**Preferred Operating Procedures**

**Residential Soil Assessment**

1. SCOPE

Soil assessment is available to residents of Trail and Rivervale to identify soils with elevated levels of metals that may be present on residential properties. The soil assessment program area is shown in Drawing 1.

1. OBJECTIVES (or goals, SMART, targets, What are the end results you hope to achieve?)

The goal of the program is to prevent and reduce health risks from exposure to metals that may be present in yard and garden soil. Each year, the program strives to sample all properties where young children (less than 3 years of age) or expectant families are living, sample all vegetable gardens as requested by property owners and sample at least one residential block in a presumed “hot spot” area. The soil assessment program provides information to residents on areas of potential concern on their individual properties. Soil assessment also helps develop the ‘big picture’ of soil metals levels in Trail for Teck and the Trail Area Health and Environment Committee.

1. ELIGIBILITY AND PRIORITIES

All residents in Trail and Rivervale may request soil assessment in their garden and/or yard. Priorities for yard soil assessment are properties with expectant families, families with children age 3 and under, and children who have measured blood lead levels above the Family Health case management threshold levels. Vegetable garden assessment and block program assessment are next priorities. Yard soil assessment on properties that do not have children are a low priority but are considered on a case by case basis depending on the location of the property (i.e. proximity to other properties with known higher metals concentrations) and available resources (i.e. staff availability and budget).

Gardens are often prioritized in the spring and fall prior to and after the growing season.

Case Management properties are top priority following the fall blood lead clinic so that, if necessary, yard improvement work can be arranged as early as possible in the spring.

Soil assessment of residential properties outside of the “program area” is considered on a case by case basis in consultation with Teck. Certain cases such as horse pastures have been of interest in the past and may be sampled for purposes of a “study”. Soil assessment completed outside of the Trail area has shown that it would be unlikely to find elevated metals levels that would require residential soil remediation.

1. ROLES AND RESPONSIBILITIES
   1. THEP – Home and Garden Team; completes the soil assessment work including: contacting property owners, scheduling assessment work, collecting samples, managing data, preparing reports. Within the home and garden team there is a soil assessment team; to arrange and collect soil samples, administrative support; to handle paperwork and filing, project manager; to review and report the assessment findings and prioritize remediation and yard improvement work (see Soil Remediation POP).
   2. Teck; annually approves the scope of the assessment program and financially supports the Home and Garden team to complete the work. Teck also approves special sampling programs as they arise.
   3. Property Owner; signs consent to access the property for soil sampling and receives the letter with the results.
   4. Residents; allow access to the property during sampling. This includes, tying up dogs, unlocking gates and ensuring the property is safe to complete the sampling.
   5. Contractor; has no responsibilities for soil assessment work.
2. HEALTH AND SAFETY

Prior to completing soil assessment work a Health and Safety Plan to identify potential risks is prepared. The main hazards with soil assessment is traffic (driving to and from the property), lead exposure safety and X-Ray Fluorescence safety. The Health and Safety Plan is documented in the POP for Health and Safety.

Personal Protective Equipment for soil assessment includes non-slip footware, nitrile gloves, high-vis vest, safety glasses.

