it does not matter that pieces of equipment are not physically linked together. When the equipment is on the same property, it must be added together. *Section (4) Plant Registrations (2) unless determined otherwise by the Chief Officer. Two or more plants*

of a user that are located on the same premises shall be registered as one plant. (11) (2) Where two or more plants of a user are located on the same premises and are registered as a plant, the power rating in kilowatts of the registered plant is the total of the power rating in kilowatts of the plants.

Plant Ownership and Operations

The "owner" of the plant is reviewed and identified when an application for plant registration is made with TSSA. The owner's responsibility under Section 14 of the OER never changes. It is reasonable to assume that in most municipal settings, the municipal corporation will hold the primary legal responsibility for compliance to all regulatory obligations. In private operations, it would shift to the president of the company. For municipalities, the municipal Chief Operating Officer (CAO) and/or head of Council (Mayor) will oversee and direct staff towards compliance. This would include, but not limited to, unlimited financial resources to ensure safe plant operations. Communities that enter into partnership relationships in operating registered refrigeration plants must carefully review and define how compliance will be met. Once plant registration is received, the owner then must define how it shall be operated based on the size and mechanical layout of equipment. Currently, built-up plants that exceed 200-hp are designated "attended plants" and as such, require a Chief Engineer or Operator as set out under Section 15 of the OER.

It is important to note that attended plant requirements that are defined in section 15 of the OER, is not an opportunity for plant owners who do not meet the attended criteria, to not have "competent staff" responsible for the safe operations and maintenance of the registered refrigeration plant. In simple terms, registered plant operators responsible for equipment over 200hp are strictly governed by TSSA through provincial certification, while all other plants have the onus of plant operator competency placed completely with the plant owner to define. The owner's due diligence will only be scrutinized should an incident, or accident occur.

Once an attended plant owner selects a designated Chief Engineer or Operator they relinquish control of the plant. The individual is responsible for the safe operation of the plant. The owner cannot

interfere with how the Chief Engineer or Operator chooses to staff, maintain and operate the plant. Further, they must provide, without question, all human and financial resources required by the Chief Engineer or Operator to maintain and operate the plant. In an unattended plant, the owner is given more latitude in the control of operation and maintenance of the plant.



It is important to understand that what does remain the same in both applications of the OER, is the level of accountability for non-compliance to safe operations. In an attended plant, the Chief Engineer or Operator would be the primary contact during an investigation, while it should be expected that the CAO/Mayor or President (private sector) would be key contacts in an unattended plant review. Owners must accept that non-compliance actions, or incidents occurring in a registered refrigeration plant, may be investigated by several government authorities. TSSA will investigate events under the Operating Engineers Regulation, while the Ministry of Labour would investigate under the authority of the Occupational Health and Safety Act. All other identified agencies would also be involved, including local policing authorities under Bill C-45 should there be a death of a worker or member of the public. Each agency is independent of each other and in the event of an incident, the results of each investigation may be compounded. It should not be expected that a joint finding would be tabled.

Role of the Refrigeration Contractor

Manufacturers or contractors have **no legal responsibility** to inform an owner on the Regulations or Codes that govern safe refrigeration installations. The design of a new, or retrofitted refrigeration system that complies with the various

codes and regulations is the sole responsibility of the owner and the plant design engineer. Further, it is the responsibility of the plant owner to ensure ongoing compliance is being met and that manufacturers recommended, or required maintenance and upkeep is being performed. Although it is expected that all licensed refrigeration contractors will provide guidance, recommendations, as well as general advice to the owner, it continues to be the sole responsibility of the owner to meet the highest level of operational maintenance and upkeep as possible. Failure to do so will have accountability rest with the plant owner.

Role of TSSA

The Technical Standards and Safety Authority is responsible for overseeing ongoing compliance to the OER and BPV of all registered refrigeration plants. Further, it enforces the B-52 Mechanical Refrigeration Code. These obligations are met by mandatory site visits by TSSA field staff. How often inspection will occur is based on the inspector's confidence of how the plant is being operated. Safely operated plants will require less inspection resulting in financial savings, while unsafe plants should expect as many additional inspections as TSSA determines is required to improve operations. Other TSSA interaction would include, any time there are upgrades or changes made to the plant. Depending what work has been undertaken, an "owner" should contact the TSSA office to determine if BPV design approval or inspection and re-registration is required. Consider the following example: once a refrigeration plant has been registered by TSSA, any alterations to a plant's registered energy rating must be reported to TSSA. For example, a refrigeration system with a 50-hp motor that is reduced to a 30-hp must be reported. Whereas, a 50-hp motor that is replaced with a 50-hp motor does not require reporting. Another example would be if the name of the plant owner was changed. Both examples would require the plant to be re-registered.

Additionally, under Section 47 of the OER "the user shall notify the TSSA Chief Officer, by telephone or other direct means, as soon as is practical of any accident, injury or death, but no more than eight hours after the accident, injury or death, as the case may be, and shall within 48 hours after the accident,

injury or death, send the Chief Officer a written report of the occurrence where, (a) a person is seriously injured or killed from any cause; or (b) an accident occurs involving property damage. O. Reg. 219/01, s. 47.



Role of the Boiler Inspector

An additional safe guard toward compliance is offered through the owner's relationship with their insurance provider. To reduce the potential for claim, a boiler inspector, certified by TSSA, but employed by the insurance provider will attend the plant room and conduct a detailed review to confirm that the plant is meeting current regulatory obligations and that it is being operated in a safe manner.

Role of the ORFA

The ORFA has no authority in directing plant owners on their obligations of regulatory compliance. However, as a stakeholder in worker and public safety, it notes that ice arenas are not specifically identified in any Regulation, Code or Act. This lack of specific direction allows each owner to interpret compliance specific to their operations. However, the ORFA often notes a relaxed approach toward safe registered refrigeration plant operation and maintenance. This attitude is often directed through minimum compliance levels based on ill-informed obligation interpretations. In the best interest of ORFA members, the Association offers the following recommendations and best practices specific to ice arena registered refrigeration plant operations:

1. The ORFA strongly recommends that all owners of unattended registered plants designate a "responsible person" to act in

the best interest of the owner in the on site safe operation and maintenance of the equipment.

2. That the designated responsible person oversees all workers who are given the privilege to enter the plant room and in their understanding of the risk and hazards found within the plant room.
3. That the designated responsible person ensure that all plant fail safe devices remain in proper working order and within the set recertification timelines.
4. That the designated responsible person maintains the plants log book as set out in section 37 of the OER.
5. That the designated responsible person maintains and ensures compliance by all operators to the required procedure manual as set out in section 46 of the OER, which requires that every owner of a plant keep an up-to-date, detailed operating procedures manual that sets out the procedures relating to training and the operation of all equipment and systems of the plant and all emergency procedures.
6. That the designated responsible person be required to develop operational and maintenance budgets to ensure safe plant operations.
7. That the designated responsible person oversees all work performed by any outside contractor(s) who are permitted access to the registered refrigeration plant room.

