

## **1.0 INTRODUCTION**

This standard outlines the hazards of lead and the requirements and controls to prevent and/or reduce exposures “as low as reasonably achievable” (ALARA) for lead

## **2.0 SCOPE**

This standard applies to all employees, contractors and sub-contractors working at NB Power.

## **3.0 REFERENCES**

|              |   |
|--------------|---|
| HSEE-03-01   | Hazard Identification, Assessment and Mitigation      |
| HSEE-03-18   | Respiratory Protection                                |
| HSEE-03-35   | Welding   |
| HSEE-02-P014 | Disposal of Lead-Based Paint and Lead Painted Objects |
| WorkSafeBC   | Safe Work Practices for Handling Lead                 |

## **4.0 TERMS AND DEFINITIONS**

|  |   |
|--|---|
| Containment                                | A system that effectively contains lead dust and debris within a designated work area where lead-containing materials are handled, removed, encapsulated, or enclosed.  |
| Competent Person                           | A person who is qualified, based on knowledge, training and experience, to do the work assigned in a manner that will ensure the health and safety of persons.  |
| Full Enclosure                             | an airtight seal that separates lead-containing materials from the surrounding environment.   |
| Hand washing facility                      | Must include: Wash basin, tempered water, soap and a method of drying hands   |
| Partial Enclosure                          | Allow some emissions to the atmosphere outside of the enclosure. Partial enclosures may consist of vertical tarps and floor tarps so long as the tarps are overlapped and securely fixed together at the seams. |
| Lead Contaminated Surface Coating Material | Any coating containing 0.06% or more lead content will be considered a lead contaminated coating.   |
| Time Weighted Average (TWA)                | The concentration, averaged over the applicable shift length, to which most workers may be exposed day after day, for a working lifetime, without health consequences.  |

## **5.0 ROLES AND RESPONSIBILITIES**

### **5.1 Site/ Division Manager**

- Ensure that workers and supervisors are adequately instructed and trained for working with lead.
- Take all reasonable measures to control the hazard in such a way that personal protective equipment is not required or reduced.
- Ensure lead inventory records are maintained.

### **5.2 Supervisors:**

- Ensure workers receive adequate instruction on the hazards of lead exposure.
- Ensure lead testing is completed, or lead is assumed to be present prior to work.
- Select and use the appropriate control measures as outlined for the appropriate level of lead work (see Table 4 in Appendix D).
- Report exposure incidents to WorkSafeNB
- Ensure that workers that are wearing respirators are properly trained and fit-tested as per HSEE-03-18-Respiratory Protection.
- Ensure that workers using engineering controls and appropriate PPE.
- Ensure that where lead abatement work is conducted, at the end of each shift, these areas are free from dust (i.e. no visible dust). At the end of the work the area shall be returned to its original state (i.e. no visible dust).
- Supervisor performing work requiring the establishment of a leadwork regulated area is responsible for informing other employers of the potential hazards of the ongoing work.

### **5.3 Industrial Hygienist:**

- Provide technical support for all aspects of lead work and inquiries, as required.

### **5.4 Employees:**

- Respect all lead warnings and precautions.
  - Assume all paint as lead containing, unless indicated otherwise.
  - Abstain from handling lead containing paint and coatings, unless authorized to do so.
  - Obtain proper clearance and don appropriate PPE before performing work on materials with lead-containing paints or coatings.
  - Properly trained and fit-tested as per HSEE-03-18 Respiratory Protection if a respirator is required.
  - Wash hands before eating, drinking and smoking when working with lead
-

**5.5 Contractors:**

- Assume all paint as lead containing, unless indicated otherwise Lead abatement contractors will review this instruction and adhere to all safety procedures for the specific lead abatement work they are performing.

**6.0 STANDARD**

Inorganic lead compounds are used in pigments, paints and coating. Workers can be exposed to lead either through inhalation of lead containing dust, fumes or mist, or through ingestion of lead residue from their hands (e.g. when eating or smoking).

Lead is a suspected human carcinogen and is poisonous to most organs and tissues Including: the nervous system, bones, intestines, reproductive organs, and kidneys.

This standard shall define the minimum expected requirements to identify lead containing materials and how to safely manage work around and with lead.

**6.1 Lead at NB Power**

Location of Lead-Containing Paints and Coatings at NB Power

Due to the timelines of the limits stated by federal legislation (Appendix G) and the lack of requirements for imported equipment and piping into Canada, at NB Power we will assume that all surface paints or coatings could contain lead at or above the limit whereby the occupational exposure limit (OEL) could be exceeded during removal work.

The limit defined as lead containing material at NB Power will be 0.06% lead (or 600ppm). Recent data collected in British Columbia suggests that 0.04mg/cm<sup>2</sup> is equivalent to approximately 0.06% by weight.

White and red pigmented paints are known to commonly contain lead. However, lead can be present in all pigments and colors of coatings.

**6.2 Lead Exposure Limits**

The current threshold limit values (TLV's) for lead is as follows:

|           |                        |
|-----------|------------------------|
| 8-Hr TWA  | 0.05mg/m <sup>3</sup>  |
| 10-Hr TWA | 0.035mg/m <sup>3</sup> |
| 12-Hr TWA | 0.025mg/m <sup>3</sup> |

Table 1 - The current threshold limit values (TLV's) for lead

---

### 6.3 Buying Lead Free Expectation

Coated purchased equipment, as well as purchased paints and coatings, will not contain lead, or these materials for site use shall comply with local Canadian regulations for lead containment in paints and coatings.

