Clean and Safe Drinking Water Workshop

Occupational Health requirements for Chlorination Buildings

Danika Drover, BKin, MSc. (Kin), MHSc
Industrial Hygienist
Service NL
OHS Division

Newfoundland Labrador
Service NL

OHS Mandate

- The Division's mandate is to maintain and improve health and safety standards in the workplace through the administration of:
  - The OHS Act and Regulations 2012 (every workplace must have a copy)
  - The Radiation Health and Safety Act and Regulations
  - Other associated Regulations, Codes of Practice and specified standards

Newfoundland Labrador
Service NL

OHS Activities

- Investigating workplace accidents and incidents.
- Conducting compliance inspections and detailed strategic inspections of workplaces.
- Hygiene assessments of various physical, chemical, biological and ergonomic agents in the workplace in order to protect worker health.
- Evaluating and inspecting radiation control measures in workplaces.
- Enforcing Occupational Health and Safety Legislation

Newfoundland Labrador
Service NL

OHS Sections

- Inspection Section
- Occupational Health Section
- Compliance Section
- Standards & Regulatory review Section

Newfoundland Labrador
Service NL

Presentation Objectives

- PPE for chlorination systems
- Alarm settings
- Storage requirements
- Typical infractions in chlorination buildings

Newfoundland Labrador
Service NL

PPE for Chlorination Systems

Newfoundland Labrador

Service NL

Personal Protective Equipment

- Eye Protection
  - Tight chemical goggles
  - Face shield may be necessary
  - Full-facepiece respirator
  - Contact lenses should not be worn

Newfoundland Labrador
Service NL

Personal Protective Equipment

- Skin Protection
  - Chemical Protective Clothing
    - Gloves
    - Aprons
    - Boots
  - Emergency Response Workers
    - Full-body protective suits

Newfoundland Labrador
Service NL

When are respirators required?

- Respirators are required when changing a gas cylinder in gas chlorination systems.
- When there is a leak that needs to be repaired.
- If using powdered chlorine a particulate respirator may be required.
- Depending on ventilation and quantity of liquid sodium hypochlorite a respirator may be required.

Newfoundland Labrador
Service NL

Respiratory Protection

- Full-facepiece air purifying respirators
- SCBA respirators for emergency response or when the full face respirator does not provide enough protection.
- Escape Respirator
- Particulate/OV respirators where powdered calcium hypochlorite is being used.

Newfoundland Labrador
Service NL

Table 4: Choosing the right respirator		
Situation	**Chlorine concentration**	**Respirator choice**
Routine work in chlorine room	—	• Escape respirator (If a leak occurs, the concentration will be unknown. Exit room immediately.)
Working on chlorine system	—	• Half-facepiece respirator with tight chemical goggles, or • Full-facepiece respirator (If a leak occurs, the concentration will be unknown. Exit room immediately.)
Leak occurs, enter to repair	Up to 5 ppm	• Half-facepiece respirator with tight chemical goggles, or • Full-facepiece respirator
	Greater than 5 ppm up to 10 ppm	• Full-facepiece respirator
	Greater than 10 ppm	• SCBA
	Unknown; always assume to be IDLH level	• SCBA

Source: Work Safe BC

Newfoundland Labrador
Service NL

Assigned Protection Factors (APF)

Concentration of Chlorine Gas	PPE Required
Less than 0.5ppm	• No specialized PPE required
0.5ppm to 10ppm	• Full Face Respirator fitted with Acid Gas Cartridges
Greater than 10ppm*	• SCBA • Full Body Protective Clothing

Newfoundland Labrador
Service NL

Alarm settings

Newfoundland Labrador

Service NL

Exposure Limits

- TWA – 0.5ppm
- STEL – 1ppm
- Notations – A4
- TLV Basis – URT & eye irritation
- NIOSH REL - 0.5 ppm 15-minute CEILING
- Current OSHA PEL - 1 ppm CEILING

Newfoundland Labrador
Service NL

Alarm Settings

- Often factory set at 1ppm and 3ppm
- ❖ Proper alarm settings (should be set at 0.5 ppm for the first alarm and 1.0 ppm for the high alarm)
- ❖ Systems must be tested and calibrated as per manufacturer's instructions.
- ❖ Workers must know the alarm levels.

