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DRAFT FINAL

REGION VIII SUPERFUND PROGRAM RESIDENTIAL SOIL LEAD SAMPLING GUIDANCE DOCUMENT

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1.0 Introduction

This document was prepared to assist all U.S. Environmental Protection Agency (EPA) Region VIII personnel, State personnel, and contractor/subcontractor personnel who conduct Superfund related residential soil lead sampling for or on behalf of EPA Region VIII. This document presents guidelines for collecting surface and subsurface soil samples. These guidelines call for utilizing a Removal and Remedial Program team approach. The successful implementation of this team approach will increase the likelihood of efficiently collecting appropriate and useful data, and reduce repeat sampling, thereby saving costs and staff time.

This document is not intended to replace other guidance documents relating to Program specific activities, SOPs, QAPPs, etc., but stresses a team approach when dealing with a newly discovered, NPL-caliber site. For all other sites that require further study past the screening stage, this policy defines the Region VIII standard sampling procedures and sample management practices for residential soil lead sites. Site by site deviations from this guidance document may be appropriate on a case by case basis if the reasons for the deviations are adequately documented.

This document has significant resource issues associated with it. The Removal Program, with limited resources, is often the lead program that will implement this policy. At sites requiring collection of more than 1000 samples, the standard sampling procedures and sample management practices may need to be modified to reflect resource issues, and a phased sampling approach may be warranted.

2.0 Primary Sampling goal

Define the nature and extent of contamination and determine where elevated concentrations of lead are present at levels posing an unacceptable risk to humans in a legally defensible, documentable, and consistent manner.

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2.1 Sample collection goals at residential lead sites

Sample collection goals at residential lead sites include:

1) Collecting analytical data meeting the endangerment-based needs of the Removal Program and facilitating subsequent response actions addressing the chronic risk based needs of the Remedial Program. Samples that might be collected can include but are not limited to:

screening samples;
risk assessment samples;
Removal evaluation samples;
PA/SI and/or HRS samples;
disposal samples; and
RI/FS samples.

2) Minimizing the number of sampling events at a given location, thus reducing or eliminating duplicative effort to the extent practicable and minimizing the impact on property owners.

Both programs need to collect sufficient data to support potential decisions and needs of the programs. Critical Removal Program needs include: 1) "mass distribution," determining the nature and extent of contamination, 2) screening a large number of properties quickly, 3) considering only high risk sites, and 4) "construction and design", minimizing cleanup costs and removing a limited amount of impacted soil. Remedial Program data collection activities focus on: 1) considering sites with varying risk levels, 2) gathering chronic exposure data for health based risk assessments, 3) attributing contamination to a source or generator and, similarly to the Removal Program, 4) determining the nature and extent of contamination.

A team approach enables data users and technical experts to specify, prior to data collection, their particular needs and participate in data collection planning. At a minimum, a site team shall consist of an OSC, RPM, and an EPA Regional Toxicologist. The site team will identify each programs' objectives, provide consistency within the Region over time at residential lead sites, minimize costs, and eliminate resampling and rework. Coordination between the programs will also occur during the Response Analysis Process (RAP).

3.0 Preparing For Field Sampling Activities

3.1 Problem Definition

Specify the site problem (situation) in general terms and state the preliminary risk management goals. For example, define the boundaries of surficial soil lead concentrations above 400 ppm and above 2000 ppm on an exposure unit basis.

3.2 Develop a Site Conceptual Model

One of the primary objectives or end uses of residential lead sampling data involves determining whether unacceptable risk exists to human receptors at a site. To design a sampling plan that accomplishes this objective, the team must first develop a site conceptual model. This model must show a source or the presence of site contamination, how it moves in the environment, and how humans come into contact with contaminated media. It generally answers the following questions:

1) Who is being exposed?

2) Where are they being exposed? and

3) How are they being exposed?

The Region 8 Superfund Technical Guidance RA-05 provides detailed guidance on how to develop such a model. The RPM, in conjunction with the Toxicologist will produce this Remedial Program document, and provide the OSC with an opportunity to review a draft. However, the development of the Project Plan (see below) will occur simultaneously and may in some high profile cases actually be finished first.

3.3 Develop Project Plans

Study objectives must be specified before designing a sampling program. Those objectives include specifying the desired number of samples collected and their quality, e.g., field screening methods (i.e., XRF) or analytical data from a laboratory.

The lead Program will utilize appropriate quality assurance and quality control guidance documents, (QA/R-5 [EPA Guidance for Quality Assurance Project Plans], QA/G4 [Guidance for the Data Quality Objectives Process], ERB Quality Assurance Project Plan, OSWER Directive 9285.7-09A [Guidance for Data Useability in Risk Assessment (Part A)], ...) and one of the flow charts attached to this document.

Typically for a Removal Program-lead sampling effort, the OSC will produce a draft Project Plan (or Sampling and Analysis Plan) and provide the RPM and Toxicologist with a copy for review. Comments will be provided by the RPM and Toxicologist within one to two weeks. The OSC will revise the document to incorporate all substantial comments, and the team may meet at that time to discuss the final draft, if necessary.

In accordance with the development of data quality objectives (DQOs) as presented in EPA QA/R-5 the team will accomplish the following:

- Clarify the study objectives;

- Define the most appropriate type of data to collect;

- Determine the most appropriate conditions under which to collect the data;

- Define the precision, accuracy, representativeness, completeness, and comparability of the data required for the project;

- Specify the acceptable level of decision errors that will be used as the basis for establishing the quantity and quality of data needed; and

- Develop project schedules including time tables for reviewing and commenting on project plans.