### 6.4 Identification of Lead at NB Power

Treat all paints or coatings as lead-containing unless validated to be lead free by:

**6.4.1 Lead Test Kit:** Lead test kits are used to determine whether lead is present on a surface. These kits use a colorimetric reaction with lead, whereby the material visibly changes colour (usually to a pink colour), which indicates the presence of lead. A colour change simply indicates the presence of lead in the surface and does not give a numeric value of the amount of lead contained in the surface. This technique will only be used as a screening tool at all NB Power sites as it can be quick, but are known to have low reliability and testing complications. This method requires disrupting the coating material and may take up to 24 hours for the color change to complete. This test method can be performed by anyone who has been trained. If tests come back negative (no lead), further quantitative verification will be required by one of the two techniques below. See Appendix D for further details on lead test kits.

**6.4.2 Bulk Paint Sampling:** This form of lead identification requires a paint chip sample to be collected and submitted to a laboratory for lead analysis. This method is the most accurate, but requires disturbing the existing materials and more lead time for shipping and analysis. The paint sample collected should be approximately 2.5cm x 2.5cm in area. To ensure all paints or coatings are collected for analysis, all layers of paint or coatings need to be collected, including the original surface. This method can be performed by anyone who has been trained. See Appendix D for details on bulk paint sampling.

**6.4.3 X-Ray Fluorescence (XRF) Analyzers:** XRF analyzers give an immediate reading of the concentration (in mg/cm<sup>2</sup> or µg/cm<sup>2</sup>) of lead present in the lead paints or coatings, without disrupting the surface material. Numerous readings can be taken quickly using this technique. Only individuals certified and trained to use these analyzers may perform this lead identification technique. If using XRF to identify lead coatings, keep in mind that an accredited laboratory test will still be required prior to disposal (Section 6.11.2). See Appendix E for details on the XRF analyzer used at NB Power

**Note: Each site must maintain an inventory of identified lead containing locations.**

---

All surfaces that are proven to not be lead containing will be identified. This applies to newly painted or coated surfaces, whereby the SDS identifies there is no lead present, as well as for older surfaces which are verified to not be lead-containing by the techniques mentioned above.

## 6.5 Prohibited Activities

The following activities are known to significantly increase the risk of exposure to lead and are hereby prohibited:

- Eating or drinking in a lead contaminated area.
- Entering lead-contaminated areas without permission and the appropriate PPE.
- Performing lead work without the appropriate training, education and permission.
- Introducing a new coating or paint containing lead above the legislated limit. SDS reviews will be required of all new coatings or paints introduced on site.

## 6.6 Hazard Communication to Employees

Persons controlling building, equipment or work areas are responsible for notifying the following of the presence and location of lead work being performed.

- Current employees and contractors who may work in or adjacent to areas where lead work is being performed.
- Prospective employers whose employees may work in or adjacent to areas where lead work is being performed.

## 6.7 Accidental Lead Exposure

In the event that a worker suspects they have discovered, or been exposed to, lead-containing painted or coated materials, follow these steps:

- Immediately stop work and contact your supervisor if you suspect you have discovered or have been exposed to lead. Do not leave the worksite until given permission from your supervisor.
- The supervisor will make arrangements to secure the work area, and have the material tested.
- The supervisor shall notify health and hygienist who may request worker decontamination and or biological monitoring.

## 6.8 Classification of Lead Work

All lead work conducted at NB Power sites are classified as stated below. Lead risk level classifications can be found in Table 2 below (Reference Appendix J for a detailed description of lead work operations):

---

| Risk Level    | Potential Airborne Lead Concentration (mg/m <sup>3</sup> ) |
|---------------|--|
| Low           | <0.05  |
| Low-moderate  | 0.05-0.50  |
| Moderate      | 0.50-1.25  |
| Moderate-high | 1.25-2.50  |
| High          | >2.50  |

Table 2 – Lead Risk Level Classifications

### 6.8.1 Low-risk lead work activities:

In low-risk lead work activities the airborne lead exposure of these activities is not expected to exceed the eight-hour TWA or 0.05mg/m<sup>3</sup>. Low-risk activities are included in this standard as there are other non-respiratory risk factors (such as dermal) that need to be controlled.

- Applying lead-containing paints or coatings with a roller or brush
- Installing or removing sheet metal that contains lead
- Operating an excavator (within the enclosed cab) during building demolition
- Transporting sealed lead waste containers
- Removing lead-containing coatings with a chemical gel or paste by hand\*
- Soldering
- Minor disturbance of lead coatings to collect a sample for analysis
- Unbolting/Bolting (where the paint/coating on the bolts, screws and hinges are disturbed, but does not otherwise interfere with a painted/ coated surface)
- Installation or removal of lead containing packing, babbitt or similar material

**\* Note - Removal of lead coatings with chemicals introduces other risks such as chemical skin and inhalation exposure and a JHA is required.**

### 6.8.2 Low-moderate-risk lead work activities:

- Removal of lead-containing coatings or materials by scraping or sanding using non-powered hand tools (e.g. wire brush)
  - Removing lead materials using a power tool with an effective dust collection system and HEPA filter (ex. Needle gunning)
  - Welding, burning, or torch cutting of surfaces from which lead-containing coatings have been removed.\*
  - Manually demolishing lead-painted plaster walls or building components using a sledgehammer or similar tool
  - Mechanical or pneumatic cold-cutting (cutting where there is no spark or flame produced).
-

- Clean up and removal of lead dust and debris using wet or HEPA vacuum methods. Depending on the circumstances, additional controls such as enclosures may be required depending on the specifics or magnitude of the job.