1. MATERIALS AND EQUIPMENT REQUIRED
   1. Forms and Templates
      1. Consent to Access Property
      2. Property Condition Checklist
      3. Sample Soil Log
      4. Sample Results Letter
   2. Educational materials
      1. Greening Your Garden Brochure
      2. Gardening in Lead and Arsenic Contaminated Soils
   3. Equipment
      1. Camera
      2. Soil Auger
      3. Clean Soil Poly (Ziploc) bags and jars
      4. Nitrile gloves
      5. Spray bottle filled with DI water
      6. Wipes
      7. X-Ray Fluorescence Analyzer
   4. Supporting Materials – None applicable to the soil assessment program
2. PROCEDURE
   1. **Consent to Access the Property**: The Soil Assessment Program (yard and garden sampling) are voluntary and require signed consent from the Property Owner prior to collecting samples.
      * + FYI: Obtaining signed consent requires contacting and having the property owner sign consent by either emailing or faxing in the consent form or coming in to the Program Office to sign. Consent may be signed at the time the soil assessment work is completed if the property owner will meet the soil assessment team at the property.
   2. **Site Reconnaissance**: The first step in assessing a yard is completing a property inspection to identify key areas of interest such as problem areas. Take photos of the property and determine where to best collect soil samples. Talk to the property owner or resident, if available, and find out more about the property. Make a drawing of the property and label with the sample locations. Fill out of the Property Condition Checklist.
   3. **Sample Collection**: Surface soil samples are collected across the yard and/or garden to a depth of 15 cm.
      * + FYI: 15 cm sample depth is meant to avoid having to perform utility locates prior to sampling. This often provides the best representation of metals levels since metals are present due to aerial deposition. If deeper sampling is required, utility locates are initiated.
      1. **Yard Soil Samples**: Using a hand auger, discrete samples are collected from yard areas. Ten samples are collected from across the yard to evenly distribute samples across the entire property (i.e. in a loose grid pattern). If available, an additional 2 samples may be collected from bare areas or other areas of interest (i.e. drip lines, play areas, parking areas, etc.) that are not part of the loose grid.
         * FYI: Additional samples are collected to highlight an area of interest without affecting the UCLM calculation for the yard. Sometimes special areas of interest will be remediated separately from the rest of the yard, if warranted.
      2. **Garden Soil Samples**: Using a small spade or shovel, a composite sample is collected from vegetable and flower garden areas. The composite sample is made up of 10 locations (aliquots) from across the garden. The sample is collected to a depth of 15 cm.
   4. **XRF Soil Screening**: Samples collected on the property are screened for metals using an X-Ray Fluorescence Analyzer (XRF). Certification and training is required by all employees prior to using the XRF. The operation of the XRF including safety features is provided in the OP – XRF Operation. Samples are screened in the CPO and connected directly to the computer to download the data. The soil bag is mixed well and each sample is screened directly through the PVC bag. Samples are screened separately and recorded on the soil log. Details: Studies completed on sample preparation prior to XRF soil screening show that for the purposes of this program it is not necessary to dry and sieve the soil and it may be screened directly through the soil bag. This also avoids unnecessary exposure to the soil by Home and Garden soil sampling team.
   5. **Laboratory analysis**: Two or three samples are selected for laboratory analysis. Generally the maximum and median samples from the yard and a sample from a vegetable garden are submitted. Samples are placed into lab supplied clean glass jar. Samples are named using standard naming:

SSYY-PID-SAMPLE NUMBER-YYMMDD

SS=surface soil

YY=year

PID= property identification

Sample number=01-10 for yards, FG1 for flower gardens, VG1 for vegetable gardens

Date= in format Year Month Day YYMMDD

A COC is filled out for the property and samples are shipped to a pre-approved laboratory for analysis of metals using BC SALM.

* 1. **Data interpretation:** Once laboratory results have been received from the lab they are uploaded to THE Database. The lab results are correlated to the XRF screening readings and are corrected. Using pro-ucl software the UCLM for the property is calculated. The results of the UCLM are uploaded to the Database.
  2. **Data Management:** Information and data collected from the property, including XRF and laboratory results are recorded in the THE DataBase. Information on THE DataBase is included in OP – Data Management
  3. **Reporting:** Letters are sent to each Property Owner with the findings of the soil assessment work and whether or not the property qualifies for remediation. A summary report including all the assessment properties and results is provided to Teck at the end of the sampling year.
  4. **QA/QC:**
     1. Blind Duplicate sampling: Split one of every 10 samples into two and submit under an alias name.
     2. Garden Uncertainty sampling: Collect a second and third composite sample from different spots within a garden from 10 vegetable gardens throughout the sampling season. This shows that garden composite sampling represents the garden as a relatively homogeneous soil.
     3. Laboratory report review: Review of laboratory errors to ensure all lab procedures were completed correctly.

1. MONITORING, EVALUATING AND CONTINOUS IMPROVEMENT

QAQC plays an important role in determining success of the sampling but other important measures to evaluate the program are; the number of properties requested and the number sampled, the number of properties identified and the number of property owners interested in participating, and reporting to the THEC the results of the assessment year and any unique needs in the community.

Workshop of what we did for the year

* Reporting to the community of how we did

1. REFERENCES