Newfoundland Labrador
Service NL

Storage Requirements National Fire Code 2015

Newfoundland Labrador
Service NL

NFC Indoor Storage

- Indoor Storage of Toxic or Oxidizing Gases (3.2.8.3)
  - Cylinders shall be located in a room that
    - Is separated from the rest of the building
    - Is located on an exterior wall
    - Can be entered from the exterior
    - Is provided with ventilation to the outdoors
    - Cylinders
  - Cylinders shall not be stored in a room containing combustible materials

Newfoundland Labrador
Service NL

NFC Indoor Storage

- Compressed Gas (3.1.2.5)
  - Compressed gas cylinders shall be protected against mechanical damage
  - Stored cylinders shall be protected against valve damage and secured in a position that will not interfere with the operation of the cylinder valve assembly

Newfoundland Labrador
Service NL

NFC Indoor Storage

- Access Aisles(3.2.2.2)
  - ❖ Adequate access for firefighting purposes shall be provided and maintained to all portions of the storage area

- Fire Suppression Systems (3.2.7.9)
  - ❖ Buildings shall be equipped throughout with a sprinkler system or other fire suppression system

Newfoundland Labrador
Service NL

NFC Indoor Storage

- Ambient Conditions (3.2.7.3)
  - Rooms shall be cool and dry
  - Shall be provided with a ventilation system to exhaust toxic gases or vapours outdoors
- Spill Control (3.2.7.11)
  - Measures to control spilled liquid or solid shall be provided.

Newfoundland Labrador
Service NL

Regulatory Requirements

Newfoundland Labrador

Service NL

Documents to be Requested and Reviewed

- Occupational Health and Safety Program
- Respiratory Protection Program
- Material Safety Data Sheets
- Written Emergency Procedures
- Written Preventative Maintenance procedures
- Procedures for checking on a worker working alone
- Written safe work procedures including:
  - Changing Chlorine Cylinders
  - Leak Detection and Control
  - Container Repair and use of the repair kit
  - Disposal of damaged containers
- First aid training records
- Information on the location of confined spaces, if applicable, and entry procedures.

Newfoundland Labrador
Service NL

Legislative Requirements

- WHMIS Regulations
  - Section 13(11) - Material Safety Data Sheets
  - Labelling
  - Decanting

❖ Emergency Washing Facilities
  - ❖ OHS Regulations - Section 42(11)

❖ Personal Protective Equipment
  - OHS Regulations - Part VII

- First Aid Regulations

Newfoundland Labrador
Service NL

Legislative Requirements

- Emergency response Plan
  - OHS Regulations - Section 12(j)

- Working Alone
  - OHS Regulations - Section 15

Newfoundland Labrador
Service NL

Legislative Requirements

- Safe Work Procedures
  - OHS Regulations - Section 12(1)(c)

- Training/Education
  - OHS Act - Section 5(b)

Newfoundland Labrador
Service NL

Legislative Requirements

- Chlorine Gas Storage Practices
  - OHS Regulations
    - Section 59 - Storage
    - Section 32 – Signage

- Chlorine gas storage practices and area must be appropriate for location, type and quantity

Newfoundland Labrador
Service NL

Legislative Requirements

- Engineering Controls
  - OHS Regulations
    - Section 45 – Ventilation
    - Section 42 (1) – Gas detection / alarm system

- Noise
  - ❖ OHS Regulations
    - ❖ Section 68

Newfoundland Labrador
Service NL

Thank you!

Newfoundland Labrador

Service NL