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## APPENDIX L LEAD PAINT ANALYSIS PROTOCOL<sup>1</sup>

A portable X-ray fluorescence (XRF) analyzer (Niton XLp 700) will be utilized to analyze up to ten (10) locations in and around the home for the presence of lead paint. Areas with frayed or chipping paint and areas where children spend significant amounts of time will be tested for the presence of lead paint.

### Safety Check

To check for damage of unit (e.g., dropped in transport), check whether the “shock-sensor” is red. Check to confirm whether the temperature of the unit is within normal range (~ -25°C). If lower (e.g., -800°C) this is an indicator of internal damage to the unit. The “vcool” voltage reading should be approximately 1500.

### Calibration of Unit

Prior to paint analysis, auto and manual calibrations should be conducted at each household.

- Auto-calibration:
  - This function is found in the utilities menu and takes approximately 2 minutes to complete.
  - If the unit does not calibrate successfully, this may indicate that screen of the unit is dirty. Clean the screen with a wipe or q-tip.
    - If the XRF does not calibrate successfully, push the Reset Button on the bottom of the instrument and recalibrate; contact Pine Environmental or the Niton Service Department if does not calibrate successfully in 3 attempts.
- Manual calibration of XRF: A Standard Reference Material (SRM) sheet is provided in rental package.
  - Testing using SRM should be conducted after the instrument finishes auto-calibration.
    - Using SRM 2573 (1.04 +/- 0.06 mg/cm<sup>2</sup>), three (3) duplicate measurements should be taken. XRF should display a value between 0.8 and 1.2 mg/cm<sup>2</sup> and should have a depth index indicative of surface lead.

### Set-up

- Before XFR use, confirm that date/time settings are correct and baud rate set at 38,400.
- Conduct analysis for the presence of lead paint using the K & L Mode.
- Confirm that the default “Action Level” for unit is 1.0 mg/cm<sup>2</sup>.

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<sup>1</sup> Methodology adapted from Health Canada study *Canadian Study of the Impact of Drinking Water Lead Levels on the Exposure of Young Children to Lead*.

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### Identification of Rooms to be Tested

- Confirm with the parents/guardians of child participants in which room the child spends most of her/his time.
- Identify rooms to evaluate, in function of their utilization by the child or by the deterioration degree of the paint. As a minimum, the following rooms are to be included for each household:
  - Child's bedroom
  - Kitchen
  - Room frequently used by the family (family room, play room)
- Identify the component that will be analyzed by the XRF.
- The components to evaluate in a child's bedroom (if painted) include:
  - Walls
    - If it is the same colour on each wall, choose 2 different walls
    - If the walls have different colours, choose 2 different walls with 2 different colours
  - Window's edge
  - Door
  - Ceiling (only if deteriorated)
  - Floor (if painted)
- Walls are to be evaluated in a kitchen, family room, bedroom, or any other room frequently used by the child. Additional components may be identified as a potential concern due to frayed or chipping paint.
- For the components where the paint is deteriorated (inside or outside), do not take the measure straight on the chipped paint. Analyze a surface less deteriorated close to the deteriorated area.
- Record the following information within a field notebook or sampling sheets:
  - Location of the room (inside or outside)
  - The room
  - The component; what was analyzed in the room (wall, door, window, ceiling or floor).
  - The condition of the paint on the analyzed area (good, slightly chipped or very chipped).
  - The painted substrate (wood, plaster, dry wood or other).
- Document the following within a field notebook or sampling sheets:
  - The measure number;
  - The value of the measure; and,
  - The margin of error.

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### Additional Notes

- Readings:
  - In Standard Paint Mode + Spectra, the instrument will measure the paint sample only until a 95% confident reading of "**Positive**" (greater-than-or-equal-to) or "**Negative**" (less-than) versus the action-level. If a test is terminated before a "Positive" or "Negative" determination is attained by the instrument, it will display a "**Null**" test result.
  - Three readings will be provided: (i) L-shell reading (displayed as L); the K-shell reading (displayed as K), and the combined reading (displayed as Pb). The Pb reading the relevant value.
- Depth Index:
  - The Depth Index (DI) is a numerical indication of the amount of non-lead paint covering the lead detected by the instrument.
  - According to XRF Operating Manual:  $DI < 1.5$ , Pb very near the surface layer of paint;  $1.5 > DI < 4.0$ , moderately covered Pb;  $DI > 4$  indicates deeply buried Pb.
- Sampling on Curved Surfaces (information from Operating Manual):
  - The Niton XRF can measure accurately many curved surfaces. Position the instrument so that its window is flat on the surface. The rest of the instrument doesn't have to lie flat. \*The window of the instrument must be flat against the paint surface or it cannot read properly.
  - On very highly curved surfaces (such as quarter-round moldings or balusters) the XRF will tend to underestimate the amount of lead present. On very highly curved surfaces, your XRF can only be used to positively identify high concentrations of lead.

### Safety Considerations

- For the purposes of the study, Niton XRF analyzers will be operated by only those study team members that have been trained in radiation safety through the Radiation Safety Institute of Canada, or those under the direct supervision of a trained team member, so as to ensure the safe use of the device and adherence to the ALARA (As Low As Reasonably Achievable) principle.
- Niton XRF analyzers are designed so that there is virtually no measurable radiation external to any part of the instrument when the shutter is closed. The analyzers are designed so you cannot accidentally open the shutter or leave it open accidentally when you lift the instrument from a surface. The XRF analyzer's shutter will be open only during a test.
- When XRF analyzers are used according to instructions, there is minimal radiation exposure even with the shutter open. The analyzers contain sealed Cd109 radioactive sources. The source is designed to remain secure even under extreme conditions, so that even if the instrument is broken, crushed or burned, there will be no leakage of radioactive material.

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- The Niton XRF analyzers to be used in the study have been subject to leak testing according to the test frequency required by the Canadian Nuclear Safety Commission. Leak test certificates are available.

#### References

Niton XRF Operating Manual: <http://www.thetowntalk.com/assets/pdf/DK106384421.PDF>

US Department of Housing and Urban Development (HUD). HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing. Available at: [http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/healthy\\_homes/lbp/hudguidelines](http://portal.hud.gov/hudportal/HUD?src=/program_offices/healthy_homes/lbp/hudguidelines)