To assist owners in ensuring competency of the selected "responsible person", the ORFA strongly recommends that this individual hold the designation, or equivalent training, of a Certified Arena Refrigeration Plant Technician (CARPT). To qualify for the CARPT designation the applicant must:

- Hold "Individual Membership" in the ORFA
- Have a minimum of Grade 12 education
- Have two years full-time work experience in the care and control of a refrigeration plant
- Have completed the following ORFA-approved courses with a minimum 65% passing grade:
 - Basic Arena Refrigeration

- Advanced Refrigeration Facility Operator
- Recreation Facility Environmental Systems (HVAC/R)
- ORFA Legal Awareness

In addition, the ORFA recommends that all holders of a TSSA B-Class Refrigeration Operator Certificate obtain the ORFA CARPT professional designation as proof of ongoing professional development specific to the ice arena industry within 5-years of being issued the TSSA certificate.

In Closing

It is essential that all plant Owners, Chief Engineers, Chief Operators and Operating Staff have a clear understanding of the Operating Engineers Regulation and that Chief's follow Section 15 and owners Section 14. The Regulation and related Directors Orders can be accessed on the TSSA website at <http://www.tssa.org> and a hard copy of the Regulation and Directors Orders should be available in the plant for the guidance of all operating staff.

Additional Resource

- All operators currently permitted access to an Ice Arena Registered Refrigeration Plant Room should read all ORFA resources which are provided as a benefit of membership [LINK](#)

Basic Compliance Of The B-52 Mechanical Refrigeration Code

The Ontario Recreation Facilities Association Inc. (ORFA) regularly researches and writes about issues that could affect our clients. These documents provide an opinion on key risk management issues but are not meant to provide any form of legal opinion or official interpretation. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation. All rights reserved. ©2014 Ontario Recreation Facilities Association Inc.

May 2014

Introduction

Ontario's ice rink operators must read and comply with a variety of legislation. The B-52 Mechanical Refrigeration Code (MRC) is one such document. *The purpose of the B-52 MRC is to minimize the risk of personal injury by providing minimum requirements for the design, construction, installation, inspection, and maintenance of the mechanical refrigeration systems.* The ORFA document is meant to assist its members in understanding some key requirements of the B-52 MRC but it should not be considered an interpretation of any obligation of the B-52 MRC. The review of the full B-52 MRC should be undertaken by the refrigeration plants Chief and/or Responsible Person. As the reader will note there are a variety of operational and testing of equipment requirements to take place. A caution is given to the fact that these inspections are an owner's responsibility to ensure that they take place and are recorded. There should be no expectation that the refrigeration contractor or their designate will ensure compliance to the B-52 MRC or any other regulatory obligation by the owner is being met. Expected maintenance, inspection or testing requirements should be clearly identified in the refrigeration equipment annual or ongoing work plan. The full B-52 MRC document may be purchased at:

<http://shop.csa.ca/en/canada/pressure-vessels/b52-package/inv/27022582005>

Section	Section Overview	Compliance Review Date
1.2.2.	The B-52 MRC applies to all refrigeration systems installed in a new or existing premise	
5.11.1 Signs (All Systems)	Each refrigeration system will have a permanent sign which is secured, readily accessible, legible containing the following information: <ul style="list-style-type: none"> ✓ name and address of installer ✓ refrigerant type ✓ lubricant type and amount ✓ total weight of refrigerant required for normal operation ✓ field test pressures applied ✓ refrigerant capacity at design or nominal conditions ✓ and for prime mover(s) the rating in kilowatts (hp) or full-load current and voltage 	
5.11.3 Signs for Systems with more than 45kg 100lb of Refrigerant	In addition systems containing more than 45 kg (100lb) of refrigerant shall be provided with durable signs with letters not less than 13 mm (1/2 in) in height designating the following: <ul style="list-style-type: none"> ✓ the main electrical disconnect switch(es) ✓ any remote control switch(es) ✓ any pressure-limiting device(s) ✓ each pressure vessel ✓ the main shut-off to each vessel; and the refrigerant piping (indicating whether it is at the high-side or low-side pressure and whether it is normally in the liquid or vapour state). 	
5.11.5 Posting of instructions	It shall be the duty of the owner of a refrigeration system or systems with a prime mover or movers having a capacity exceeding 125 kW (175 hp) to place in a conspicuous location and as near as practicable to the refrigerant compressor(s) a card giving directions for operating the system, including precautions to be observed in case of breakdown or leakage, as follows: <ul style="list-style-type: none"> ✓ the telephone number of the appropriate first-response organization for an emergency situation ✓ instructions for shutting down the system in case of emergency; ✓ the name, address, and day and night telephone numbers for obtaining service; and the name, address, 	

	<p>and telephone number of the nearest regulatory authority, and instructions to notify the authority immediately in case of emergency</p> <p><i>Consideration should be given to preparing an emergency evacuation plan for those installations for which a plan is deemed appropriate.</i></p>	
6.2.2 Doors	<ul style="list-style-type: none"> ✓ Each machinery room shall have a door or doors that open outward, are self-closing (and tight fitting if they open into the building), and are of a number large enough to ensure that persons can escape in an emergency ✓ The door(s) shall not open to a public corridor or any room used for assembly ✓ There shall be no openings that will permit passage of escaping refrigerant to other parts of the building. 	
6.2.3 Refrigerant Vapour Detector for Refrigerants Other Than Ammonia	<ul style="list-style-type: none"> ✓ A refrigerant vapour detector shall be located in an area where refrigerant from a leak is most likely to concentrate and shall be actuated at a value not greater than the corresponding TLV®/TWA (or a consistent toxicity measure) ✓ The sensors, when activated, shall sound a sufficiently audible alarm; and initiate mechanical ventilation – Ammonia Vapour Detection requirements is covered in Section 6.3 	
6.2.4.1 Explosion Protection	<ul style="list-style-type: none"> ✓ Except as permitted by Clause 6.2.4.3, no open flames or apparatus to produce an open flame shall be installed in a machinery room 	
6.2.5 Ventilation	<ul style="list-style-type: none"> ✓ Machinery rooms shall be ventilated to the outdoors by a mechanical ventilation system 	
6.2.5.4 Fan Switches	<ul style="list-style-type: none"> ✓ Readily accessible independent fan switches shall be installed inside and outside the machinery room ✓ Fan switches located outside the machinery room shall be capable of starting but not stopping the ventilation. 	
6.2.5.5.2 Minimum Ventilation	<ul style="list-style-type: none"> ✓ Whenever the refrigeration system is operating or whenever the room is occupied, a sufficient part of the mechanical ventilation shall be operated to provide normal volumes equal to the greater of the following: 2.54 L/s/m² (0.5 cfm/ft²) of machinery room area; or the volume required to prevent a maximum temperature rise above ambient greater than 10 °C (18°F), based on all of the heat-producing machinery in the room. 	
6.2.5.7 Minimum Temperature	<ul style="list-style-type: none"> ✓ Supplementary heating shall be provided to maintain a minimum machinery room temperature of 5 °C (40°F) where damage could result at temperatures below freezing. 	
6.3 Class T Machinery Rooms	<ul style="list-style-type: none"> ✓ There shall be no flame-producing device or hot surface over 427 °C (800°F) permanently installed in the room ✓ the room shall have at least one exit door that opens directly to the outer air. Other exits communicating with the building shall be permitted, but shall be through a vestibule equipped with approved self-closing, tight-fitting fire doors ✓ the machinery room envelope, including any vestibule, shall be of tight construction; the machinery room envelope, including any vestibule, shall have not less than one-hour fire-resistive construction ✓ all pipes piercing the interior walls, ceiling, or floor of a shall be tightly sealed to the walls, ceiling, or floor through which they pass ✓ air ducts shall be of tight construction and shall have no openings in such rooms; remote pilot control of the mechanical equipment in the machinery room shall be located immediately outside the machinery room and shall be provided solely for shutting down the equipment in an emergency ✓ ventilation fans shall have a control switch on a separate circuit located immediately outside of the 	

