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Urban Soil Lead Abatement Demonstration Project

Volume II. Part 2
Boston Report

NOTICE

This document is a preliminary draft. It has not been formally released by EPA and should not at this stage be construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

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APPENDIX A

SAMPLING GUIDELINES

APPENDIX A-1

PRELIMINARY SAMPLING

CATEGORY:	TITLE:	
Field Technical	PRELIMINARY SOIL SAMPLING PROTOCOL LEAD FREE KIDS DEMONSTRATION PROJECT	No. FT 7-15 Date: 3/90

Revision: 0

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Prepared By:	Approved By:	Reviewed By:

1.0 PURPOSE

The purpose of this guideline is to describe specific elements of the preliminary phase of soil sampling for the Lead Free Kids Demonstration Project, Boston, Massachusetts. This guideline was developed for use by field sampling teams to assure that soil sampling and associated activities are consistent throughout the project to meet data quality objectives for qualifying properties for participation in the project.

2.0 SCOPE

The specific elements described in this guideline are applicable to soil sampling and associated activities to include:

- site description documentation;
- schemes for locating sampling points;
- sample collection;
- sample handling and storage; and
- recordkeeping and sample custody.

3.0 DEFINITION

None

4.0 RESPONSIBILITIES

Task Leader - The Task Leader is responsible for the collection of soil samples in accordance with all elements of this guideline. The Task Leader will supervise and participate with field personnel to accomplish this task and be responsible for delivery of samples to the EPA laboratory.

5.0 GUIDELINE

5.1 Overview

The Soil Lead Abatement Demonstration Project involves sampling and analysis and soil removal and restoration of approximately 150 lead contaminated properties in the City of Boston.

Three soil sampling events are associated with the Project; Preliminary, Detailed, and Post Abatement. Preliminary soil sampling phase presented herein will be conducted to determine eligibility of properties for participation in the project. The property will be eligible if two or more soil sample results are equal to or greater than 1500 parts per million lead.

Typically three to four composited surface samples will be collected within two meters of the house; one from each side where soil is present; one composited surface sample will also be taken from any obvious play areas. Sketches of the properties showing key landmarks and sample locations will be made. Samples will be analyzed by x-ray fluoresces at the EPA Region I laboratory.

5.2 Sampling Procedures

5.2.1 General

The quality of sample collection is assured by adhering to sampling procedures. All soil sample collection will be limited to composite surface from 0 to 2 cm. A five-point composite depicted in Figure 6-1 is the technique for all composite soil samples. No preservatives will be required for samples. Sample containers will consist of self sealing Ziplock or equivalent) plastic baggies. Field documentation will include a brief site sketch with amplifying information, labeling of sample bags with the appropriate code (provided by LFK), and chain of custody forms. The procedures presented below will ensure that a representative portion of the source is collected and sample integrity is preserved.

5.2.2 Preliminary Soil Sampling

Site Description and Sampling Locations

For each property, a field sketch shall be made that indicates the boundary of the lot, the position of the main building and any other buildings, such as storage sheds or garages, the position of the sidewalks, driveways, and other paved areas, the position of the play areas, if obvious, and the areas with exposed soils. The property may be divided into separate sub-areas for clarity and detail, if necessary, and be identified with alpha designation i.e., Section "A", Section "B", etc. This may include isolated areas of the

site, such as side or backyards. The resulting sketch(s) will be recorded on separate sheet(s) of paper. Sample locations will be identified on drawing(s) with approximate distance notations from buildings and other landmark structures (see Figure 6-2).

On the detailed sketch, the following information will be included:

- address;
- date and name of artist;
- apparent use of yard, if any (toys, sandbox, children present);
- debris, standing water, vegetation, cover and bare spots, and animals on property; and
- any notable unusual feature.
- Location of sampling points.

5.2.3 Sampling Schemes

The sampling scheme selected for each property must adequately determine eligibility of the property for further abatement activities. It must identify the presence of lead in two or more surface soil samples equal to or greater than 1500 parts per million (ppm). Consequently, selecting the most appropriate sampling scheme is a critical element in site description and should be noted in the drawing. Several sampling schemes are available to the investigator; all or some may be used.

Line Source Pattern

This pattern can be used whenever the source of the lead is thought to be linear, such as along a building foundation, a fencerow, a street, or beside a garage. Draw a line parallel to the source, such as the foundation of the main building within two meters from the foundation.

Small Area Pattern

When the sub-area is less than two square feet in each dimension, a single composited sample may be taken if it appears that such a sample would adequately represent the sub-area.

Targeted Pattern

Select those locations within the sub-area that are likely to reflect potential exposure to lead in soil dust. These may be play areas, paths, drainage collection areas, or areas that are likely to contribute dust to other surfaces that children use. This method may be used alone or with the line source patterns.

From 3 to 4 composite surface soil samples will be collected from each property. Sampling locations will be selected to adequately represent soils present at the site. Further compositing of line source (along the long axis) samples may be required to reduce the total number of samples taken to obtain the desired three to four composites for analytical testing. Small area and targeted pattern samples will not be composited with other line source samples and will be in addition to the 3 or 4 samples submitted for testing.

5.2.4 Equipment List

- plastic sandwich-size sample bags (Zip-lock or equivalent);
- indelible marker (to put sample number on bag);
- cooler or similar container to hold samples;
- measuring tape;
- spoons or spatulas;
- detergent solution;
- wash bowls for decontamination of sampling gear;
- paper towels;
- distilled water;

- plastic trash bags (for disposable items);
- bound logbook, paper and pens; and
- chain-of-custody form.

5.2.5 Sample Collection

Each selected sample point will represent the center of a sampling location. Each sampling location will consist of a two-foot square area from which five surface soil samples will be composited. Samples will be collected as follows:

Collect two tablespoonfuls of soil from each of the four corners and from the middle. Sample depth should be from 0 to 2 cm. Place the composited sample into a plastic bag, seal it, and mark the bag with the sample number. Maximum volume should be about 1/2 bag (1 cup). A composite will be identified as a single sample. A chain of custody is used to record information about the composite.

The sampling device should be clean and free of soil from the previous sampling location, with decontamination between locations. Vegetation and debris can be removed at the point of collection, being careful not to disturb soil or decayed litter.

The surface soil samples should be composited in sealable plastic polyethylene containers (Zip-lock baggies or equivalent) suitable for prevention of cross-contamination and loss of the sample. The sample identification number should be placed on the container (see Figure 7-2), and chain of custody (see Figure 7-1). After each sample composite, the sampling device should be cleaned with distilled water and wiped with a paper towel. Store the composited soil sample at ambient temperature until returned to the NERL.

A field blank should be taken for each sample crew day. This is normally done by taking a sample container with clean quartz sand into the field, opening it to exposure the container for a period of time, representing normal sample procedures, then returning the container to the EPA Region I laboratory in the same manner as other soil

samples. The purpose of the field blank is to detect accidental or incidental contamination during the sampling process.

Duplicate samples should be taken at the frequency of 1 per 20 and collected from the mid-point between regular composite sample cornerpoints (see Figure 6-1). The purpose of the field duplicate is to detect differences in homogeneity of the contaminants in soil and error in sampling techniques.

5.2.6 Sample Handling and Storage

The sample containers should be sealed to prevent loss or cross-contamination of the sample. No special considerations will be given to shipping container labelling as they will be delivered to the EPA Region I laboratory by a member of the LFK Staff. Any storage of shipping containers and/or samples should be in a cool, dry location.

5.2.7 Recordkeeping and Sample Custody

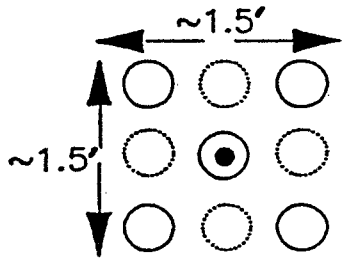
Soil sample records for each property consist of a property diagram with sample location and codes indicated, and chain-of-custody forms.

Samples should be sequentially numbered within each sub-area. Each location diagram and chain-of-custody form should bear all sample numbers and the signature of the person responsible for verifying the quality of the information collected. This signature certifies that there has been no misuse of the sample protocol, no mistake in recording the information, and that the information is sufficient to clearly identify these samples for comparison with other types of samples taken at the same location, such as house dust. These documents also establish the chain of custody required for the for the project.

When the sample is delivered to the laboratory, custody is relinquished by the field investigator or sample courier and received by the laboratory Task Leader or Analyst by signatures on the chain-of-custody form. The original form will remain with the LFK for project files. EPA will keep a copy of the chain-of-custody form.

FIGURE 6-1

5 Point Composite Sample Scheme



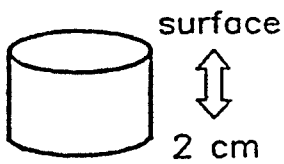
Legend

- Sampling Station
- Sample Composite Location
- Field Duplicate Sample Composite Locations

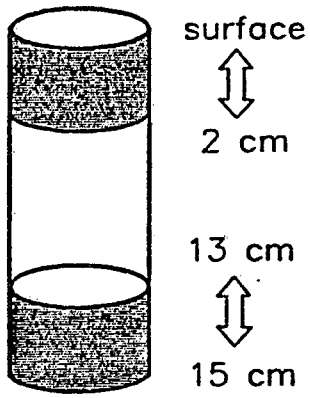
(At selected sampling stations duplicates will be collected at mid-points between sample composite locations.)

A
Preliminary and Post Abatement Phase Surface Sample Composite Location Schematic

B
Detailed Phase Surface and Subsurface Sample Composite Location Schematic



Sample collected from surface to 2cm below surface.



First sample collected from surface to 2 cm below surface.

Second sample collected from 13 cm to 15 cm below surface in same boring location.