**\*Note – when removing lead coatings prior to hot work, at least 4 inches must be removed on either side of the hot work location.**

### 6.8.3 Moderate-risk lead work activities:

- Spraying on lead-containing coatings
- Using a heat gun to remove lead-containing coatings

### 6.8.4 Moderate-high-risk lead work activities:

- Using electric or pneumatic cutting devices for dry removal of materials that contain lead
- Using power tools without an effective dust collection system equipped with a HEPA filter to remove lead-containing materials (ex. Needle gunning)
- Using a high-pressure water jet to remove lead-containing surface coatings
- Repairing or removing ventilation systems that were used for controlling lead exposures
- Welding or high temperature cutting of lead-containing coatings or materials indoors or in a confined space
- Any operation that is not listed as low, low-moderate, moderate or high will be treated as moderate-high unless deemed otherwise by Industrial Hygiene.

### 6.8.5 High-risk lead work activities:

- Removal of lead-containing coatings through abrasive blasting (including wet, slurry, and dry abrasive blasting)
- Removal of lead-containing coatings using dry-ice blasting
- Removal of lead dust using an air mist extraction system

## 6.9 Lead Work Requirements

The following sub-sections clarify the mandatory requirements to safely perform lead work. See Figure 4 in Appendix B for a list of the requirements for each level of lead work.

### 6.9.1 Signs

Signage shall be posted at low-moderate risk and higher work area boundaries, and must read as follows:

---

*“Danger, area may contain lead dust. Authorized personnel only. Respirators and PPE required.”*

### 6.9.2 Isolation (barriers and enclosures)

Barriers and enclosures are used to separate lead work areas from adjacent work areas. They are used to prevent additional risk to non-lead workers.

#### 6.9.2.1 Barriers

- Barriers can be as simple as red barrier taping off the regulated work area with appropriate signage on multiple entry points.
- Barriers shall be used for low-moderate risk work only.

#### 6.9.2.2 Enclosures

Partial enclosures isolate an area but are not airtight; therefore, there are some possible emissions that can get outside of the enclosure. Partial enclosures shall be utilized for moderate risk lead work.

Full enclosures provide the greatest level of isolation. Full enclosures are tight and allow for few or no emissions to escape to isolated area. Full enclosures shall be used for moderate-high and high risk lead work activities. The following are guidelines for full enclosures:

- Windproof materials shall be used, which are impermeable to dust
  - The enclosure shall be supported and secure
  - All joints of the enclosure shall be sealed.
  - Overlapping tarps or air locks shall be utilized for entrances
  - Full enclosures must be ventilated to maintain negative air pressure:
    - Use HEPA air filters.
    - Maintain 4 air changes per hour.
    - Maintain negative air pressure of 0.02 inches of water.
    - Exhaust air outdoors.
    - Run continuously until the enclosure has been confirmed to be clean via clearance monitoring and is about to be disassembled.
  - A full enclosure requires a decontamination facility.
-



### **6.9.3 Containment Ventilation**

When using local exhaust to minimize exposure to lead (e.g. power tools with effective ventilation), the following apply:

- Ensure that the air velocity is sufficient to overcome currents and capture the contaminated air.
- Ensure that the exhaust is equipped with a HEPA filter and is exhausted in such a way that contaminants cannot re-enter the workplace.
- The local exhaust shall be placed in a way so that air is drawn down and away from the workers breathing zone.

### **6.9.4 Housekeeping**

#### **6.9.4.1 Area Cleaning**

- Prior to work being performed, clean the work area of all visible dust.
- The two preferred methods for cleaning lead debris and dust are:
  - Wet Methods: Where possible, to minimize dust generation, surfaces shall be wetted.
  - Vacuum up dust/debris using an effective HEPA vacuum.
- Drop sheets shall be used below all lead work operations that may produce lead dust or debris.
- Inspect the work area often, or at least once per shift.
- Lead dust shall be cleaned up regularly and stored in dust-tight containers labeled as holding lead waste. A vacuum equipped with the HEPA filter should be used to clean up dust and debris.
- The use of compressed air is prohibited for clean up, especially for lead
- Clean up controls will be the same as the risk level activity that generated the debris. E.g. low-moderate risk wet sanding will require low-moderate risk controls for clean up of that debris.

### **6.9.5 Waste Management**

- For any activities related to the removal of lead contaminated coatings that will result in waste to be disposed of, please refer to HSEE-02-P014 to determine the testing required and how and where the material may be disposed. In order to facilitate efficient disposal of the waste, appropriate sample(s) shall be obtained as soon as possible during the work.
  - Lead waste may not be acceptable at the local landfill depending on concentration and form. Do not dispose of the material without proper documentation.
-

- PPE that has been used during the removal of lead impacted coatings may be disposed of either separately or with standard wastes. Contamination levels are typically very low on PPE materials and are appropriate for landfill disposal.

## **6.9.6 Lead Work Hygiene**

It is important to ensure lead stays at the worksite and that it is managed to prevent accidental ingestion. The following options are available to ensure lead dusts are kept off of clothing and personnel: a dirty room, a hand-washing facility, a washing facility with shower, and a clean room.