	<p>machinery room, and shall be permitted to run as long as power is available; all locations shall be equipped with a vapour detector that shall automatically start the ventilation system and actuate an alarm at the lowest practical detection levels not exceeding 300 ppm for ammonia; the vapour detector shall also initiate a supervised alarm so that corrective action can be initiated.</p>	
8.1 Charging and Withdrawal of Refrigerants	<ul style="list-style-type: none"> ✓ No service containers shall be left connected to a system, except while refrigerant is being charged or withdrawn. 	
8.3 Refrigerant Storage	<ul style="list-style-type: none"> ✓ Refrigerant, in addition to that in the system, shall be stored only in a machinery room. Such refrigerant shall not exceed a maximum limit of 136 kg (300lb) and shall be stored in acceptable storage containers. Storage of the refrigerant in any other room shall first be approved by the regulatory authority having jurisdiction. 	
8.4.1. Maintenance	<p>The following minimum maintenance requirements shall be met:</p> <ul style="list-style-type: none"> ✓ pressure-relief valves shall be replaced or recertified at intervals no longer than five years. Recertification of relief valves shall be conducted in accordance with the requirements of the regulatory authority having jurisdiction ✓ pressure-limiting devices shall be tested at least once every 12 months for set point accuracy and for their ability to properly stop the affected equipment ✓ other safety devices shall be tested at least once every 12 months for set point accuracy and for their ability to properly stop the affected equipment ✓ leak detectors shall be tested for function at the specified refrigerant concentration in accordance with the manufacturer's instructions. The maximum interval between tests shall not exceed one year; the leak detector, in the simulated leak test, shall initiate an audible and visible alarm and begin ventilation ✓ all safety-related maintenance recommendations by the equipment manufacturer(s) shall be followed ✓ all power and control electrical terminations shall be checked at least once every 12 months and tightened if necessary ✓ at the end of each test, a tag noting the test date and the tester's name shall be affixed to the tested components 	
9.11 Maintenance	<ul style="list-style-type: none"> ✓ 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. 	
9.1.2 Service Personnel	<ul style="list-style-type: none"> ✓ Installation and service personnel working on a refrigeration system shall be equipped, on arrival at the premises, with the personal protective equipment required by the jurisdiction where the system is located. 	

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Recreation Facilities Environmental Waste Compliance Guidelines

The Ontario Recreation Facilities Association Inc. (ORFA) regularly researches and writes about issues that could affect our clients. These documents provide an opinion on key risk management issues but are not meant to provide any form of legal opinion or official interpretation. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation. All rights reserved. ©2014 Ontario Recreation Facilities Association Inc.

June 2014

Role of the Ministry of Environment (MOE)

We help protect Ontario's environment by making laws that improve our air quality, protect our drinking water, and give us recycling programs and safe places to put our waste.

Introduction

Please be advised that it remains the generators responsibility to manage their waste in accordance with all applicable environmental legislation. The following information is shared for guidance purposes only and are not to be considered as the Ministry's endorsement of the guideline.

Recreation facilities are being pressured to be “good environmental stewards” by controlling the waste generated through their general operations, programs and services. Items (light bulbs, unused paint, ballasts, and batteries) that were once hauled to landfill may now need to be disposed of in a more appropriate manner. While concession wastes are expected to be sorted and placed in the appropriate recycling bins. However, some wastes may be required to be disposed of under specific Regulation. For example, facilities that utilize onsite septic systems that require pumping may be required to accurately maintain an emptying recording system. Further, specific legislation controls the disposal of asbestos [O. Reg 347 (17)]. Containments such as ice paints, soaps, and pool filter materials/cleaning chemicals - along with high concentrations of chlorine and chloride concentrations that were once merely discharged into municipal sewer systems or local waterways with little thought to environmental impact. Operational activities such as the traditional method of dumping ice shavings outdoors each spring has fallen under scrutiny by officials from the MOE causing facility managers to reassess their responsibilities in these matters. To assist recreation professionals, the ORFA offers the following information to its members in hope of elevating awareness to the known issues and ultimately raising our overall environmental performance.

Legislative Framework – “Cradle to Grave Waste Management”

Ontario has a comprehensive legislative and regulatory framework to ensure that wastes are managed in an environmentally safe manner. Through the *Environmental Protection Act* (EPA) and accompanying regulations, the ministry has established a “cradle to grave” management system, which includes the systematic control of collection, storage, transportation, treatment, recovery and disposal of this waste. Ontario Regulation 347 identifies wastes through a series of listings and tests. It also sets standards and requires annual registration of generators of waste (HW) and liquid industrial (LIW) and the payment of a registration fee.

Regulation 347

The Environmental Protection Act (provincial) R.R.O 1990 Regulation 347 and Reg. 326/03 are the primary piece of documentation that guides all workplaces in waste management responsibilities. Both documents are further supported by the Ministry of Environment “Registration Guidance Manual for Generators of Liquid Industrial and Waste” (2009). Beyond domestic wastewater disposal [sinks, toilets, showers] recreation management should be prepared to defend wastewater disposal best practices and policies. In some cases, facilities may require a “waste discharge permit” to dispose of waste into the local sewer system. Wastes containing suspended solids such as ice paints and pool filter materials [diatomaceous earth] have been known to cause blockage in sewer lines or contribute to the grazing of pumps. Liquid effluent may contain high or low pH, chloride, chlorine, oil, grease or other chemicals/substances in high concentrations that can upset the natural balance of the aquatic organisms used to balance the municipal waste disposal system. These operational wastes must be disposed of correctly.

Beyond the obvious oils, greases, chemicals and filter wastes, the addition of construction or demolition materials [brick, corrugated cardboard, concrete, drywall, steel and wood (O. Reg. 347 s.2(2)

that leave a “facility construction site” may be designated as wastes; controlled under specific legislation. Section 61 of O. Reg. 347.

Refrigerant Management

Both Regulation 463 and 347 guide refrigerant disposal.

- Regulation 463 governs what you do with the refrigerant product.
- Regulation 347 governs what you do with the refrigerant waste.

Regulation 463 defines a refrigerant as “any liquid or gas that is or that contains a class 1 ozone depleting substance, a class 2 ozone depleting substance or a halocarbon and that is used in refrigeration equipment. Ammonia (R717), glycol or brine are not defined as refrigerants.

Regulation 347 defines Refrigerant Waste as:

- Stationary Refrigerant Waste
- Mobile Refrigerant Waste

Regulation 463/10 came into force in January 2011 and consolidated five former ozone depleting substance regulations into one. Governs the discharge, making, use, sale, transfer, display, transport, storage Reg. 347 (17.2) and disposal of ozone-depleting substances and other halocarbons in Ontario. Discharge – report discharges of refrigerants into environment over 100 kg to the ministry’s Spills action Center at 1-800-268-6060. An ozone depleting prevention (ODP) certificate is required to perform maintenance and/or refill refrigerant

Who is a Waste Generator?