As a starting point, teams should consider a radial progression sampling strategy at residential lead sites, but only if the source of the lead is known or suspected. From the area of the suspected source, begin sampling outward in concentric circles until the soil concentrations drop below the agreed-upon lead screening level. This method creates an isobar at the agreed upon lead screening level around the known/suspected "hotspot".

An OSC /RPM has the discretion to add samples based upon site specific conditions. However she/he shall notify the team to significantly reduce the number of samples collected during the sampling activity.

4.0 Sampling

4.1 Definitions

- "Surface" is zero to two inches (0 to 2") below the vegetative layer;

- Depth sampling intervals can be: 2 to 6 inches, 6 to 12 inches, and 12 to 18 inches (if site specific conditions dictate). Depth samples can also be tailored to meet other data needs, such as a 12" to 14" sample to simulate the new "surface" after removal of contaminated soil, a composite disposal sample from all removal depths, etc.;

- An "exposure unit" is the property immediately surrounding a residential unit, regardless of the size of the property. For sampling purposes, exposure units can be broken up into "zones";

- "Zones" are a further division of an exposure unit. Zones effectively break up exposure units into smaller, more manageable portions of property.

- A discrete sample is comprised of material collected by a single operation of a sampling device from a single medium from a single location.

- A composite sample is prepared by combining several discrete samples of a single medium collected from different locations.

- RPD (Relative Percent Differences) is the difference between two numbers divided by the average of the same two numbers.

  For example:

  Concentration values of 100 ppm and 50 ppm produce an RPD of 66%

$$\frac{(100-50)}{(100+50)/2} * 100 = 66.6\%$$

4.2 Sampling Procedures

- Number of samples taken and sample locations shall be based upon the likeliness of children living on the property now and in the future.

- Composite surface soil samples, zero to two inches, below vegetative layer.

- **Standard city lots** with dimensions such as 40' x 150', 50' x 100', 25' x 75' but no larger than 100' x 150' can be sampled as one zone, realizing that for larger lots more samples may need to be collected for adequate characterization. A **minimum** of two surface composite soil samples comprised of 3 to 5 subsamples should be collected per zone, and a RPD calculation may be performed. A RPD value of 50% or less suggests an acceptable concentration variance within a zone. A RPD value greater than 50%, suggests that it may be necessary to reevaluate the property.

- **For non-standard city lots,** areas immediately around houses should be considered as a zone. Each property should dictate the number and sizes of other zones, which might be dependent on buildings, fences, natural boundaries, irrigation ditches, and land use.

- **Subsurface Soil Samples**

  - Discrete subsurface sample locations shall be selected by the OSC or RPM. The following types of samples might be considered depending on the particular data needs as defined by the OSC or RPM:

    Composite: 2-6", 6-12", 12-18", 2-12", 2-18", etc.;
    Composite disposal sample (multiple aliquots from all removal depths/areas);
    Discrete sample from a particular depth: 6-8", 12-14", etc.

  - The number of subsurface samples will be determined on a site by site basis, and will be selected based on the data needs as defined by the OSC or RPM. For sites comprised of numerous residential yards, a small subset of yards may be selected for subsurface sampling.

4.3 Sample Management

- Risk assessment samples collected from the 0-2 inch soil horizon should be sieved to minus 250 microns (60 mesh screen). Subsurface samples do not need to be sieved. If the site is very large and this requirement is too onerous, then enough samples need to be prepared and analyzed at both total and minus 250 micron size to develop a valid statistical comparison. A valid statistical comparison can typically be made with 20 - 30 site samples; and

- Samples collected during a Removal Program-lead sampling activity should be archived for six months unless another agreement is reached between the OSC and RPM. The RPM will arrange for the storage of archived samples.

5.0 Using Data for Determining Whether to Remediate

5.1 Remedial Program General Clean-up Range

Per OSWER Directive 9355.4-12 [Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities] and the May 29, 1997, memorandum from Steve Luftig, [Lead Site Response Decisions: Formation of the Lead Sites Consultation Group], residential soil clean-up levels for lead will normally be between 400 ppm and 1200 ppm. Clean-up levels outside of this range must be presented to the National Lead Policy group by Regional Management. Specific remediation requirements and the selection of zones to remediate should be dictated by the risk assessment developed for the site in question.

5.2 Removal Program General Clean-up Range

Region VIII Removal action levels for lead-contaminated residential soils are established on a case by case basis.

5.3 Excavation Depth

The National Residential Lead policy will recommend that 12 inches is the maximum excavation depth at lead sites. However, OSCs and RPMs may excavate to 18 inches if site specific conditions dictate, i.e., source removal and garden areas.

6.0 Disputes

Team disputes will be brought to the attention of unit level supervisors for prompt resolution.

REMOVAL PROGRAM-LEAD
RESIDENTIAL LEAD SAMPLING

1. Site information received from Site Screening Group. Does site qualify as a potential NPL site? If yes, proceed below. If no, continue on usual Program path.

2. Management decides which programs need to be involved and who has the lead. If Removal Program has the lead, see below. If Remedial Program has the lead, see Remedial Program-Lead flow chart.

3. Assemble site team (OSC, RPM, TOX, SAM). OSC prepares draft Sampling Plan to address the following:

Identify objectives of sampling (nature and extent, risk assessment, HRS package, etc.);
Determine requirements to meet objectives (types and number of samples);
Determine general sampling strategy (radial, phased, drainage pattern based, etc.);
Determine likely hand-off of site from Removal to Remedial and potential action level;
Project schedule;
Determine general sampling protocol for yards (zones, sample density, depths, etc.); and
Determine analytical requirements (XRF confirmation, sieving, archiving, etc.).

4. RPM/TOX/SAM review draft Sampling Plan, provide comments, OSC incorporates comments, team meets as necessary. Final Sampling Plan produced and distributed.

5. Sample.