### **6.9.6.1 Hand-Washing Facility (Required for all levels of lead work):**

- Must include: Wash basin, tempered water, soap and a method of drying hands
- Must be provided for workers to use before they eat, drink, smoke or leave the worksite
- The supervisor or project manager must determine what handwashing facilities are required and where they must be located.
  - Pre-existing handwashing facilities (e.g. bathrooms) may be adequate based on the pre-job assessment.
  - Temporary handwashing facilities should be considered where the work is remote, or where workers could touch surfaces travelling to the handwashing station.

### **6.9.6.2 Basic Requirements for PPE removal:**

Regardless of the risk level, the following requirement exists:

- All contaminated PPE must be removed before leaving the work area. For low-moderate risk activities, this could consist of a waste barrel in the work area, a dirty room, or a managed decontamination facility depending on the work being performed.

### **6.9.6.3 Decontamination Facility (Required for moderate, moderate-high, and high risk lead work)**

A decontamination facility offers physical boundaries to keep clean equipment and gear from soiled ones, and provides workers with appropriate means to remove and manage lead hazards. Decontamination facilities shall incorporate:

- A shower room with the following:
    - Hot and cold water or a constant temperature that is no less than 40°C
-

- Clean towels
- A clean room is a room suitable for storing clean clothing and equipment.
- A dirty room is a room where soiled PPE can be removed.

## 6.9.7 Monitoring (Health Monitoring and Exposure Sampling)

### 6.9.7.1 Health Monitoring:

The purpose of health monitoring is to determine if a worker has absorbed significant amounts of lead or to validate the effectiveness of PPE and other controls. Health monitoring may be required if:

- Ordered by WorkSafeNB.
- The job scope warrants additional validation of controls (as per Industrial Hygienist).
- If accidental lead exposure has occurred.
- A project or workplace has anticipated routine or very high lead exposure.

Health monitoring must be discussed and approved by Industrial Hygiene.

### 6.9.7.2 Air Monitoring:

Work requiring full enclosures will require a lead exposure sampling strategy and resources to manage the work (i.e. moderate-high and high risk lead work). Industrial Hygienist must be notified of all moderate-high and high risk lead work to determine the appropriate sampling strategy.

- Sampled workers who have participated in personal air sampling will be notified of their results in writing as soon as feasible.
- Industrial Hygienist will determine when sampling is required for other activities.
- Clearance testing may be required prior to handing the workspace back to normal use. Industrial Hygienist will determine if clearance sampling is required. See Appendix H for more details.

## 6.9.8 Personal Protective Equipment

### 6.9.8.1.1 Protective Work Clothing:

Protective work clothing is intended to limit contamination of personal clothing and spreading of lead dust and debris from the work location. Disposable protective clothing is preferred but reusable protective clothing can be used so long as a program is established by the employer to collect and clean coveralls for workers.

---

If using a commercial laundry service, the clothing must be bagged and labelled as lead contaminated. Contaminated clothing must never be taken home.

The use of disposable protective clothing (i.e. coveralls) is recommended for lead work with a low-moderate risk or higher. A risk assessment will help determine what tasks or activities require disposable protective clothing. Workers shall wear protective clothing that:

- Is made from a material that is resistant to penetration from lead dust
- Covers the body, feet, and head (excluding the face)
- Fits snugly at the ankles, wrists, and neck
- That if torn, can be immediately repaired, or replaced

**6.9.8.2 Respiratory Protection:**

Table 3 outlines the appropriate level of respiratory protection based on the level of work risk activity.

| <b>Lead Concentration</b>                                      | <b>Air-Purifying Respirator</b>          | <b>Air-Supplying Respirators</b>  |
|--|--|---|
| <b>Low lead work (&lt;0.5 mg/m3)</b>                           | <b>n/a</b>                               | <b>n/a</b>  |
| For low-moderate lead work (up to 0.5 mg/m3)                   | Half mask respirators with P-100 filters | n/a   |
| For Moderate to Moderate-High Risk lead work (up to 2.5 mg/m3) | Full-face respirator with P-100 filters  | n/a   |
| For High-Risk lead work (Up to 500 mg/m3)                      | n/a                                      | Air-line continuous flow (supplied air) full-face respirator<br>OR<br>Self-contained breathing apparatus (SCBA) |

Table 3: Respiratory protection choices for varying levels of lead concentration of lead work category

Refer to HSEE-03-18 Respiratory Protection for details on respiratory protection requirements at NB Power. Refer to HSEE-03-35 Welding for respiratory protection requirements for welding tasks as required. All workers must have respiratory protection training, have completed a respiratory medical fit test, as well as completed fit testing prior to wearing a respirator.

## 7.0 TRAINING

All individuals who will be working on materials with lead-containing paints or coatings will require appropriate instruction and training.

|                     | <b>Training Required</b> | <b>Example</b>   |
|---------------------|--------------------------|--|
| Low / Low -Moderate | Awareness                | Review standard and applicable work procedures   |
| Moderate and Higher | Formal Training          | Content must include <ul style="list-style-type: none"><li>• Health Hazards</li><li>• Exposure risks</li><li>• Specific work practices</li><li>• Worker protection</li></ul> |

Proof of training shall be provided for each employee or contractor, upon request.