FIGURE 6-2
Detailed Site Diagram

Address: _____ **Date:** _____

Name: _____

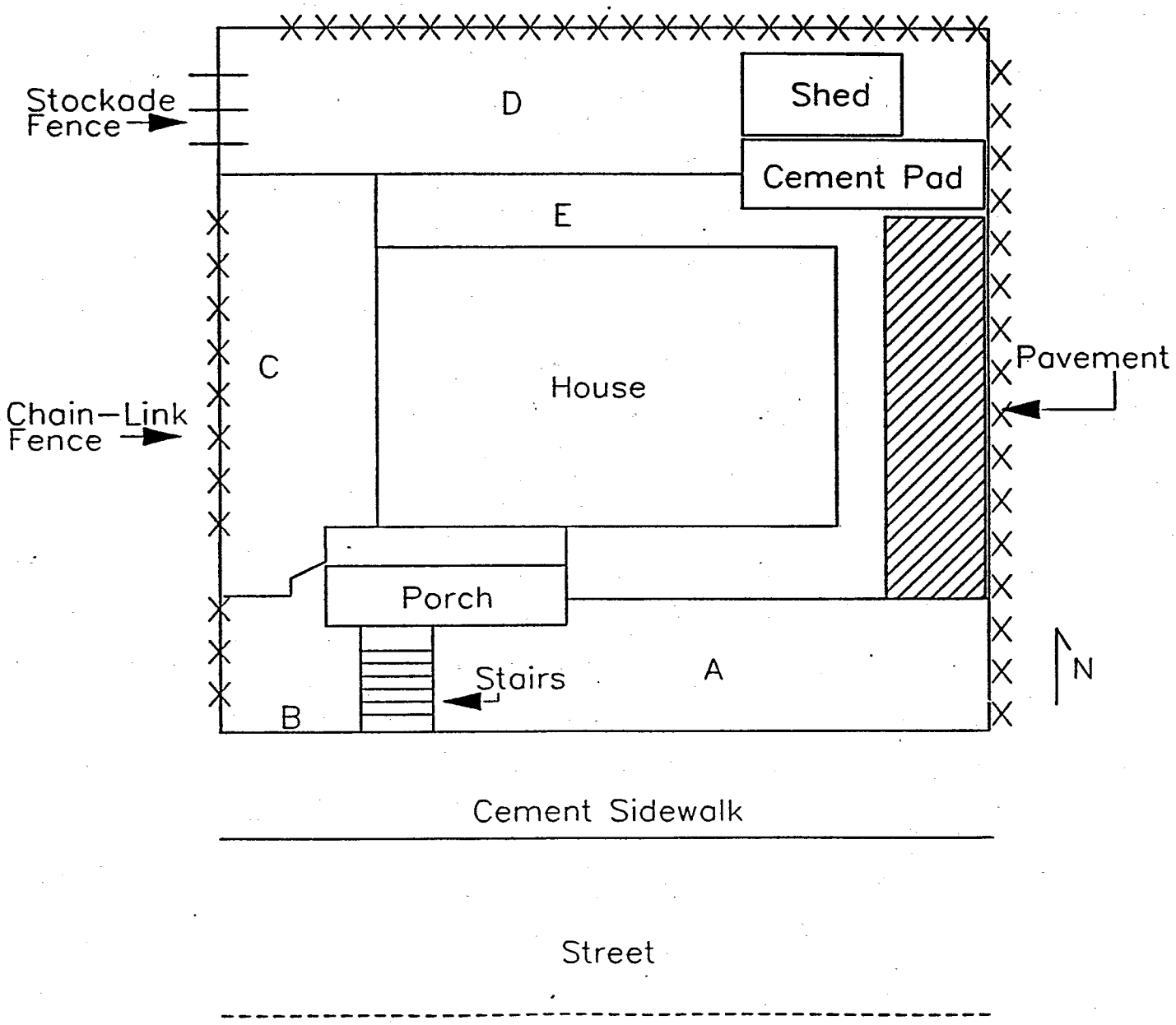


Figure 7-1

- Soil -

Lead-In-Soil Demonstrtation Project

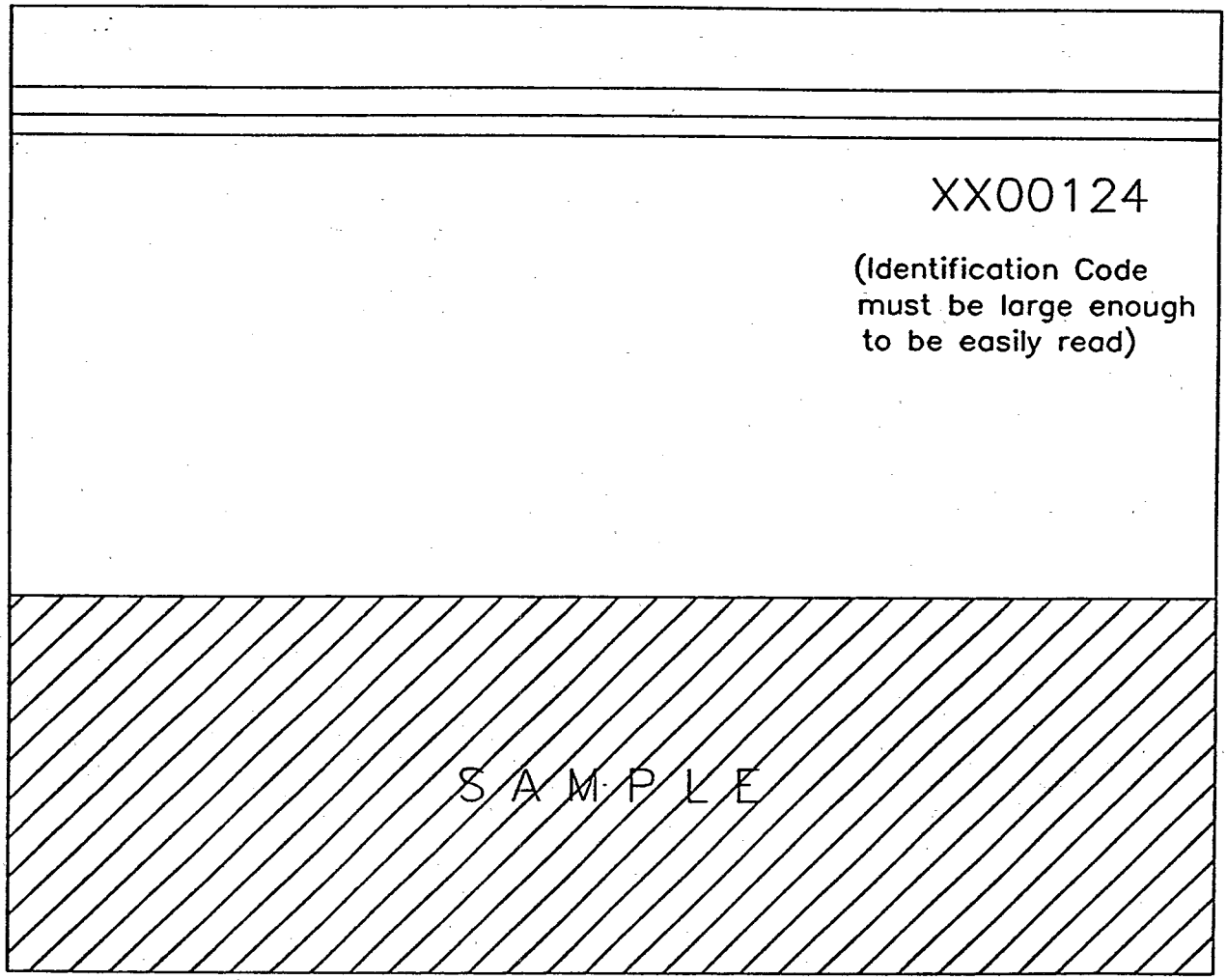
Chain-of-Custody Record

Prem. ID	Samp ID	Address	Dist.	Date Collected	Collected By

Relinquished By	Received By	Date	Time	Comments/Instructions

FIGURE 7–2
Sample Container with Sample Identification Marking

Plastic Ziplock Bag or Equivalent

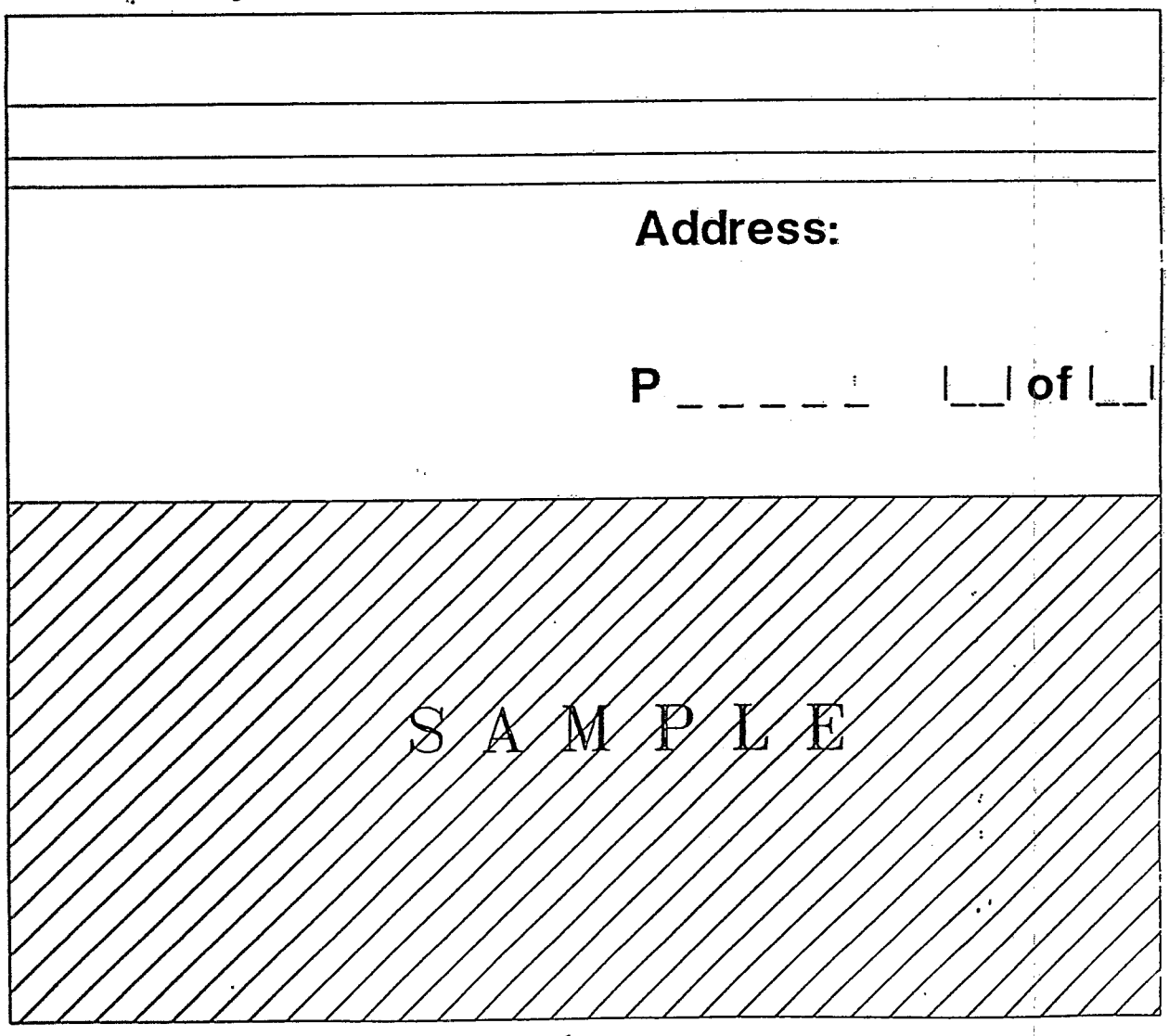


~ To Scale

FIGURE 7-3

Soil
Sample Container with
Sample Label

Plastic Ziplock Bag or Equivalent - Soil



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APPENDIX A-2

DETAILED SAMPLING

CATEGORY:	TITLE:	Detailed Soil Sampling Protocol	
Field		Lead Free Kids	No. FT 7-16
Technical		Demonstration Project	Date: 3/90
			Revision: 0

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6.0 REFERENCES
None

7.0 ATTACHMENTS

Figure 6-1
Figure 6-2
Figure 7-1
Figure 7-23

Prepared By:	Approved By:	Reviewed By:

1.0 PURPOSE

The purpose of this guideline is to describe specific elements of the detailed phase of soil sampling for the Lead Free Kids Demonstration Project, Boston, Massachusetts.

This guideline was developed for use by field sampling teams to assure that soil sampling and associated activities are consistent throughout the project to meet data quality objectives. Adherence to this guideline will assist in defining the extent of lead contamination for soil removal and property restoration activities.

2.0 SCOPE

The specific elements described in this guideline are applicable to soil sampling and associated activities, and include:

- site documentation, updating of preliminary soil sampling site sketches, and other pertinent information;
- schemes for locating sampling points;
- sample collection;
- sample handling and storage; and
- recordkeeping and sample custody.

3.0 DEFINITIONS

None

4.0 RESPONSIBILITIES

Task Leader - The Task Leader is responsible for the collection of soil samples in accordance with all elements of this guideline. The Task Leader will supervise and participate with field personnel to accomplish this task, and be responsible for delivery of samples to the EPA laboratory.

5.0 GUIDELINE

5.1 Overview

The Soil Lead Abatement Demonstration Project involves soil sampling, analysis and soil removal, and restoration of approximately 150 lead contaminated properties in the City of Boston.

Three soil sampling events are associated with the Project; Preliminary, Detailed, and Post Abatement. The detailed soil sampling phase presented herein will be conducted to define the nature and extent of soil lead contamination and obtain additional data from properties qualified as a result of preliminary soil sampling. Information gathered and analytical results will be used by LFK epidemiologists.

Corings will be advanced throughout the property. Soil core samples will be composited from the top, 0 - 2 cm depth and composited from the 13 - 15 cm depth. The sampling schemes used to locate sample locations will vary according to the property layout. Samples will also be collected from any obvious play areas. Samples will be analyzed by x-ray fluorescence at the EPA Region I laboratory.

5.2 Sampling Procedures

5.2.1 General

The quality of sample collection is assured by adhering to sampling procedures. All soil sample collection will be limited to compositing of corings. Separate composites will be made from the 0 - 2 cm fraction and the 13 - 15 cm fraction. A five-point composite depicted in Figure 6-1 is the technique for all composite soil samples. No preservatives will be required for samples. Sample containers will consist of plastic baggies. Field documentation will include locating sampling points on the detailed site sketch developed during the preliminary sampling along with pertinent information, and completion of chain-of-custody forms. The procedures presented below will ensure that a

representative portion of the source is collected and sample integrity is preserved.

5.2.2 Detailed Soil Sampling

Site Description Documentation

During the Detailed Soil Sampling Phase for each location, the project log should briefly describe the sampling locations and sampling schemes used, and include the following information if not provided by investigation:

- address, date, name of artist;
- type of building construction;
- condition of main building;
- condition of lot (debris, standing water, vegetation cover);
- nature of adjacent property;
- presence and type of fence;
- animals on property;
- apparent use of yard (toys, sandbox, children present);
- Location of sampling points; and
- underground utilities.

5.2.3 Sampling Schemes

The sampling scheme for each property must be chosen to adequately define the nature and extent of lead contamination on the property. Several options are offered for the best judgement of the investigator due to the difference in property dimensions and size. The pattern should be selected to fit the property.