A “waste generation facility” is defined as a facility, equipment and/or operations that are involved in the production, collection, handling or storage of waste at a site. Determining, if in fact, a specific recreation facility is considered a “waste generator” under legislation requires an internal assessment/audit to be conducted.

Waste includes, but are not limited to:

- manufacturing residues (e.g. waste acids, contaminated sludge)
- mercury light bulbs
- biomedical wastes from hospitals
- spent photo finishing chemicals
- waste pesticides

- PCBs
- paints, Varsol and refrigerants
- un-used cleaning products and discarded batteries

These wastes require special handling to reduce adverse effects to human health and the environment.

Registering as a Waste Generator

Regulation 347 came into effect on January 1st, 2002, and requires that anyone that generates waste is required to register as a waste generator and must pay a registration fee. In addition any waste that leaves a registered facility must be manifested, and transported under the Transportation of Dangerous Goods Act. There are specific companies that are registered to transport these wastes to registered treatment facilities. Your facilities should be using these companies to manage any waste that is leaving the sites. Generators of waste need to register online at www.hwin.ca

Generators will be given an Ontario generator number, and once registered should use a registered hazardous waste hauler to move waste from their site. Regulation 347 provides a comprehensive system for the management of hazardous and liquid industrial wastes, from their point of origin to their final disposal. In Ontario,

- “All generators of subject waste must register by February 15th of each year”
- “All generators of waste will be required to pay a fee associated with their annual registration”
- As required under Regulation 347, “all generators of wastes must evaluate their wastes to identify in fact they are “hazardous” or “liquid industrial” and if so, register with the Ministry of Environment.

Waste must be in compliance of Regulation 347 whenever it is stored, processed, disposed of or transported. Processing/transporting and disposing of waste may also be required to adhere to other acts/regulations such as the Transportation of Dangerous Goods Act and such wastes in Ontario unless a “generator registration document” has been created and posted on the Hazardous Waste Information Network (HWIN).

Note: The (processing disposing and transporting of wastes requires a Certificate of Approval through the Ministry of Environment; it is recommended that none of these tasks be completed at any recreation facility.

Facility managers must research all applicable compliance requirements based on their specific task.

The registration process includes 3-steps.

Step 1: Will help you determine whether or not registration of your waste(s) is required. The Ministry has created a flowchart to help in this identification process [attached in the appendix]. Once you have reviewed the flowchart, and determined if in fact your wastes are subject to registration-you will need to either register or not.

Step 2: Is completing and submitting your annual Generator Registration Report.

Step 3: Once the Ministry accepts and reviews your reports - it outlines your ongoing obligation as a waste generator.

A comprehensive guidance manual is provided at no cost from the Ministry. It may be downloaded at: http://www.ene.gov.on.ca/envision/env_reg/er/documents/2000/RA00E0002.htm

Note: For registration on the HWIN system there is a 2006 registration renewal guide for renewal registration. There is also a HWIN helpdesk for any issues associated with registering available at 1-866-HWIN-MOE from M-F 8-5 EST.

Manifesting Requirements

A manifest is a document used to track the movement of liquid industrial and waste (subject wastes) as they move from a generator to an off-site receiving facility. Manifests are used to identify the type of waste being shipped, overall volumes and the movements of the waste from generator to receiver to ensure that these wastes are managed appropriately. Generators are required to retain copy 2, however it is recommended that copy 6 is retained and attached to its corresponding copy 2 to verify waste receipt.



Example: The Any-Town Ice Arena orders 4 – 20L pails of compressor oil from their refrigeration contractor on Sept.1 – this is the cradle portion of the purchase. The oil is used during the ice in season and must be disposed of – this the grave portion of the process. The receipt for the purchase and a copy 6 is retained and attached to the corresponding copy 2 to verify the proper waste disposal of the oil.

Creating Acceptable Discharge Practices

Recreation facility management must set controls for the disposal of non-domestic wastes. Paints, oils, greases, solvents, acids and caustics can potentially cause fires, explosions, blocked piping, odours or corrosion/damage of underground sewage piping. Proper disposal of these products is required under Reg. 347. Disposal methods will need to be developed using a Job Hazard Analysis. The creation of this document will help ensure compliance is being met. Refrigerant coolant, used paper [lines], plastic markings, logos/stencils, ice paints, pool filter remnants must also have specific disposal guidance system applied.

Curling and Ice Rink Ice Paint Disposal

Investigations by the MOE has raised issues related to the removal of ice and disposal of ice contaminated with ice paint. Some operations annually leave ice piles outside their facilities to naturally melt. The potential exists for water contaminated with ice paint to enter the environment through storm sewer or natural drainage. This practice may not be viewed as the environmentally friendly image we aspire to project nor, legally acceptable.

Note: The MOE requires that the following be completed (after ice had been melting outside of the facility):

1. Pump out all storm sewer catch basins on the local street and dispose of the wastewater in the sanitary sewer system.
2. Thoroughly clean the street and parking lot.
3. Ensure that the removed ice contaminated with paint was either:
 - Trucked to an acceptable disposal area.
 - Melted in a contained area.
 - Disposed of through a sanitary sewer system.
4. Remove and dispose of any paint residue attached to ditches in the area.
5. Submit a contingency plan to the provincial officer to outline what actions are taken to prevent the discharge of paint residues to ditches.



General Safety

- The ORFA wishes to remind all operators that ice shavings dropped outside at any time of the year may contain traces of “human body fluids” [spit, vomit, blood etc.] and as such managers should consider posting these areas as unsafe and attempt to ensure they do not pose an attraction as “child play areas” or used for “cooling purposes” of sport team beverages or “First Aid”.
- As required under OHS laws - workers should be advised of the possible hidden dangers found in ice shavings
- Personal Protective Equipment of gloves, long sleeved shirts, long pants, eye protection and hearing protection may need to be worn
- A complete written procedure outlining the acceptable methods of ice disposal should be in place and reviewed by all involved with the process

The ORFA recommends that you:

- Have a current MSDS for all ice paints used

- Consult with the appropriate authorities for approval of an acceptable ice-disposal procedure-local sanitary officials, local office of the Ministry of Environment etc.

Note: Sewer use is governed by each municipality, however the Ministry of the Environment regulates everything else (third party disposal, outside discharge etc.)

Sample disposal methods include:

- An ice pad that is 25.9 x 56.4m (85 x 185ft) with an average depth of 3.8cm (1.5in) will be scraped out in 30-35 loads
- If the paint has been installed close to the ice surface, as recommended in the ORFA Ice Making and Painting Technologies training course-only the last 3-5 loads of ice shavings should contain paint-drivers should monitor ice depth and snow shavings to identify when paint is at or near the surface-once identified, a fresh blade should be installed to quickly complete the process
- If acceptable, shavings containing paint may then be dumped into “the snow pit” for drainage into the sanitary sewer system a thorough cleaning and sanitizing of the snow pit should be conducted once all snow has melted
- Snow pits that empty into a septic system should not be used for paint disposal
- A site inspection of the proposed dump area should be conducted by a “competent person” to ensure ground water from melting shavings will not enter natural waterways such as creeks, rivers or well-water supplies
- The area should be protected from possible human contact-posted with warning signs and/or fenced off
- Shavings with no ice paint may then be placed outside
- Shavings being placed outside containing ice paint should be controlled:
 - A barrier such as plastic or tarp should be placed on the ground as a barrier between the contaminated sand and the natural soil
 - The ground barrier should have 15-30cm (6-12in) of sand placed on top to help trap melting paint
 - A containment system of one or any combination of 30cm (12in) of sand, hay, or wood box construction is then placed on

the outer edge of the ground barrier to help prevent leakage.