## 8.0 APPENDIX

Appendix A - Discovering Potential Lead Containing Coatings/Paints

Appendix B - Overview of lead work requirements for each risk classification

Appendix C - Effects of Lead Exposure on Health

Appendix D - Lead Identification Techniques

Appendix E – Interpreting the Overall Results of XRF

Appendix F - Example of a Decontamination Facility

Appendix G - Lead Containing Paint Legislation

Appendix H – Lead Working Operations

Appendix I - Lead Clearance Sampling



Director of Total  
Health & Safety

---

---

# Health & Safety Standards



Document  
Number:  
HSEE-03-62

Date Effective:  
2023-05-12

Revision #:  
New

Page **14** of **24**

Title:  
Working with Lead

---

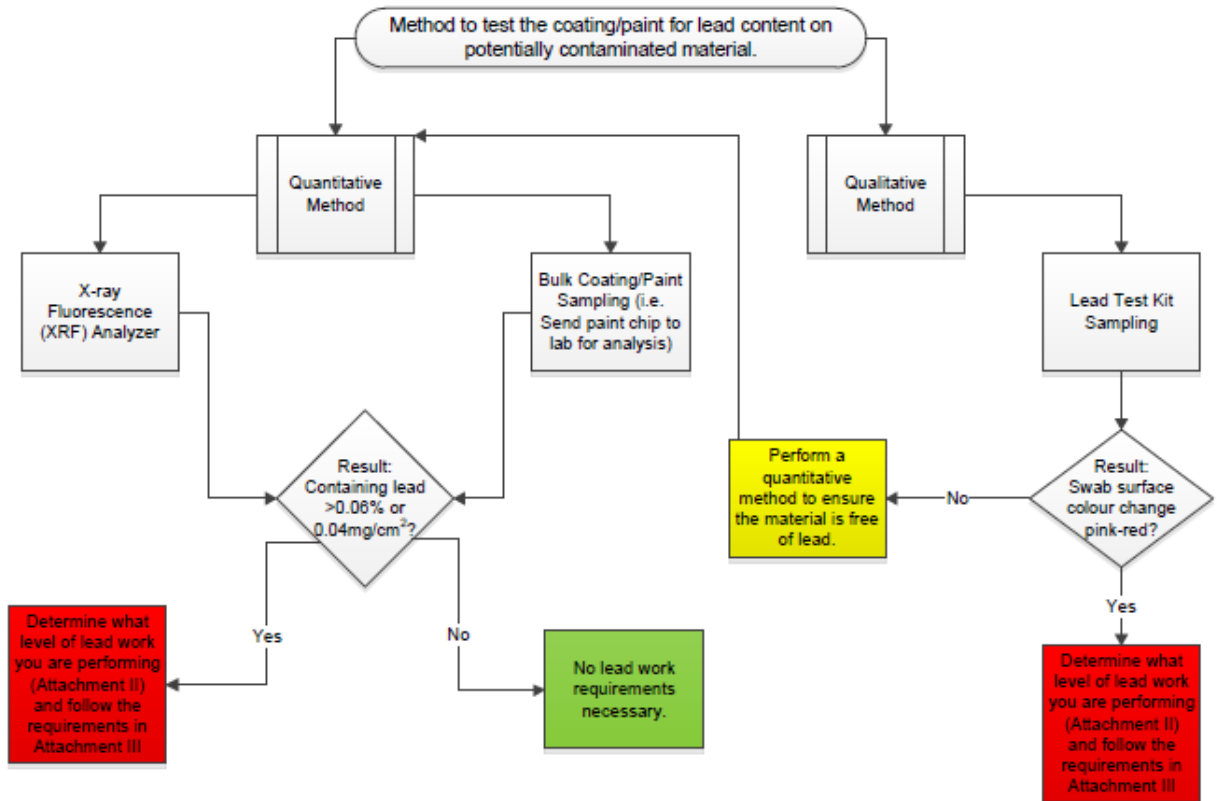
## DOCUMENT APPROVAL/REVISION RECORD

| Revision # | Date       | Revision Summary | Author                        | Reviewed By | Approved By |
|------------|------------|------------------|-------------------------------|-------------|-------------|
| New        | 2022-05-12 | New              | Matt MacFarlane<br>Zach Fitch | H&S Team    | Roland Roy  |
|            |            |                  |                               |             |             |

---

Appendix A – Discovering Potential Lead Containing Coatings/Paints

Figure 1- How to determine if a coating/paint on a surface contains lead



**Appendix B – Overview of lead work requirements for each risk classification**

**Figure 4- Table depicting requirements for levels of lead work. This table is only a summary and each section must be reviewed for specific requirements.**

| <u>Requirements</u>  | <u>Section</u> | <u>Low</u> | <u>Low/Moderate</u> | <u>Moderate</u>                       | <u>Moderate/High</u>                               | <u>High</u>  |
|--|----------------|------------|---------------------|---------------------------------------|--|--|
| <u>Training</u>  | 7.0            | Yes        | Yes                 | Yes                                   | Yes  | Yes  |
| <u>Signage</u>   | 6.8            | No         | Yes                 | Yes                                   | Yes  | Yes  |
| <u>Barrier</u>   | 6.9            | No         | Yes                 | No                                    | No   | No   |
| <u>Enclosure with Ventilation</u>  | 6.9.2          | No         | No                  | Partial or Full with ventilation      | Full (requires ventilation)                        | Full (requires ventilation)                        |
| <u>Air Monitoring</u>  | 6.13.2         | No         | No                  | No                                    | Yes  | Yes  |
| <u>Disposable Coveralls</u>  | 6.14.1         | No         | Yes                 | Yes                                   | Yes  | Yes  |
| <u>Respiratory Protection</u>  | 6.14.2         | No         | Yes                 | Yes                                   | Yes  | Yes  |
| <u>Drop Sheets</u>   | 6.11.1         | Yes        | Yes                 | Yes                                   | Yes  | Yes  |
| <u>Hand-Washing Facility</u>   | 6.12.1         | Yes        | Yes                 | Yes                                   | Yes  | Yes  |
| <u>Decontamination Facility (e.g. Dirty rooms, Washing facility with shower, and clean room)</u> | 6.9.2          | No         | No                  | Yes: Partial (No clean room required) | Yes: Full  | Yes: Full  |
| <u>Area Cleaning</u>   | 6.11.1         | Yes        | Yes                 | Yes                                   | Yes (Wet sweeping, wet shovelling, or HEPA Vacuum) | Yes (Wet sweeping, wet shovelling, or HEPA Vacuum) |
| <u>Waste Management</u>  | 6.11.2         | Yes        | Yes                 | Yes                                   | Yes  | Yes  |