Line Source Pattern

Draw a line parallel to the source, such as the foundation of the main building, approximately 0.5 meters (20 inches) from the foundation. Repeat at the property boundary if the subplot is more than three meters (10 feet) wide and add a third parallel line between the first two if the sub-area exceeds five meters (16 feet) in width. Divide each line into segments that do not exceed seven meters (20 feet) in length. Take one composite of 5 cores on each line segment. A sub-area, for example, that is at the side of the main building and measures 12 by 7 meters would have three lines of two segments each. The lines would be parallel and approximately three meters apart. They would be 12 meters long and consist of two 6 meter segments each, making a total of six samples, each being a composite of at five cores divided into a top 2 cm sample and a bottom 2 cm sample.

Targeted Pattern

Select those locations within the sub-area that are likely to reflect potential exposure to lead in soil dust. These may be play areas, paths, drainage collection areas, or areas that are likely to contribute dust to other surfaces that children use. This method may be used alone where grid or line source patterns are not acceptable, or as an overlay on a grid pattern if appropriate. Determine the number of samples to be taken by identifying distinctive land use characteristics (path, swingset, sandbox), and take a composite of 5 cores for each sample.

Small Area Pattern

When the sub-area is less than two meters in each dimension, a single composited sample may be taken if it appears that such a sample would adequately represent the sub-area.

Grid Pattern

Establish a rectangular grid of intersecting lines 2 to 10 meters apart, and sample each rectangular area. For larger areas, randomly select the rectangles to be sampled. In each rectangular area, mark three lines parallel to the longest axis, and composite 5 cores on each line. Since the rectangle should not exceed four meters, there is no need to divide the line into segments. Therefore, each rectangle should have six samples of 5 composites each. Use this pattern when the subarea is generally uniform and there is no reason to suspect large variations in lead concentrations.

5.2.4 Equipment List

- plastic sandwich-size sample bags (Zip-lock or equivalent);
- corer
- indelible marker (to put sample number on bag);

- sample cards (to assign a sample number to each sample);
- cooler or similar container to hold samples;
- measuring tape;
- spoons or spatulas;
- detergent solution;
- wash bowls for decontamination of sampling gear;
- paper towels;
- distilled water;
- plastic trash bags (for disposable items);
- bound logbook, paper and pens; and
- chain-of-custody form.

5.2.5 Sample Collection

The corer should be clean and free of soil particles. Vegetation and debris can be removed at the point of insertion, but do not remove any soils or decayed litter. The corer should be driven into the ground to a depth of at least 10 cm, 15 cm if possible. If the 10 cm depth cannot be reached, the corer should be extracted and cleaned, and another attempt made nearby. If the second attempt does not permit a 10 cm core, the sample should be taken as deep as possible, and the maximum depth of penetration noted on the sample record sheet. Every effort should be made to take all cores of a composited sample at the same depth.

The cores of each plot should be examined for debris, artifacts, and any other evidence of recent soils disturbance. These should be noted on the sub-area description sheet, as should a brief description of the soil color and characteristics.

For each sample location, the top 2 cm segment of each of the cores are composited into one sample, and the 13 to 15 cm segment or the bottom 2 cm segment combined into a second. For the surface segment, debris and leafy vegetation should not be included with the sample. However, no soil or decomposed litter should be removed, as this is the most critical part of the soil sample and is likely to be the highest in lead concentration.

The soil core segments should be composited in sealable plastic bags (Zip-lock baggies or equivalent) suitable for prevention of contamination and loss of the sample. The sample identification number should be placed on the container and the chain-of-custody form. After each sample composite, the corer should be cleaned before reinsertion in the next sampling area. Store the composited soil sample at ambient temperature until returned to the laboratory.

A field blank should be taken for each sample crew day. This is normally done by taking a sample container with clean quartz sand into the field, opening it to expose the container for a period of time representing normal sample procedures, then returning the container to the laboratory in the same manner as other soil samples. The purpose of the field blank is to detect accidental or incidental contamination during the sampling process.