- The exact size of this containment area will need to be calculated by each facility to best meet their specific needs-the containment area may collect all ice shavings or only ice shavings containing ice paint.
 - Paint waste and sand should then be disposed as per local by-laws.
 - Some operations have been known to use local contractors with portable waste containers in lieu of a ground barrier system to collect ice shavings containing paint.
- A reminder that “sand” tracked onto an ice surface will quickly dull an ice resurfer blade. Dull blades require significantly more mechanical and human resources (waste) to complete the task at hand-a comprehensive tire washing program should be in place if shavings are to be dumped outside
 - A final inspection of the disposal area should be conducted and logged once melting is complete

Note: The sample method may not be acceptable under every circumstance. It is the facility manager’s responsibility to ensure that any disposal method meets all the conditions of Regulation 347.

Aquatic Facilities

Swimming pools, whirlpools and water parks all require regular maintenance and upkeep. Care should be taken to ensure over-dosage or spillage of chemicals does not occur during use. Leftover or expired chemicals should never be disposed of by dumping into the sewer system. They should be handled as hazardous waste and disposed of accordingly. Backwash waters, cleaning chemicals and diatomaceous earth or sand must be filtered prior to release into a municipal sewer system (contact the municipality for acceptable levels and municipal guidelines).

Note: If unsure of how best to approach this task, consider sourcing an expert in the area and ask for their advice.

Wastewater containing residual chlorine should be regularly tested to ensure chlorine levels are at acceptable levels prior to release.

Consider; minimizing the use of chlorinated water for deck cleaning purposes; reduce the level of chlorine in backwash wastewater by utilizing freshwater for backwashing; perform backwashing at low flow periods of the municipal wastewater collection system; installing automated chlorine/bromine systems that use inorganic salts or ozone systems; reuse or recycle separated diatomaceous earth or pool filter sand; or take them to the landfill site for disposal. Ensure that any waste that is leaving the facility is properly disposed of following municipal, provincial and federal guidelines.

Staff Training

The first line of defense is at the frontline staffing level. Providing and maintaining employee education is an indication of management’s commitment to compliance. Employees should be made aware of inherited risks associated with the handling of contaminated waste as well as the hazards involved with the materials and chemicals they are using. Response plans and emergency evacuation procedures for spills or releases must be in place and practiced to be effective. Housekeeping is a key element to ensure emergency situations are avoided. Storing chemicals, paints, etc. in areas with drain systems can unknowingly create a release into the sewer system. Proper storage, labeling and rotating of chemicals will help avoid such situations.

Note: (See also Regulation 347- Section 17.2 for acceptable storage lengths for waste generators - this is only for waste products not for “new” products.

Should a spill occur, it is important to immediately contact the MOE (as per Section 92 EPA). Facility managers should be prepared to professionally respond to such events as well as conducting staff training on spill response protocols.

Visit: <http://www.ene.gov.on.ca/spills.htm> or 1-800-268-6060 (emergency reporting).

Energy Management is Waste Management

Loss of tap water through poor maintenance and upkeep adds thousands of dollars to every municipality’s operational costs. Pool covers can help reduce evaporation, while ice thickness and temperature control can produce a more quality surface-reducing energy costs.

Conclusion

Waste management has become another subject that today's facility practitioner must continually monitor. Contracts must reflect responsibility of generated waste but the true responsibility of the 'owner' cannot be shifted or reduced through such contractual arrangements.

Remaining diligent, in all aspects of operation can only be accomplished through continued information review and professional interaction. Recreation professionals should never be hesitant in contacting the MOE for guidance on any environmental issue.

References

Registration Guidance Manual for Generators of Liquid and Industrial and Hazardous Waste

<http://www.ontario.ca/environment-and-energy/registration-manual-generators-liquid-industrial-and-hazardous-waste>

Appendices

<http://www.ontario.ca/environment-and-energy/registration-manual-generators-liquid-industrial-and-hazardous-waste-append>

Report a Spill

<http://www.ontario.ca/environment-and-energy/report-spill>

HWIN Help Desk 1-866-494-6663 or www.hwin.ca

www.e-laws.gov.on.ca



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Technical Safety BC – Investigation Report Ammonia Release – Fernie Memorial Arena, October 17, 2017

**ORFA Commentary on Ontario-related Legislation,
Regulations, and Registered Refrigeration Plant
Operational Best Practices**

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INCIDENT OVERVIEW

On October 16, 2017, the curling brine chiller at the Fernie Memorial Arena, BC was put back into operation after a seasonal shutdown. During the shutdown and seasonal maintenance, ammonia had been detected in the curling brine system, indicating that the curling brine chiller was leaking.

At 3:53 a.m. on October 17, 2017, an ammonia alarm in the arena's mechanical room was triggered and the system was shut down. Between 9:15 a.m. and 9:38 a.m., rising pressure contained within the curling brine system led to the separation of a pipe coupling in the mechanical room. Upon separation of the coupling, an estimated 9 lb. of ammonia was rapidly released into the room followed by additional ammonia from the system. The atmosphere in the mechanical room may have reached or exceeded concentrations of 20,000 parts per million (ppm) of ammonia.

Ammonia odour was reported from nearby areas of the community between 9:40 a.m. and 1:20 p.m.. At 12:50 p.m., an electrician discovered a worker in the mechanical room, called 911, removed the person, and performed CPR until the arrival of the fire department.

A total of three people were found deceased in the mechanical room: the director of leisure services, the refrigeration operator, and a refrigeration mechanic.

Responders opened the emergency discharge valve and pressed the emergency stop for the ammonia system located on the exterior wall of the arena at 1:50 p.m.. Opening the discharge valve resulted in an estimated initial release of 55 lb. of ammonia into the atmosphere with approximately 632 lb. of ammonia from the system being slowly released during the subsequent days.

Due to the three fatalities, the ammonia release and the unknown amount of ammonia remaining in the arena on the day of the incident, the City of Fernie issued a local state of emergency and evacuated approximately 55 homes and 95 residents from the surrounding area. The evacuation order remained until October 22, 2017 and the local state of emergency remained in effect until October 24, 2017.

The Ontario Recreation Facilities Association Inc. (ORFA) has reviewed the investigation report produced by Technical Safety British Columbia (the safety authority and governing body for pressure vessels and operating engineers in BC), and offers the following comparative as it relates to Ontario related legislation, regulations, and registered refrigeration plant operational best practices.