**Appendix C – Effects of Lead Exposure on Health**

**Work Exposure:**

When working with lead containing paints or coatings, either through application, partial removal, or demolition, lead dust, fume or vapours can be generated. There are two main routes for lead exposure:

**Inhalation:**

- Through breathing in lead dusts, fumes or vapours. These dusts, fumes or vapours may not have an odour, and therefore an individual may be unaware that exposure is occurring.

**Ingestion:**

- Eating or drinking in areas where lead contamination exists can lead to lead exposure.
- Poor hygiene practices, such as licking one’s fingers, touching one’s face or biting nails can transfer lead from hand to mouth, if proper cleaning has not been performed.

**Health Effects:**

Regardless of the route of entry for lead exposure, the health effects are the same. Most of the lead that enters the body will be excreted from the body through multiple routes (i.e. urination, sweating, dead skin cells, etc.). However, the lead that is not excreted from the body accumulates in the bones where it can be stored for decades and released later back into the blood stream. Pregnancy and aging can result in larger releases of lead from bones.

Lead exposure may result in effects on multiple organ systems, such as the nervous system, cardiovascular system, reproductive system, renal system, haematological system, and gastrointestinal system.

Where high exposure from lead has occurred over a short period of time, acute effects/symptoms, such as abdominal pain, nausea, vomiting, diarrhea, and constipation can occur. In some instances, acute poisoning can occur, which has symptoms such as constipation, diarrhea, poor appetite, or weight loss. Long-term exposure to lower doses of lead may cause chronic effects, such as encephalopathy, reduced sperm count and motility, anemia, hypertension, etc.

Health problems commonly identified with lead exposure include anemia, central nervous system dysfunction (i.e. mood changes, hearing loss, mental function disturbances, hallucinations, impaired balance, and coma), musculoskeletal pains, gastrointestinal dysfunction, peripheral neuropathy, and negative effects on male reproduction.

**Severity of acute symptoms:**

**Figure 5-The severity of overt symptoms increases with blood lead levels:**

| <b>Mild Symptoms</b>   | <b>Moderate Symptoms</b>   | <b>Severe Symptoms</b>   |
|--|--|--|
| Mild Fatigue<br>Emotional irritability<br>Difficulty concentrating<br>Sleep disturbances | Headache<br>General fatigue or drowsiness<br>Myalgia<br>Arthralgia<br>Tremor<br>Nausea<br>Decreased appetite<br>Abdominal cramps<br>Constipation or diarrhea<br>Decreased libido | Colicky abdominal pain<br>Peripheral neuropathy<br>Encephalopathy with seizures<br>Delirium and coma |

### Appendix D – Lead Identification Techniques

#### 3M Lead Check Swabs:



#### Activation of Lead Check Swabs:

- **Crush:** Squeeze and crush points marked “A” and “B” located on the barrel of the swab
- **Shake and Squeeze:** With the porous fibre swab tip facing down, shake twice and squeeze gently until the yellow liquid comes to the tip of the swab-the swab is now activated for testing.
- **Rub:** While squeezing gently, run the swab on the test area for 30 seconds.

#### Results:

- If the swab tip and/or test surface, turn pink or red the test is positive, indicating that a hazardous level of lead is present.
- If the swab or test area shows no pink or red colour change, the test is negative. To confirm that the swab was activated correctly, use a test confirmation card located in the kit. If this turns red you have confirmed a negative test result. All negative test results must be followed by analysis either by an XRF or bulk paint sampling to confirm no trace levels of lead are present in the surface.

\*Note: The painted/coated surface must be cleaned and all dust must be removed from the area being tested. Also, all layers of paints/coatings must be exposed for testing. This can be done by using a scraper to cut a small notch to expose all layers.

#### Bulk Paint Sampling:

A paint sample collected should be approximately 2.5cm x 2.5cm in area. To ensure all paints or coatings are collected for analysis, all layers of paint or coatings need to be collected, including the original surface. This method can be performed by anyone who has been trained.

All paint chip samples shall be sent to an accredited lab for analysis. Ensure this sampling technique is performed early as it may take weeks for results to be returned.

---

**X-Ray Fluorescence (XRF) Analyzers: Niton XL2-XRF:**



On site Niton XL2-XRF analyzers are available as the preferred lead screening device. They are able to detect the presence of lead in surface paints/coatings on a detect/non-detect basis, analyzing the amount of paint in the surface in  $\mu\text{g}/\text{cm}^2$  and  $\text{mg}/\text{cm}^2$ . These analyzers are easy to use and can perform multiple analysis in seconds.

Use of these instruments is regulated by Natural Resources Canada and requires a licence and training to operate.