Duplicate samples should be taken at the frequency of 1 per 20 and collected from the mid-point between regular composite sample corner points (see Figure 6-1). The purpose of the field duplicate is to detect differences in homogeneity of the contaminants in soil and error in sampling technique.

5.2.6 Sample Handling and Storage

The sample containers should be sealed to prevent loss or cross-contamination of the sample. No special considerations will be given to shipping container labelling as they will be delivered to the EPA Region I laboratory by a member of the LFK staff. Any storage of shipping containers and/or samples should be in a cool dry location.

5.2.7 Recordkeeping and Sample Custody

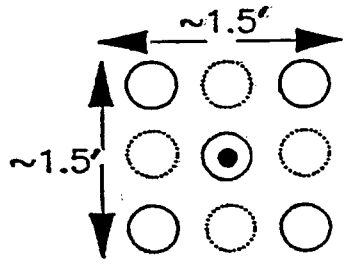
Soil sample records for each property consist of an updated property sketch with sample location and codes indicated, and chain-of-custody forms, (see Figures 6-2, 7-1, and 7-2).

Samples should be sequentially numbered within each sub-area. Each location diagram, and chain of custody should bear all sample numbers and the signature of the person responsible for verifying the quality of the information collected. This signature certifies that there has been no misuse of the sample protocol, no mistake in recording the information, and that the information is sufficient to clearly identify these samples for comparison with other types of samples taken at the same location such as dust. These documents also establish the chain of custody required for the project.

When the sample is delivered to the laboratory, custody is relinquished by the field investigator or sample courier and received by the laboratory Task Leader or Analyst by signatures on the sample record form. Original to remain with the investigator for LFK project files and a copy will be kept for EPA files.

FIGURE 6-1

5 Point Composite Sample Scheme



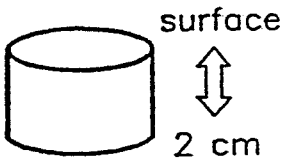
Legend

- ● Sampling Station
- ○ Sample Composite Location
- ○ Field Duplicate Sample Composite Locations

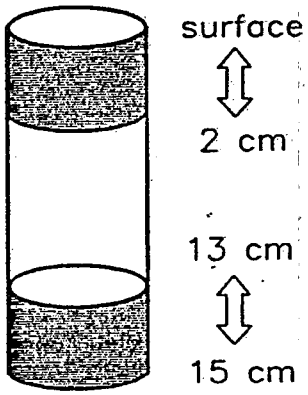
(At selected sampling stations duplicates will be collected at mid-points between sample composite locations.)

A
Preliminary and Post Abatement Phase Surface Sample Composite Location Schematic

B
Detailed Phase Surface and Subsurface Sample Composite Location Schematic



Sample collected from surface to 2cm below surface.



First sample collected from surface to 2 cm below surface.

Second sample collected from 13 cm to 15 cm below surface in same boring location.

FIGURE 6-2
Detailed Site Diagram

Address: _____ **Date:** _____

Name: _____

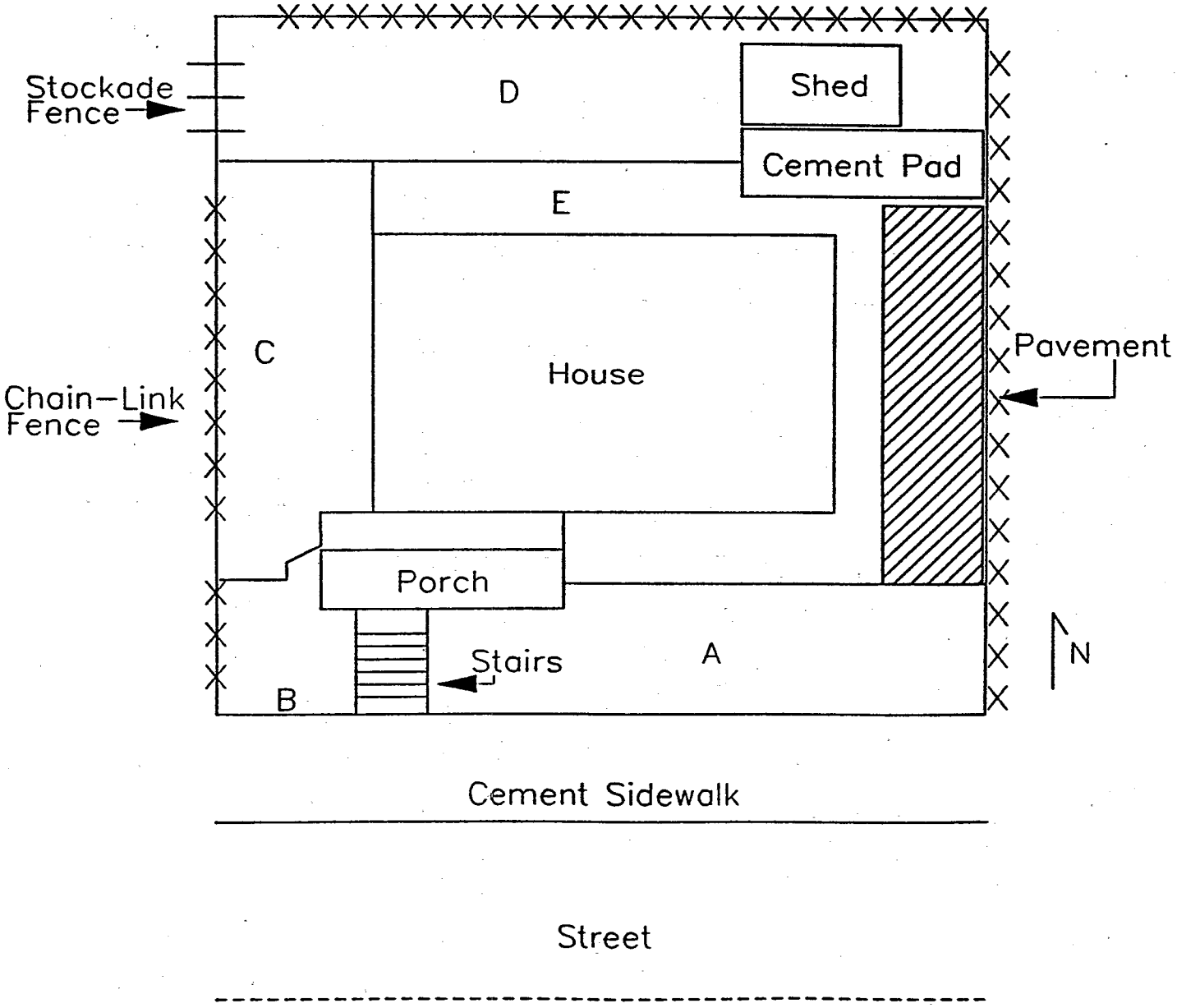


Figure 7-1

- Soil -

Lead-In-Soil Demonstrtation Project

Chain-of-Custody Record

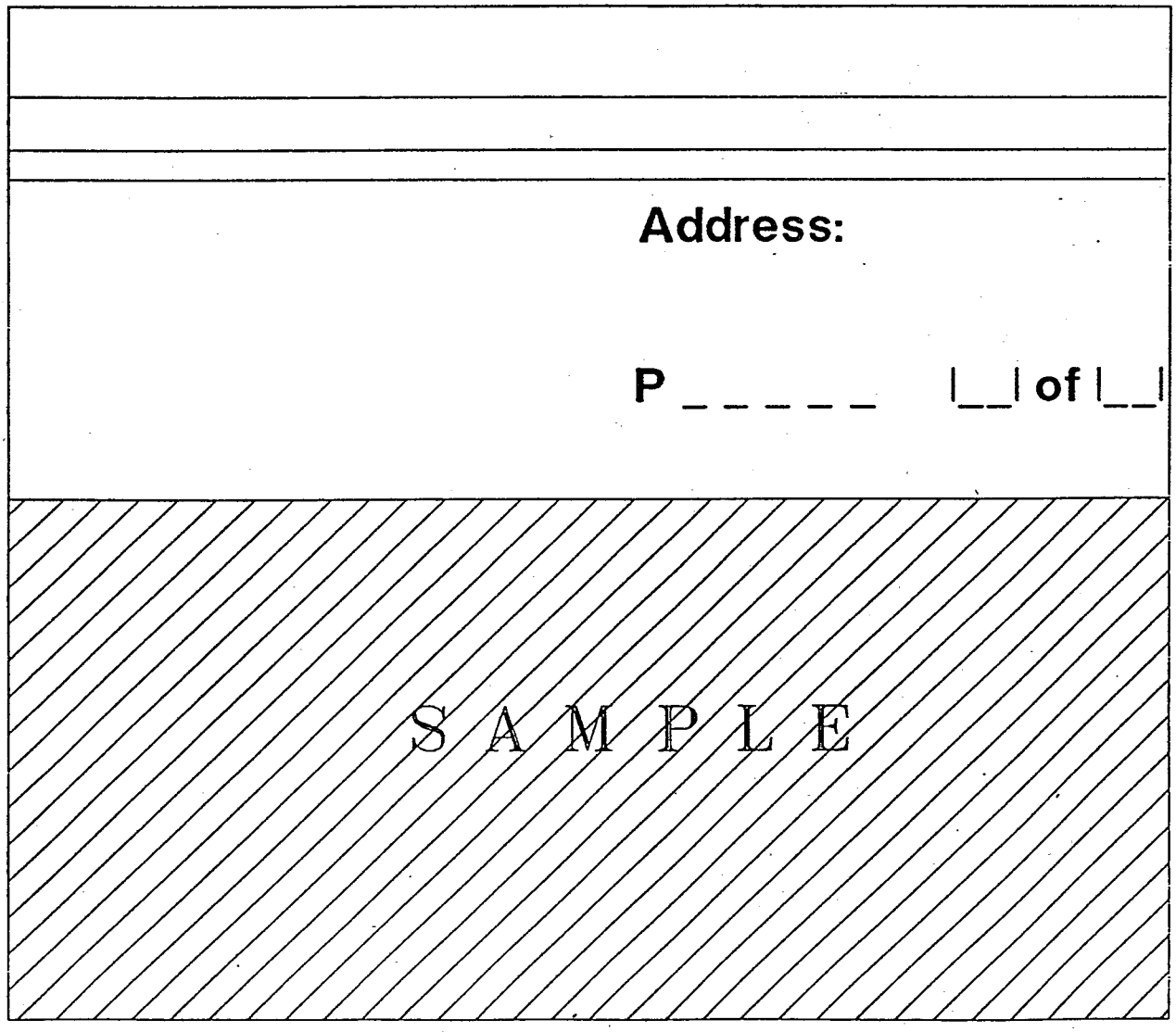
Prem. ID	Samp ID	Address	Dist.	Date Collected	Collected By