Page	Technical Safety BC Fernie Investigation Report (Link to Full Report)	ORFA Comments
2	Technical Safety BC	Counter-part in Ontario: Technical Standards and Safety Authority (TSSA)
2	Safety Standards Act	Equivalent in Ontario: Operating Engineers Regulation (OER)
2	<i>Incidents involving products or work subject to the Act are required to be reported in accordance with Section 36 of the Act.</i>	OER 47 . The user shall notify the chief officer, by telephone or other direct means, as soon as is practicable of any accident, injury or death, but no more than eight hours after the accident, injury or death, as the case may be, and shall within 48 hours after the accident, injury or death, send the chief officer a written report of the occurrence where, (a) a person is seriously injured or killed from any cause; or (b) an accident occurs involving property damage.
2	<i>The role of Technical Safety BC with respect to the investigation of incidents is to understand relationships between incidents, equipment and work that are subject to the</i>	The same investigative relationships occur with TSSA: <ul style="list-style-type: none"> • Fire departments/Office of the Fire Marshal • Electrical Safety Authority

	<ul style="list-style-type: none"> • Ministry of Environment, Conservation and Parks • Ministry of Labour • Law enforcement officials, and • Office of the Chief Coroner
<p>5 <i>In October 2010, seven years prior to the incident, the City of Fernie received a recommendation from their maintenance contractor to replace the curling system brine chiller due to its age. Analysis of evidence gathered during the investigation identified a series of key decisions during this seven- year period that contributed to the incident.</i></p> <p><i>Potential influences of these decisions were identified, including:</i></p> <p><i>A. facility management and organizational priorities;</i></p> <p><i>B. failure to include safety risk criteria from aging infrastructure risk assessment;</i></p> <p><i>C. operational management structure;</i></p> <p><i>D. employee capacity and turnover;</i></p> <p><i>E. incomplete maintenance planning; and</i></p> <p><i>F. an industry practice of run-to-failure or run-past-failure for brine chillers.</i></p>	<p>Each of the items outlined in 5 A to F have been identified as Ontario industry issues by the ORFA over the past 20-years. The ORFA has created a series of resources to assist members of the importance to address each contributing factor. Refer to: ORFA Guidelines and Best Practices</p> <p>The ORFA Guidelines and Best Practices have also been blended into the following training courses: Basic Arena Refrigeration, Advanced Refrigeration Facility Operator, Recreation Facility Environmental Systems and Legal Awareness I: Supervising in a Recreation Environment. Further, the opportunity to apply for the ORFA Certified Arena Refrigeration Plant Technician (CARPT) professional designation is provided to those individuals with the required skills and knowledge.</p>
<p>6 <i>The City of Fernie initially scheduled funding to replace the curling brine chiller for 2013. This funding was deferred to 2014 and then deleted from further financial planning. At the end of the 2016/2017 operating season, an ammonia leak was detected in the curling system, indicating a potential failure of the chiller. A decision was made to monitor the leaking chiller in the summer of 2017, followed by a decision to put the leaking chiller back into operation on October 16, 2017. Available evidence did not indicate that there was an awareness of any safety risk associated with the continued operation of the chiller by any parties involved.</i></p>	<p>The ORFA reminds members of the importance of asset management and the tracking of life expectancy of equipment.</p> <p>The Occupational Health and Safety Act (OHSA) gives a worker the right to refuse work that he or she believes is unsafe to himself/ herself or another worker. The Act sets out a specific procedure that must be followed in any work refusal. It is important that workers, employers, supervisors, members of joint health and safety committees (JHSCs) and health and safety representatives understand the procedure for a lawful work refusal.</p>
<p>6 <i>In addition to analysis of the cause, the investigation also evaluated the role of the ammonia detection, ventilation and discharge</i></p>	<p>The ORFA recommends that all members evaluate current refrigeration plant room ammonia detection,</p>

systems following the ammonia release. This analysis determined the ventilation system could not have prevented the large concentration of ammonia within the room, and that it may have contributed to the spread of ammonia to other areas of the arena. It was also determined that the deployment and configuration of the emergency discharge system introduced risk while not reducing the amount of ammonia released into the mechanical room.

ventilation and discharge systems and bring equipment up to current standards.

Refer to: [Canadian Standards Association B52-13](#) Mechanical Refrigeration Code. The 11th edition of CSA B52 provides minimum requirements for the design, construction, installation, inspection, and maintenance of mechanical refrigeration systems.

- 7 The scope of activity undertaken during the investigation included:
- documentation of the scene;
 - examination of log books, manuals and procedures;
 - integrity inspections, tests and analyses of refrigeration system equipment;
 - operational tests of the ammonia detection and ventilation systems;
 - laboratory analyses of the curling brine chiller, brine system pipe couplings and valves;
 - analysis and simulation of ammonia release and dispersion;
 - interviews of current and past City of Fernie employees and maintenance contractors;
 - examination of email correspondence relating to the Fernie Memorial Arena;
 - examination of budget and financial management between 2010 and the incident date;
 - examination of strategic planning materials related to the arena and asset management;
 - examination of arena work, inspections and service orders between 2010 and the incident date;
 - evaluation of the organizational structure, turnover and management incentives at the City of Fernie;
 - examination of industry asset management planning materials;
 - evaluation of qualifications and training materials for refrigeration industry workers;

The ORFA continues to promote the practical and legal importance of quality record keeping and log book practice. Refer to ORFA [log book order form](#)

The ORFA reminds owners and chief operators that all testing requirements identified in the list MUST be coordinated by the plant owner, or operator, as they are not automatically scheduled by the plant service provider.

[OER 45](#). (3) A refrigeration installation referred to in subsection (1) that is located in a machinery room, as defined by CAN/CSA-B52, shall be equipped with a gas detector system that will activate the alarm system required by clause (2) (a) and start a mechanical ventilation system if there is a leak of refrigerant causing the airborne concentration of refrigerant to rise above the level value as defined by [CAN/CSA-B52](#). O. Reg. 219/01, s. 45 (3).

The ORFA offers two specific tools to assist plant owner/operators with managing the plant room:

- [Safety Activities For Effective Refrigeration \(SAFER\)](#); and
- [Recreation Facilities Asset Management \(RFAM\)](#)

	<ul style="list-style-type: none"> • <i>benchmarking of maintenance practices and industry behaviours at other arenas and service providers.</i> 	The ORFA will offer support to TSSA in gathering up to date benchmarking information for our sector.
8	<p><i>The potential for corrosion in this type of system results from the chemical reactions between the calcium chloride brine solution and the carbon steel welded tubes. Brine systems of this type are also subject to periodic air ingress that can promote corrosion. Removal of this trapped air from the system is part of regular operation and maintenance. Evidence indicates that a corrosion inhibitor (brinehib) was being added periodically to the brine solution to slow the corrosion process within the system.</i></p>	Refer to ORFA Resource: The Importance of Ongoing Monitoring of Secondary Refrigerant Health
15	<p><i>Once the brine system coupling separated and relieved the internal pressure, the ammonia in solution and any ammonia in the brine pipe quickly expanded, projecting the contents of the brine pipe outward from the pipe opening. The ammonia quickly vapourized and expanded to fill the mechanical room reaching estimated concentrations exceeding 20,000 ppm.</i></p>	The ORFA reminds members of the need to include the dangers of vapourizing ammonia in their in-house plant training manuals.
17	<p><i>Technical Safety BC's investigation sought to gain insight into the operational context in which the incident occurred. Correspondence and administration records were examined from the City of Fernie and maintenance contractors and interviews were conducted with key personnel relating to the management of the equipment that failed.</i></p>	Key to this point is the need to have all internal staff, managers, and other stakeholders trained to the same level of competency and knowledge base.
17	<p><i>Evidence identified a number of potential influences for these decisions. These influences include organizational and departmental priorities, employee turnover, organizational design, ineffective communications, and a lack of hazard awareness associated with leaking chillers and aging equipment.</i></p>	The ORFA has been warning that these same types of influences exist in many Ontario refrigeration plant rooms today. The ORFA continues to provide support to and advocate for reduction in these shortcomings.
18	<p><i>In 2013, the replacement of the chiller was deferred to 2014 as shown in the 2013-2017 Five-Year Financial Plan deliberation. In 2014, the reference to the curling chiller replacement disappeared from five-year</i></p>	The ORFA reminds plant operators of the importance of continually being proactive in the awareness of the condition of their work environment. Frontline staff have the same "Right to Know" as senior management staff of