**Procedure for XRF Testing**

The minimum number of surfaces that will best tested is determined by the size of the equipment being tested, as follows:

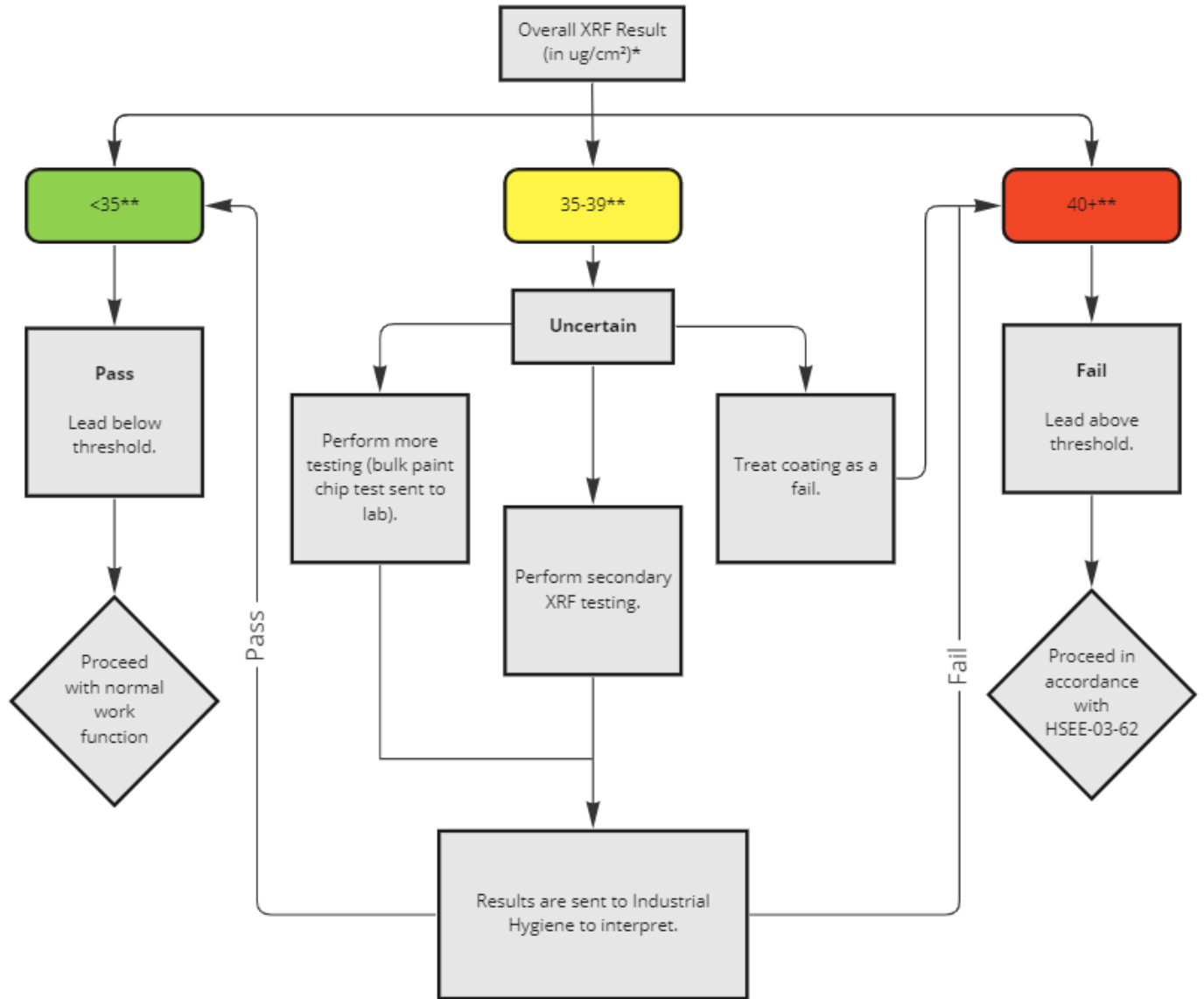
**Figure 6- Minimum number of spots to be tested with XRF by surface size**

| <b>Surface Size</b> | <b>Min. # of tests per coating</b> |
|---------------------|------------------------------------|
| <10 sq/ft           | 2                                  |
| 10-100 sq/ft        | 3                                  |
| 100-1000 sq/ft      | 5                                  |
| >1000 sq/ft         | 7                                  |