Relinquished By	Received By	Date	Time	Comments/Instructions

FIGURE 7-3

Soil
Sample Container with
Sample Label

Plastic Ziplock Bag or Equivalent - Soil



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APPENDIX A-3

POST ABATEMENT SAMPLING

CATEGORY:	TITLE:	Post Abatement Sampling Protocol	
Field		Lead Free Kids	No. FT 7-15
Technical		Demonstration Project	Date: 3/90
			Revision: 0

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Prepared By:	Approved By:	Reviewed By:

1.0 PURPOSE

The purpose of this guideline is to describe specific elements of the post abatement phase of soil sampling for the Lead Free Kids Demonstration Project, Boston, Massachusetts.

This guideline was developed for use by field sampling teams to assure that soil sampling and associated activities are consistent throughout the project to meet data quality objectives.

Adherence to this guideline will assist in assessing effectiveness of abatement activities and provide ongoing information regarding re-contamination and abatement longevity. This data will also be correlated with ongoing blood lead monitoring of project participants.

2.0 SCOPE

The specific elements described in this guideline are applicable to soil sampling activities, and include:

- reviewing and updating the site sketch from the preliminary and detailed soil sampling events, if necessary;
- schemes for locating post abatement sampling points, control stations, and recording locations on the site sketch;
- sample collection;
- sample handling and chain of custody; and
- recordkeeping and sample storage.

3.0 DEFINITIONS

None

4.0 RESPONSIBILITIES

Task Leader - The Task Leader is responsible for the collection of soil samples in accordance with all elements of this guideline. The Task Leader will supervise and participate with field personnel to accomplish this task, and be responsible for delivery of samples to the EPA laboratory.

5.0 GUIDELINE

5.1 Overview

The Soil Lead Abatement Demonstration Project involves soil sampling, analysis and soil removal, and restoration of approximately 150 lead contaminated properties in the City of Boston.

Three soil sampling events are associated with the Project, Preliminary, Detailed, and Post Abatement. The post abatement soil sampling phase presented herein will be conducted to assess the effectiveness of abatement, potential for property re-contamination and for correlation with ongoing Blood Lead testing of project participants. Sample collection procedures will be limited to surface composites from 0 - 2 cm depths.

Sample locations for each property will be pre-determined by the Principal Investigator, based on data obtained in the detailed sampling event. Typically those areas with the highest concentration of soil lead, select areas, i.e., children's play areas or any other specified area, will be designated as a post abatement control point sampling location.

Samples will be collected by LFK and analyzed by x-ray fluorescence at the EPA Region I laboratory.

5.2 Sampling Procedures

5.2.1 General

The quality of sample collection is assured by adhering to sampling procedures. All soil sample collection will be limited to compositing of corings. Separate composites will be made from the 0 - 2 cm fraction. A five-point composite depicted in Figure 6-1 is the technique for all composite soil samples. No preservatives will be required for samples.

Sample containers will consist of sealable Ziplock plastic baggies (or equivalent). Field documentation will include a review of the site sketch and additional site information documented during the preliminary and detailed sampling and notation of significant changes, i.e., vinyl siding, re-painted siding, evidence of renovations, re-landscaping, etc. This documentation may require updating the original site sketch or generation of a new one. Notation of significant changes will be made on separate dated sheets of paper. Documentation will also include completion of chain of custody. The procedures presented below will ensure that a representative portion of the source is collected and sample integrity is preserved.

5.2.2 Post Abatement Soil Sampling

Site Description Documentation

For each property, the detailed sampling event drawing will be reviewed to assist the sampling team in finding the pre-determined sampling location or locations. Once the location is found, it will be staked and located by tape measurements from the nearest permanent structure and noted on the site sketch and/or sub-area sketch. A review of the detailed additional site information form will also be reviewed and significant observation noted, such as adjacent buildings demolished, condition of the subject property, vegetative cover, erosional problems, new landscaping, etc. This information will be recorded on a separate additional site information form. Site activities will also be recorded in a site logbook with dates, addresses, samplers, and samples accounted for. Post abatement sampling documentation for subsequent events will include the same process with elimination of steps that are not applicable, such as re-taping distances staking control points at the locations.

5.2.3 Sampling Schemes

The sampling scheme selected for each post abatement sampling must adequately characterize the effectiveness of abatement, the potential exposure of children to lead in the soil, and track over time the potential for recontamination at the soil surface. Since the properties will have been abated with clean soils, post abatement sampling will be limited to surface composites, 0 - 2 cm depth.

Control Point

The Principal Investigator will select a control point sampling location or locations at a property that were previously areas of high lead concentration and reflect potential exposure to lead soil. These may be play areas, drainage collection areas, and areas determined from the detailed sampling event to have been high in soil lead, or areas that are likely to contribute soil dust to other surfaces that children use.

One or more composite surface soil sample will be collected, using the 5 point composite pattern, from each sampling station.

5.2.4 Equipment List

- plastic sandwich-size sample bags (Zip-lock or equivalent);
- indelible marker (to put sample number on bag);
- sample cards (to assign a sample number to each sample);
- cooler or similar container to hold samples;
- measuring tape;
- spoons or spatulas;
- detergent solution;
- wash bowls for decontamination of sampling gear;
- paper towels;
- distilled water;
- plastic trash bags (for disposable items);
- bound logbook, paper, and pens; and
- chain-of-custody.

5.2.5 Sample Collection

Each selected control point will represent the center of a sampling location. Each sampling location will consist of a two-foot square area approximately from which five surface soil samples will be composited. Samples will be collected as follows:

Collect two tablespoonfuls of soil from each of the four corners and from the middle. Sample depth should be from 0 - 2 cm. Place the composited sample into a plastic bag, seal it, and mark the bag with the sample number. Maximum volume should be about 1/2 bag (1 cup). Wash hand between properties. A composite will be identified as a single sample. A chain of custody is used to record information about the composite.

The sampling device should be clean and free of soil particles, with decontamination between composited areas. Vegetation and debris can be removed at the point of collection, being careful not to disturb soil or decayed litter.

The surface soil samples should be composited in sealable plastic containers (Zip-lock baggies or equivalent) suitable for prevention of cross-contamination and loss of the sample. The sample identification number should be placed on the container and chain of custody. After each sample composite, the sampling device should be cleaned with distilled water and wiped with a paper towel. Store the composited soil sample at ambient temperature until returned to the EPA - Region I laboratory.

A field blank should be taken for each sample crew day. This is normally done by taking a sample container with clean quartz sand into the field, opening it to exposure the container for a period of time, representing normal sample procedures, then returning the container to the EPA - Region I laboratory in the same manner as other soil samples. The purpose of the field blank is to detect accidental or incidental contamination during the sampling process.

Duplicate samples should be taken at the frequency of 1 per 20 and collected from the mid-

point between regular composite sample corner points (see Figure 6-1). The purpose of the field duplicate is to detect differences in homogeneity of the contaminants in soil and error in sampling techniques.

5.2.6 Sample Handling and Storage

The sample containers should be sealed to prevent loss or cross-contamination of the sample. No special considerations will be given to shipping container labelling as they will be delivered to the EPA - Region I laboratory by a member of the LFK staff. Any storage of shipping containers and/or samples should be in a cool dry location.

5.2.7 Recordkeeping and Sample Custody

Soil sample records for each property consist of updated site sketch to include approximate location of control point, and updating with additional site information, if necessary, and chain of custody. Logbooks will also be used to document activities and pertinent information through a sampling event day.

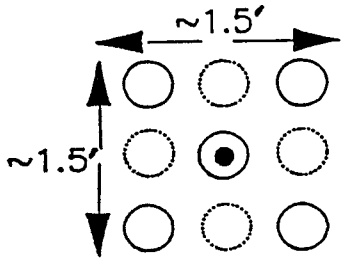
Samples should be numbered according to LFK coder.

Each updated site diagram must identify the date upon which it was revised. Each sample label and chain of custody should bear all sample numbers and the signature of the person responsible for verifying the quality of the information collected. This signature certifies that there has been no misuse of the sample protocol, no mistake in recording the information, and that the information is sufficient to clearly identify these samples for comparison with other types of samples taken at the same location, such as house dust. These documents also establish the chain of custody required for the project.

When the sample is delivered to the laboratory, custody is relinquished by the field investigator or sample Courier and received by the laboratory Task Leader or Analyst by signatures on the sample record form. Originals to remain with the LFK investigator for project files. A copy will be retained for EPA files.