<p><i>financial/capital spending plans and subsequent years' capital spending plans. The chiller replacement was no longer a budgeted activity, however it remained as an item in various management documents following 2014, including the City's 2014-2018 Corporate Strategic Plan, 2016 Business Plan, and management capital planning worksheet for 2017. In addition, five quotes were requested by the City for chiller replacement between January 2015 and August 2017. Evidence identifies that the chiller replacement deferral from 2013 to 2014 was likely influenced by other priorities for the refrigeration system.</i></p>	<p>the condition and planned maintenance of the refrigeration plant room.</p>
<p>19 <i>According to the organizational chart for the City of Fernie and the job description for the director of leisure services, the director was responsible for a wide array of duties which included: leisure services delivery and planning; facility equipment and infrastructure management and planning; and human resources management and planning for the Leisure Services Department.</i></p>	<p>The ORFA has recognized the same potential issues within many Ontario refrigeration plant rooms. A recommendation was therefore introduced to encourage every Ontario refrigeration plant room to have a Certified Arena Refrigeration Plant Technician (CARPT) for the purpose to assist managers who may not be directly involved in the day to day operations. Further, the CARPT designation holders would have a working knowledge of the refrigeration plant and work directly with service providers, as well as, assist in training other staff.</p>
<p>20 <i>A robust maintenance program typically involves a variety of strategies that includes knowledge of wear out or equipment end-of-life.</i></p>	<p>Refer to ORFA Resource: Developing a Comprehensive Registered Refrigeration Maintenance Plan</p>
<p>27 <i>Insufficient equipment emergency procedures and training may have contributed to the decision to isolate the chiller and brine system on the morning of the incident.</i></p>	<p>This once again supports the ORFA recommendation that every Ontario refrigeration plant room to have a Certified Arena Refrigeration Plant Technician (CARPT) to assist managers who may not be directly involved in the day to day operations. Further, the CARPT designation holders would have a working knowledge of the refrigeration plant and work directly with service providers, as well as, assist in training other staff.</p>
<p>28 <i>Ammonia odours were reported in the community close to the time of the incident and firefighters reported measuring 400 ppm of ammonia within the arena lobby during their response. As part of the investigative scope and mandate, Technical Safety BC examined technical systems in place at the Fernie Memorial Arena that are intended to minimize the impact after a release has occurred. In particular,</i></p>	<p>Refer to ORFA Resource: Recreation Facility Emergency Planning</p>

	<p><i>Technical Safety BC's investigation examined the condition of the alarm and ventilation systems to determine if they contributed to the ammonia concentrations experienced within the mechanical room or the community. In addition, the investigation analyzed the configuration and impact of the emergency discharge system deployed in response to the incident.</i></p>	
30	<p><i>The fan belt on the large fan was discovered to be cracked and in poor condition. When operating, the fan belt was observed to be slipping, resulting in a reduced average fan speed. The reduced ventilation system capacity was measured as being 75% of that required during a leak/rupture scenario.</i></p> <p><i>Inspection of the vestibule doors identified a gap under the door between the mechanical room and vestibule. The door between the vestibule and the arena public space did not incorporate a seal at the bottom. The gaps and sealing under the vestibule doors provided a possible leakage path for ammonia from the mechanical room into the arena lobby inconsistent with the B-52 Mechanical Refrigeration Code definition for tight fitting doors.</i></p>	<p>The ORFA recommends that members add these items to current operational and maintenance manuals if not already in place.</p>
34 – 41	<p><i>Technical Safety BC concludes that the equipment failure was caused by a small hole in the curling chiller carbon steel tube resulting from corrosion at a weld seam.</i></p> <p><i>Contributing to this failure and the release of ammonia was the:</i></p> <ul style="list-style-type: none"> <i>• chiller age and corrosive potential of the chemicals and materials used;</i> <i>• presence of tube weld seam fusion defects;</i> <i>• isolation of the curling brine expansion tank;</i> <i>• isolation of liquid ammonia within the leaking chiller; and</i> <i>• unsupported coupling joints on the brine system pipe.</i> <p><i>Technical Safety BC concludes that the incident was caused by a decision to</i></p>	<p>Although this report is directed to BC arena refrigeration plant operators, the Fernie Investigation Report outcomes will be included in all future ORFA training materials and resources.</p> <p>Further, ORFA recommends that refrigeration plant owners and/or operators ensure that the Fernie Investigation Report outcomes are included in all internal refrigeration plant operations and maintenance manuals.</p>

operate the leaking curling chiller.

Contributing to this

decision was a failure to replace the aging chiller after it surpassed its recommended operational life-span. The decision and failure to replace the chiller may have been influenced by:

- insufficient hazard awareness relating to leaking chillers and aging equipment;*
- omission of component end-of-life strategies from the maintenance plan;*
- employee turnover;*
- competing organizational and departmental priorities; and*
- organizational design of the leisure services department.*

After examination of the detection, alarm, ventilation and discharge systems, Technical Safety BC concludes the following:

- the ventilation system could not have prevented a high concentration of ammonia in the mechanical room;*
- fan location and condition contributed to ineffective ventilation after the release;*
- fan exhaust location and airflow may have directed ammonia toward building openings;*
- mechanical room doors presented a path for ammonia to enter arena public areas; and*
- the emergency discharge did not reduce the risk or amount of ammonia leakage into the mechanical room while introducing exposure risk.*

Recommendation 2 to Arena Owners:

Implement a refrigeration system maintenance program that addresses:

- Wear-out / End-of-Life - utilizes an established maintenance end-of-life strategy;*
- Resources - organizational resource commitment for significant maintenance activity;*

- *Approval & Accountability - program is approved and monitored by the owner, separate from the responsible manager.*

Recommendation 3 to Training

Providers:

Add brine testing, analysis and interpretation to the training and qualifications of refrigeration operators, refrigeration mechanics and 4th class power engineers.

Recommendation 4 to Arena Owners:

Provide refrigeration system, maintenance program and worker qualification/skill awareness training to all employees and representatives responsible or involved with approving arena maintenance related activities or expenses.