---



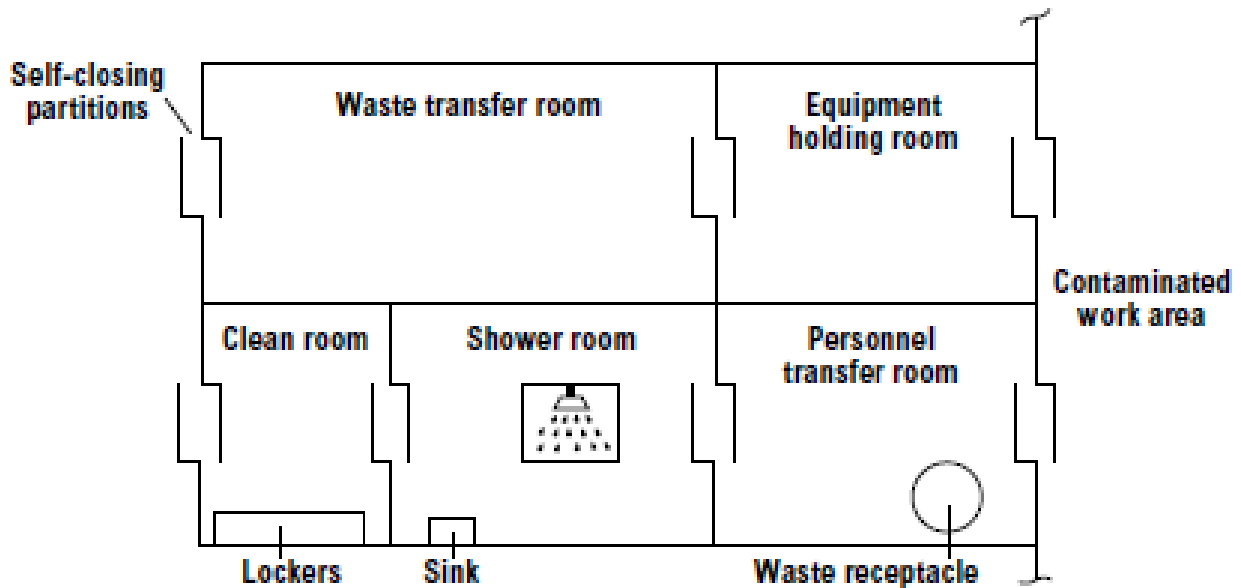
Appendix E - Interpreting the overall results of the XRF



\*Results for XRF are in  $\mu\text{g}/\text{cm}^2$ . Therefore as the limit for lead content in paint is  $0.04\text{mg}/\text{cm}^2$ , this is equivalent to  $40\mu\text{g}/\text{cm}^2$  reading on the XRF. All values above this threshold are considered lead containing.

\*\*Result values= XRF reading + deviation

Appendix F – Example of a Decontamination Facility



*A full enclosure containment facility consists of a shower room and a series of connected rooms separated by air locks. The configuration may be altered depending on the size and shape or configuration of the work area.*

**Appendix G – Lead Containing Paint Legislation**

- Lead-containing paints can contain lead by weight anywhere from 0.009% to 50%. The content in paints is regulated federally by the government.
  - In 1976 federal legislation limited the amount of lead in paints that were to be used for indoor use to 0.5% (5000ppm). However, paint that was to be used for exterior and industrial applications could contain higher lead concentrations.
  - In 2005 federal legislation limited the amount of lead in paints for all uses to 0.06% (600ppm).
  - In 2009, the Canada Consumer Product Safety Act (CCPSA), Surface Coating Materials Regulations (SCMR) was adopted, which states that “for surface coating materials, the concentration of lead may not exceed 0.009% (90ppm or 90mg/kg)”.
  - The SCMR does not apply to dry product (i.e. paint) that has already been applied to a surface. Therefore, equipment that is imported into Canada that exceeds this standard, does not require labeling.
-

## Appendix H – Lead Work Operations

The following outline various work practices that can be performed for lead application and removal at NB Power. The level of lead risk associated with each form of work is also outlined. A list of controls for each level of risk activity can be found in Figure 4 under Appendix D.

### **Chemical Removal**

Chemical removal of paints or coatings is performed by applying solvent- or caustic-based strippers to the surface with a hand or spray gun. After the manufacturer recommended wait period, the coatings can be removed using a scraper, vacuum system, or pressurized water. Coatings must be stripped 4” on either side of all hot work locations. Using this technique has a potential to release chemical vapours as well as lead, review the SDS and use appropriate chemical protective equipment. This removal technique is classified as a **low-risk** work activity.

### **Cold-Cutting**

Cold-cutting refers to methods of cutting where no spark or flame is produced. Cold-cutting is classified as a **low-moderate risk** work activity. Similar to welding, grinding and torch cutting (see below),

### **Dry Abrasive Blast Cleaning and Vacuum Blast Cleaning**

These techniques are forms of paint/coating removal, whereby a medium, such as crushed glass or sand, is blasted onto the surface to remove the paint or coating. This form of removal is classified as a **high-risk** work activity.

### **Dry-Ice Blasting**

Dry-ice blasting is a paint/coating removal whereby dry-ice pellets are directed through a blast hose and nozzle at a high velocity to remove the surface material. These dry-ice pellets consist of frozen carbon dioxide. This form of removal is also classified as a **high-risk** work activity.

### **Heat guns**

Heat guns are also utilized for removal of paints/coatings. Heat guns use a stream of hot air to separate the surface material from the substrate. The surface material is then scraped off, which can generate lead particles. Heat guns that operate at temperatures >370°C (700°F) can generate lead fume. Therefore, this technique of paint/coating removal is classified as a **moderate-high-risk** activity.

### **High-pressure water jetting**

High-pressure water jetting is a form of paint/coating removal in which a pressure pump is used to direct water through a lance-and-nozzle assembly. This form of surface removal does not generate much dust and is most effective at removing loose paints or coatings. This technique is not recommended for tight paint/coating surfaces. This form of removal is classified as a **moderate-high risk** work activity.

---

**Appendix I - Lead Clearance Sampling**

Industrial Hygienist will perform clearance sampling, as needed, inside occupied spaces. The recommended lead clearance criteria for surfaces in occupied work spaces are as follows:

| <b>Occupied spaces</b>      | <b>Floor</b>         | <b>Sill/Ledge</b>     |
|-----------------------------|----------------------|-----------------------|
| Offices, Laboratories, etc. | 2.2mg/m <sup>2</sup> | 5.3mg/m <sup>2</sup>  |
| Eating areas                | 0.4mg/m <sup>2</sup> | 0.43mg/m <sup>2</sup> |