FIGURE 6-1

5 Point Composite Sample Scheme



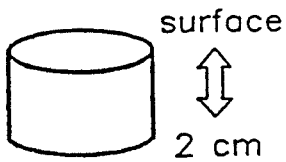
Legend

- ● Sampling Station
- ○ Sample Composite Location
- ◌ Field Duplicate Sample Composite Locations

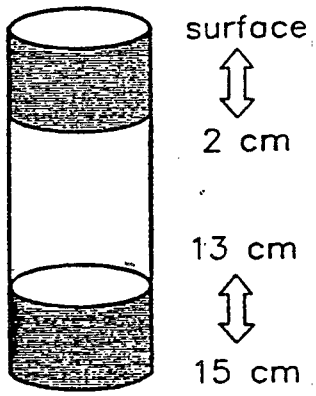
(At selected sampling stations duplicates will be collected at mid-points between sample composite locations.)

A
Preliminary and Post Abatement Phase Surface Sample Composite Location Schematic

B
Detailed Phase Surface and Subsurface Sample Composite Location Schematic



Sample collected from surface to 2cm below surface.



First sample collected from surface to 2 cm below surface.

Second sample collected from 13 cm to 15 cm below surface in same boring location.

FIGURE 6-2
Detailed Site Diagram

Address: _____ **Date:** _____

Name: _____

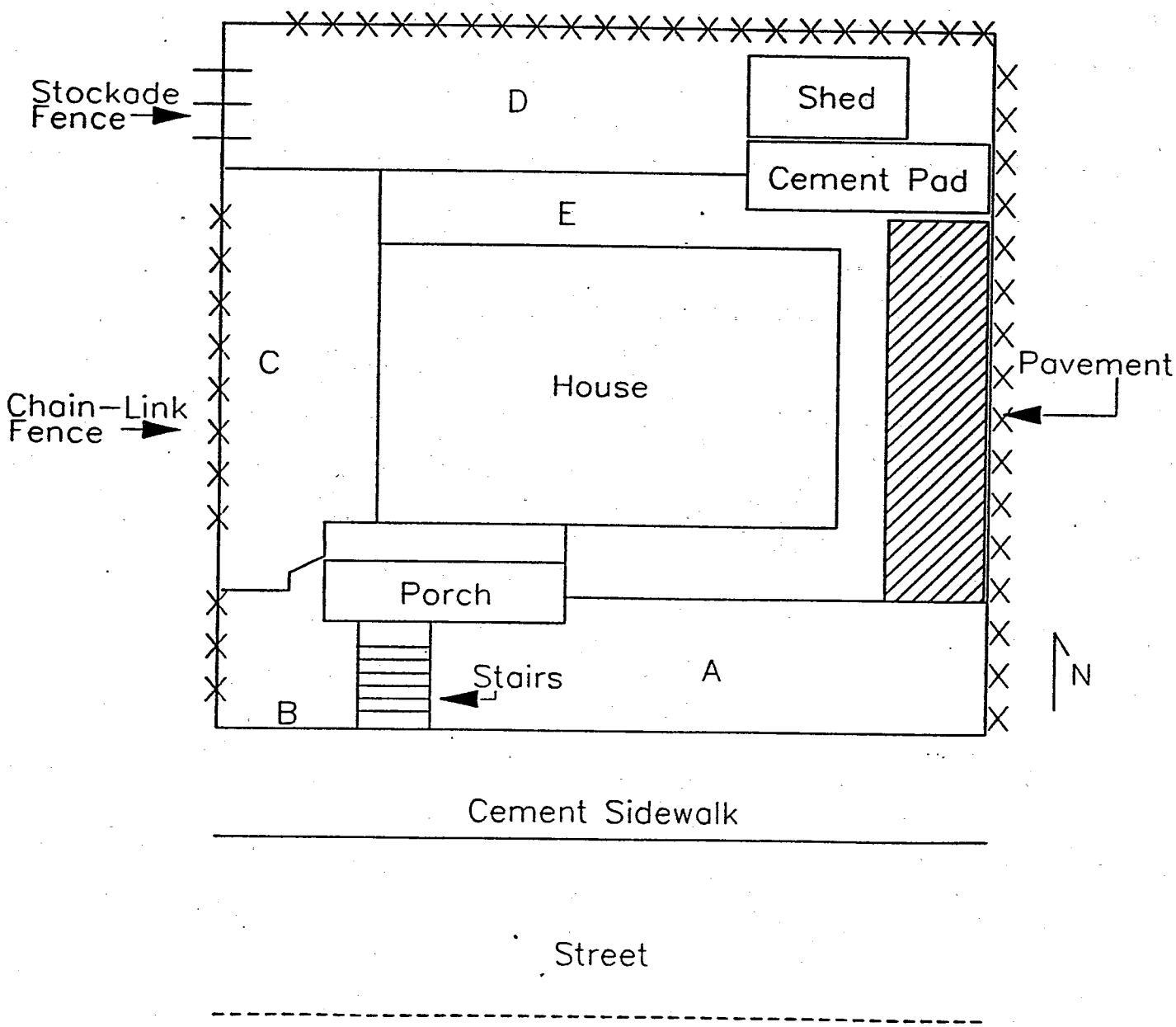


Figure 7-1

- Soil -
Lead-In-Soil Demonstrtation Project
Chain-of-Custody Record

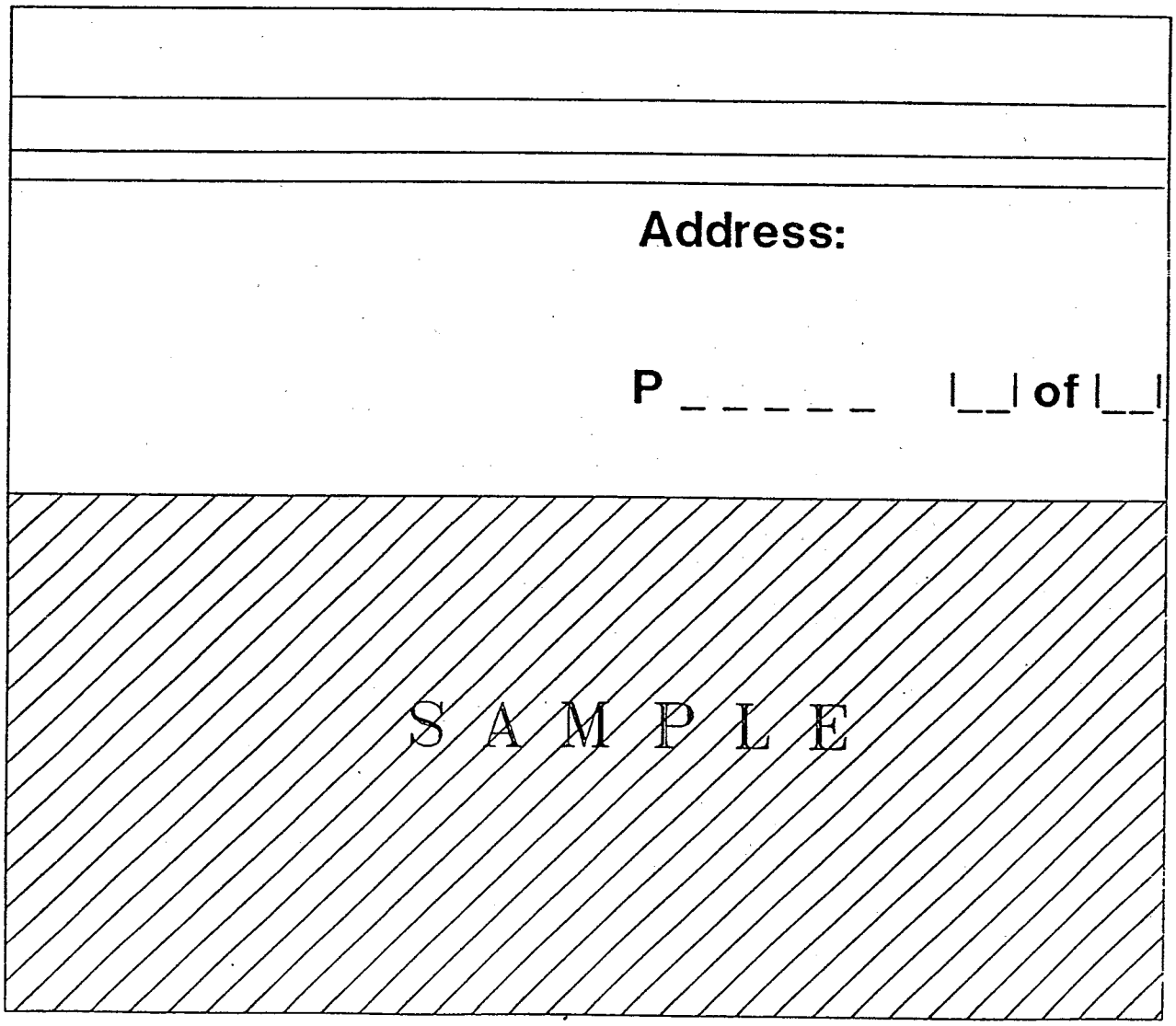
Prem. ID	Samp ID	Address	Dist.	Date Collected	Collected By

Relinquished By	Received By	Date	Time	Comments/Instructions

FIGURE 7-3

Soil
Sample Container with
Sample Label

Plastic Ziplock Bag or Equivalent - Soil



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APPENDIX A-4

HOUSE DUST SAMPLING

CATEGORY: Field Technical

TITLE: Household Dust Samplin Protocol Lead Free Kids Demonstration Project

Date: 2-89

Revision: 0

For this study, the household dust samples are defined as the samples that are most likely to come with a child's hands during indoor activity. This would include dust on upfacing surfaces accessible to the child such as bare floors, carpets, window sills and wells, furniture, as well as dust on toys and other objects likely to be handled by children.

Dust sampling ~~has~~ focusses on two components: the concentration of lead in dust, and the amount of dust or loading on the surface. The concentration of lead in dust appears to be closely related to the amount of lead on children's hands whereas the amount of dust on surfaces is an indicator of the importance of this route of human exposure.