Recommendation 5 to Training

Providers (Refrigeration Operators, Refrigeration Mechanics and 4th Class Power

Engineers): *Improve training related to maintenance strategies and maintenance program awareness dealing with component wear-out and condition assessment so that graduates can effectively participate with a comprehensive program.*

Recommendation 7 to Training

Providers (Refrigeration Operators and

Mechanics): *Develop and implement generically applicable emergency situational guidance that can be taught and posted within mechanical rooms.*

Examples of simple 'SAFE PRACTICE' instructions for consideration:

- *DO NOT operate equipment that is suspected to be failed/leaking.*
- *DO NOT isolate liquid refrigerant within suspected failed/leaking equipment.*
- *DO NOT isolate secondary coolant systems without pressure relief.*

Recommendation 8 to Refrigeration

Maintenance Contractors: Implement procedures for employees interacting with owners and operators to clearly disclose and refer items that are a cause for concern to refrigeration professionals with the necessary training to provide advice. Maintenance contractors are reminded of their obligation to report hazards that are not known to be addressed by the owner.

Recommendation 12 to Arena Owners:

Conduct an assessment and test of ventilation systems to evaluate effective internal ventilation of the mechanical room and external discharge in a manner that minimizes risk of exposure.

Recommendation 16 - to Arena Owners:

Inspect all emergency discharge piping and confirm that routing does not enter any spaces that present a risk to public safety.

Recommendation 17 - to Training

Providers: Review and amend guidance relating to the operation of an emergency discharge system such that specific scenarios where the benefits outweigh the risks are clearly identified and the necessary information to perform an emergency risk assessment is identified.

Recommendation 18 – to Local Governments, Arena Owners, and Technical Safety BC:

Make publicly available the following information associated with management and oversight of regulated refrigeration systems at public assembly facilities (such as arenas):

- refrigeration system maintenance programs for regulated equipment;
- related capital budgeting plans for supporting maintenance programs;
- assessment and audit criteria;
- results of assessments and audits;
- independent recommendations relating to the condition of equipment, including

recommendations from maintenance contractors for repair or replacement; and, • any other information relevant to the assessment, audits and overall safety of the technical equipment and its management programs.

Conclusion

The death of three workers at the Fernie Arena in October of 2017 has resulted in a sad legacy of hard lessons, the resolve of which is to do better moving forward to ensure such a tragedy never happens again.

The ORFA has long maintained, and valued, the professional, efficient and competent operation of recreation facilities within the province. The Association will continue to support its members, and continue to strive to produce industry-leading education, value-added services, and quality products to assist in protecting arena workers in Ontario.



Basic Arena Refrigeration Governance Quiz

VERSION 2019

orfa.com



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Basic Arena Refrigeration Governance Quiz

Under the Occupational Health and Safety Act (OHSA), all workers must be a “competent person”. The qualities of this designation include that the person is qualified because of their knowledge, training and experience to organize the work and its performance. In addition, they must be familiar with all governance that applies to the work. And, finally they must have knowledge of any potential or actual danger to health or safety in the workplace.

There is no one document that directs safe ice arena refrigeration plant operations. An Ontario refrigeration plant room has a series of potential Codes, Acts and Regulations that can be applied pending the design and application of the equipment. The expectation, without exception, is that all workplace stakeholders will know and comply with all aspects of regulatory obligations which are in constant state of review and redesign through specific change or clarification through updates, alerts or safety bulletins. The average person is unable to read and retain all applicable governance however, all are capable to know in a general sense, which Codes, Acts and Regulations might apply and, their responsibility to research and comply.

This quiz is designed to confirm a basic understanding of ice arena refrigeration plant regulatory governance responsibilities. Once complete, it should form the foundation for ongoing education in the subject matter. Using the provided resource, complete the following questions.

1. What are considered the ten (10) most applicable Codes, Acts and Regulations that guide safe ice arena refrigeration plant operations in Ontario?

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

2. Of these ten regulatory responsibilities, which are considered the top four (4) that are specific to refrigeration plant governance?

a. _____

b. _____

c. _____

d. _____

3. Of these ten regulatory responsibilities, which two require a plant room to have an emergency plan?

a. _____

b. _____

4. Although there are several governing authorities that can physically attend the plant room, which are considered the top two (2) to be expected for regular plant compliance inspection responsibilities?

a. _____

b. _____

5. What does section 25 (1) (c) of the Occupational Health and Safety Act state?

6. What does section 25 (2) (a) of the Occupational Health and Safety Act state?

13. How is "training" defined under the Operating Engineer Regulation?
14. What does section 6 (1) (p) of the Operating Engineers Regulation state?
15. What does section 37 (8) (e) of the Operating Engineers Regulation state?
16. What does section 37 (10) of the Operating Engineers Regulation state?
17. What does section 42 (1) (c) of the Operating Engineers Regulation state?
18. What does section 42 (1) (4) of the Operating Engineers Regulation state?
19. What does section 46 of the Operating Engineers Regulation state?
20. What does section 47 of the Operating Engineers Regulation state?
21. What section of the OHSA does this responsibility partner with?

22. What section of the B-52 Mechanical Refrigeration Code requires each refrigeration system to have a permanent sign which is secured, readily accessible, legible containing specific safety information?

23. What size of plant requires the plant owner to post specific operational instructions in the plant room?

24. What must machinery room sensors for other than ammonia be required to do when activated?

25. What must fan switches located outside the machinery room be capable of doing?

26. What is the required heat temperature for a plant room to ensure freezing does not occur?

27. What is the maximum amount of refrigerant allowed to be stored on site?

28. How often must all pressure relief devices be tested?

29. What must all service personnel arrive on site with?

30. What regulation might the Ministry of Environment apply toward safe ice arena refrigeration plant operations and what does it focus on?

31. How does the Ministry define a waste generating facility?

32. In Ontario, what agency governs the safe use of electricity?

33. Who is authorized to conduct electrical repairs in a refrigeration plant room?

34. What is the role of the waste generator manifest?

35. Review the Technical Safety BC Investigation resource and provide five (5) examples of what you consider to be key contributing factors to this accident.

a. _____

b. _____

c. _____

d. _____

e. _____



A Passport to Becoming an Ontario Refrigeration Plant Monitor

VERSION 1.0

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Refrigeration Plant Monitor Competency Passport Log Sheet

This self-directed process allows a refrigeration plant monitor to continually strive toward, maintain and competency while proving workplace specific training has occurred.

Operators Name: (Print) _____

Sign: _____

#	Professional Development	Completed Date	Re-training Date #1	Re-training Date #2	Re-training Date #3
1.	Complete the ORFA BAR Course				
2.	Complete MOL on-line health and safety training and add certificate to dossier				
3.	Complete First Aid and AED training and add certificate to dossier				
4.	Complete core and workplace specific WHIMIS training and add certificate to dossier				
5.	Review all applicable Regulations, Codes and Acts				
6.	Review the plants operating and training manual				
7.	Complete a plant room review and PPE demonstration including eyewash and deluge shower				
8.	Complete a safe plant entry procedure with a competent person - review plant room risk and hazards – electrical, slip, pinch points, chemical storage/lifting/moving/exposure, housekeeping, etc.				
9.	Identify the plants primary equipment and describe the cycle of refrigeration				
10.	Identify all plant safety devices and their operating limits				
11.	Complete log book identification insertion, review past operating conditions, conduct 20-log book entries and have entries approved by a senior operator				
12.	Review the facilities emergency evacuation plans - Participate in (1) emergency evacuation drill				
13.	Identify what work can and cannot be performed				
14.	Confirm ability to perform as a plant room monitor				

Supervisor Name (print): _____ Sign: _____