Dust Collection and Sampling Handling

There is no standard procedure for collecting dust samples. The following protocol was decided upon after reviewing other available methods (such as the personal air pump) and finding them inadequate. The dust sampling method chosen was the Sirchee-Spittler modified dust buster. We believe that it is the best method for collecting numerous dust samples within a reasonable amount of sampling time. Other necessary equipment to conduct the sampling are a ruler to measure the sampling area, a 25" by 25" template for designating the floor sampling are, paper envelopes to which the dust samples will be transferred, tape to seal the envelopes, and a cylinder of compressed air for cleaning the sample collection screen.

Before collection, make certain that the Sirchee-Spittler modified dust buster is fully charged. You can tell this running the dust buster for a few seconds and listening for a high pitched sound from the motor. Another way to monitor the charge in the dust buster is to keep track of the number of samples taken on a change. A maximum of 18 samples (roughly three households) should be taken on one charge. Also, when starting a sampling round in a household make sure that the sample collection screen is clean. Use the compressed air cylinder to blow the screen clean.

Seven dust samples should be taken in each LFK household from each of the following location: entry floor (i.e. right inside the front door of the house or apartment), LFK child's bedroom window well and floor, kitchen window will and floor and living room window well and floor. You may choose which window to sample in a room. The floor samples should be taken roughly from the center of the room. Sometimes it will not be possible to get all six samples in a household because of window that are nailed shut, obstructed by air conditioners, etc. In these instances, obtain as many samples as possible from the designated locations.

CATEGORY:	TITLE:	Household Dust Samplin Protocol	
Field		Lead Free Kids	
Technical		Demonstration Project	Date: 2-89
			Revision: 0

Once the individual sampling locations are decided upon, the size of the sampling area must be measured. For the window wells, measure the sampling area with a ruler. For the floors, set down the 25" by 25" template. If the floor is very clean, it may be necessary to vacuum a surface area larger than 25" by 25". In these cases, vacuum an area whose size is double or triple the analysis (at least 5 mg).

The sampling sequence should be as follows: Collect the bedroom, kitchen and living room floor samples first. Then, collect the floor sample from the entry way. Finally, collect the window well samples.

To collect a dust sample, switch on the dust buster and vacuum the designated area with back and forth strokes about 1-2 inches in width. The vacuum is most efficient f the head parallel to the ground and titled about 5 degrees in the direction of the motion. When the surface has been vacuumed keep finger on the switch while raising the vacuum to an upright position. The constant air flow will prevent loss of dust from the filter before it is in an upright position. Switch of the power and carefully remove the vacuum head without tilting it significantly. Reach in remove the filter screen with a gentle clockwise motion.

Transfer the dust sample to the paper envelope in the following way. Empty the contents of the filter screen into the paper envelope. Tap the envelope to times into the open envelope on a hard surface.

Tap the dust to the bottom of the enveloped and the seal the envelope and fold over 1/2 inch of the top of the envelope and crease carefully. Tape the folded part of the envelope down with at least a 10 inch long piece of Scotch tape. Each envelope should be labelled with the following information: LFK child's name, LFK number, sample location (i.e. bedroom window well) and size of sample area. It would be best if these envelopes and labels were prepared beforehand. Remember to handle the dust containing envelopes carefully; keep them upright in an envelope box. We want to avoid any loss of dust from the envelopes.

Replace the filter screen with a counter clockwise motion, attach the vacuum head and collect the other samples in the household using the same method. When you are finished sampling a household, clean out the filter screen and the vacuum head with a blast of compressed air.

* Parts of this protocol were adapted form Dr. Thomas Spittlers's 12-88 protocol "Instruments for Operation and Maintenance of Sirchee-Spittler Hand-Held Dust Vacuum Units."

APPENDIX B

ANALYTICAL PROCEDURES

APPENDIX B-1

METHOD 3050: ACID DIGESTION OF SEDIMENTS SLUDGES, AND SOILS

METHOD 3050

ACID DIGESTION OF SEDIMENTS, SLUDGES, AND SOILS

1.0 SCOPE AND APPLICATION

1.1 This method is an acid digestion procedure used to prepare sediments, sludges, and soil samples for analysis by flame or furnace atomic absorption spectroscopy (FLAA and GFAA, respectively) or by inductively coupled argon plasma spectroscopy (ICP). Samples prepared by this method may be analyzed by ICP for all the listed metals, or by FLAA or GFAA as indicated below (see also Paragraph 2.1):

FLAA		GFAA
Aluminum	Magnesium	Arsenic
Barium	Manganese	Beryllium
Beryllium	Molybdenum	Cadmium
Cadmium	Nickel	Chromium
Calcium	Potassium	Cobalt
Chromium	Sodium	Iron
Cobalt	Thallium	Molybdenum
Copper	Vanadium	Selenium
Iron	Zinc	Thallium
Lead		Vanadium

2.0 SUMMARY OF METHOD

2.1 A representative 1- to 2-g (wet weight) sample is digested in nitric acid and hydrogen peroxide. The digestate is then refluxed with either nitric acid or hydrochloric acid. Dilute hydrochloric acid is used as the final reflux acid for (1) the ICP analysis of As and Se, and (2) the flame AA or ICP analysis of Al, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, Mo, Pb, Ni, K, Na, Tl, V, and Zn. Dilute nitric acid is employed as the final dilution acid for the furnace AA analysis of As, Be, Cd, Cr, Co, Pb, Mo, Se, Tl, and V. A separate sample shall be dried for a total solids determination.

3.0 INTERFERENCES

3.1 Sludge samples can contain diverse matrix types, each of which may present its own analytical challenge. Spiked samples and any relevant standard reference material should be processed to aid in determining whether Method 3050 is applicable to a given waste.

4.0 APPARATUS AND MATERIALS

4.1 Conical Phillips beakers: 250-mL.
4.2 Watch glasses.
4.3 Drying ovens: That can be maintained at 30°C.
4.4 Thermometer: That covers range of 0 to 200°C.
4.5 Whatman No. 41 filter paper (or equivalent).
4.6 Centrifuge and centrifuge tubes.

5.0 REAGENTS

5.1 ASTM Type II water (ASTM D1193): Water should be monitored for impurities.

5.2 Concentrated nitric acid, reagent grade (HNO_3): Acid should be analyzed to determine level of impurities. If method blank is <MDL, the acid can be used.

5.3 Concentrated hydrochloric acid, reagent grade (HCl): Acid should be analyzed to determine level of impurities. If method blank is <MDL, the acid can be used.

5.4 Hydrogen peroxide (30%) (H_2O_2): Oxidant should be analyzed to determine level of impurities.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 All samples must have been collected using a sampling plan that addresses the considerations discussed in Chapter Nine of this manual.

6.2 All sample containers must be prewashed with detergents, acids, and Type II water. Plastic and glass containers are both suitable. See Chapter Three, Section 3.1.3, for further information.

6.3 Nonaqeuous samples shall be refrigerated upon receipt and analyzed as soon as possible.

7.0 PROCEDURE

7.1 Mix the sample thoroughly to achieve homogeneity. For each digestion procedure, weigh to the nearest 0.01 g and transfer to a conical beaker a 1.00- to 2.00-g portion of sample.

7.2 Add 10 mL of 1:1 HNO_3, mix the slurry, and cover with a watch glass. Heat the sample to 95°C and reflux for 10 to 15 min without boiling. Allow the sample to cool, add 5 mL of concentrated HNO_3, replace the watch glass, and reflux for 30 min. Repeat this last step to ensure complete oxidation.

Using a ribbed watch glass, allow the solution to evaporate to 5 mL without boiling, while maintaining a covering of solution over the bottom of the beaker.

7.3 After Step 7.2 has been completed and the sample has cooled, add 2 mL of Type II water and 3 mL of 30% H_2O_2. Cover the beaker with a watch glass and return the covered beaker to the hot plate for warming and to start the peroxide reaction. Care must be taken to ensure that losses do not occur due to excessively vigorous effervescence. Heat until effervescence subsides and cool the beaker.

7.4 Continue to add 30% H_2O_2 in 1-mL aliquots with warming until the effervescence is minimal or until the general sample appearance is unchanged.
NOTE: Do not add more than a total of 10 mL 30% H_2O_2.

7.5 If the sample is being prepared for (a) the ICP analysis of As and Se, or (b) the flame AA or ICP analysis of Al, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Na, Tl, V, and Zn, then add 5 mL of concentrated HCl and 10 mL of Type II water, return the covered beaker to the hot plate, and reflux for an additional 15 min without boiling. After cooling, dilute to 100 mL with Type II water. Particulates in the digestate that may clog the nebulizer should be removed by filtration, by centrifugation, or by allowing the sample to settle.

7.5.1 Filtration: Filter through Whatman No. 41 filter paper (or equivalent) and dilute to 100 mL with Type II water.

7.5.2 Centrifugation: Centrifugation at 2,000-3,000 rpm for 10 min is usually sufficient to clear the supernatant.

7.5.3 The diluted sample has an approximate acid concentration of 5.0% (v/v) HCl and 5.0% (v/v) HNO_3. The sample is now ready for analysis.

7.6 If the sample is being prepared for the furnace analysis of As, Be, Cd, Cr, Co, Pb, Mo, Se, Tl, and V, cover the sample with a ribbed watch glass and continue heating the acid-peroxide digestate until the volume has been reduced to approximately 5 mL. After cooling, dilute to 100 mL with Type II water. Particulates in the digestate should then be removed by filtration, by centrifugation, or by allowing the sample to settle.

7.6.1 Filtration: Filter through Whatman No. 41 filter paper (or equivalent) and dilute to 100 mL with Type II water.

7.6.2 Centrifugation: Centrifugation at 2,000-3,000 for 10 min is usually sufficient to clear the supernatant.

7.6.3 The diluted digestate solution contains approximately 5% (v/v) HNO_3. For analysis, withdraw aliquots of appropriate volume and add any required reagent or matrix modifier. The sample is now ready for analysis.

7.7 Calculations:

7.7.1 The concentrations determined are to be reported on the basis of the actual weight of the sample. If a dry weight analysis is desired, then the percent solids of the sample must also be provided.

7.7.2 If percent solids is desired, a separate determination of percent solids must be performed on a homogeneous aliquot of the sample.

8.0 QUALITY CONTROL

8.1 For each group of samples processed, preparation blanks (Type II water and reagents) should be carried throughout the entire sample preparation and analytical process. These blanks will be useful in determining if samples are being contaminated.

8.2 Duplicate samples should be processed on a routine basis. Duplicate samples will be used to determine precision. The sample load will dictate the frequency, but 20% is recommended.

8.3 Spiked samples or standard reference materials must be employed to determine accuracy. A spiked sample should be included with each group of samples processed and whenever a new sample matrix is being analyzed.

8.4 The concentration of all calibration standards should be verified against a quality control check sample obtained from an outside source.

9.0 METHOD PERFORMANCE

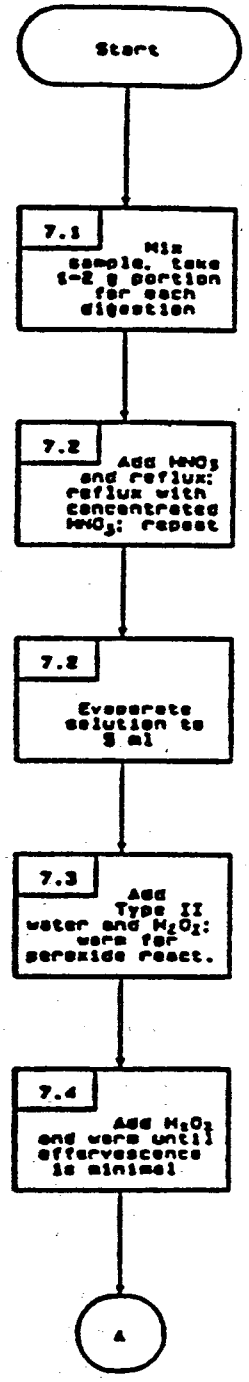
9.1 No data provided.

10.0 REFERENCES

10.1 None required.

METHOD 3050

ACID DIGESTION OF SEDIMENTS, SLUDGES, AND SOILS



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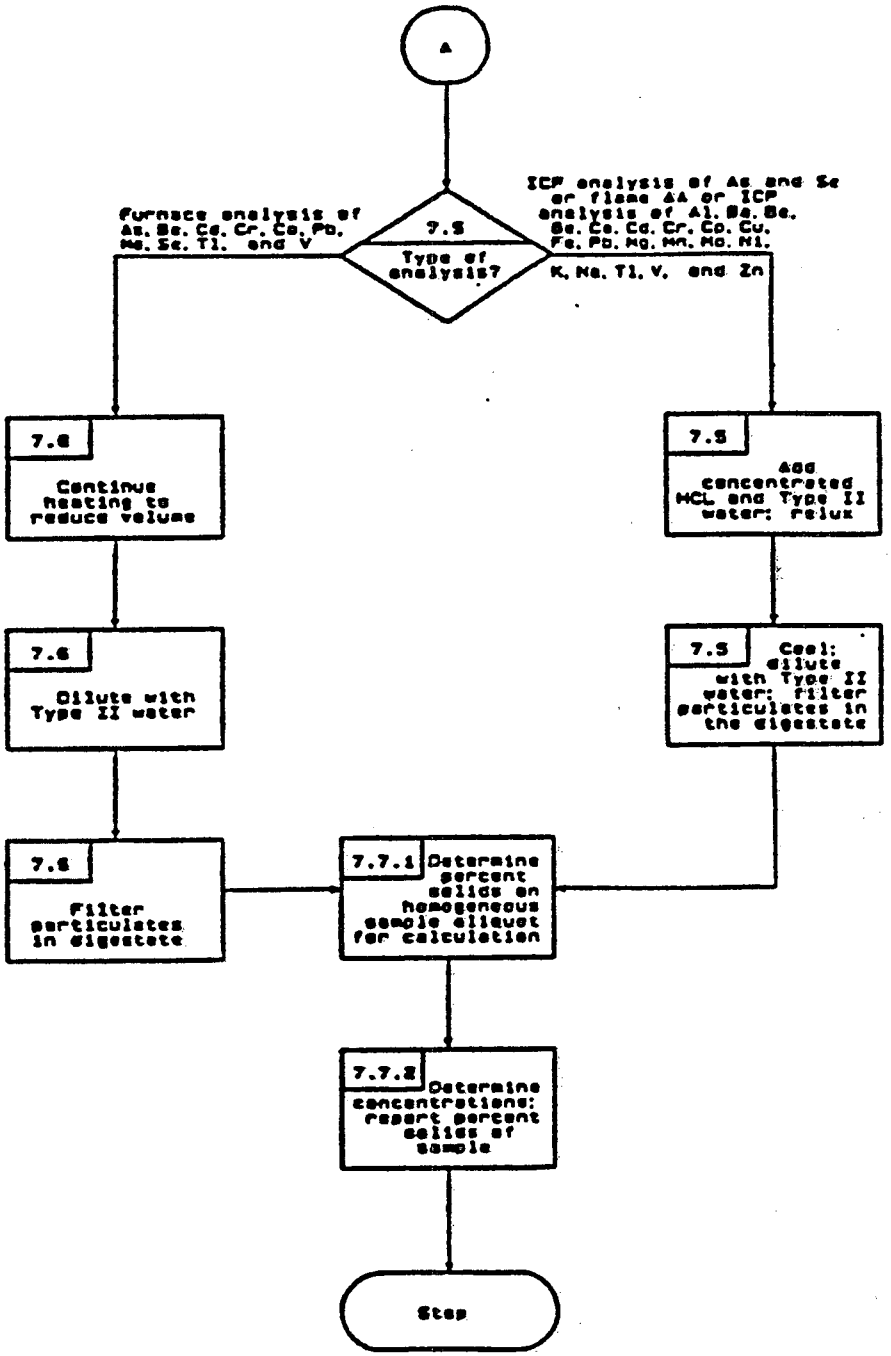
METHOD 3050

ACID DIGESTION OF SEDIMENTS, SLUDGES, AND SOILS

(Continued)



Revision 0
Date September 1986

APPENDIX B-2

METHOD 6010
INDUCTIVELY COUPLED PLASMA
ATOMIC EMISSION SPECTROSCOPY

METHOD 6010

INDUCTIVELY COUPLED PLASMA ATOMIC EMISSION SPECTROSCOPY

1.0 SCOPE AND APPLICATION

1.1 Inductively coupled plasma atomic emission spectroscopy (ICP) determines elements including metals in solution. The method is applicable to a large number of metals and wastes. All matrices, including ground water, aqueous samples, EP extracts, industrial wastes, soils, sludges, sediments, and other solid wastes, require digestion prior to analysis.

1.2 Elements for which Method 6010 is applicable are listed in Table 1. Detection limits, sensitivity, and optimum ranges of the metals will vary with the matrices and model of spectrometer. The data shown in Table 1 provide concentration ranges for clean aqueous samples. Use of this method is restricted to spectroscopists who are knowledgeable in the correction of spectral, chemical, and physical interferences.

1.3 The method of standard addition (MSA) (Paragraph 8.5.3) shall be used for the analysis of all EP extracts and sample digests unless either serial dilution or matrix spike addition demonstrates that it is not required.

2.0 SUMMARY OF METHOD

2.1 Prior to analysis, samples must be solubilized or digested using appropriate Sample Preparation Methods (e.g., Methods 3005-3050).

2.2 Method 6010 describes the simultaneous, or sequential, multielemental determination of elements by ICP. The method measures element-emitted light by optical spectrometry. Samples are nebulized and the resulting aerosol is transported to the plasma torch. Element-specific atomic-line emission spectra are produced by a radio-frequency inductively coupled plasma. The spectra are dispersed by a grating spectrometer, and the intensities of the lines are monitored by photomultiplier tubes. Background correction is required for trace element determination. Background must be measured adjacent to analyte lines on samples during analysis. The position selected for the background-intensity measurement, on either or both sides of the analytical line, will be determined by the complexity of the spectrum adjacent to the analyte line. The position used must be free of spectral interference and reflect the same change in background intensity as occurs at the analyte wavelength measured. Background correction is not required in cases of line broadening where a background correction measurement would actually degrade the analytical result. The possibility of additional interferences named in Section 3.0 should also be recognized and appropriate corrections made; tests for their presence are described in Section 8.5.

TABLE 1. RECOMMENDED WAVELENGTHS AND ESTIMATED INSTRUMENTAL DETECTION LIMITS

Element	Wavelength[a] (nm)	Estimated Detection Limit[b] (ug/L)
Aluminum	308.215	45
Antimony	206.833	32
Arsenic	193.696	53
Barium	455.403	2
Beryllium	313.042	0.3
Boron	249.773	5
Cadmium	226.502	4
Calcium	317.933	10
Chromium	267.716	7
Cobalt	228.616	7
Copper	324.754	6
Iron	259.940	7
Lead	220.353	42
Magnesium	279.079	30
Manganese	257.610	2
Molybdenum	202.030	8
Nickel	231.604	15
Potassium	766.491	See note c
Selenium	196.026	75
Silicon	288.158	58
Silver	328.068	7
Sodium	588.995	29
Thallium	190.864	40
Vanadium	292.402	8
Zinc	213.856	2

[a]The wavelengths listed are recommended because of their sensitivity and overall acceptance. Other wavelengths may be substituted if they can provide the needed sensitivity and are treated with the same corrective techniques for spectral interference (see Paragraph 3.1). In time, other elements may be added as more information becomes available and as required.

[b]The estimated instrumental detection limits shown are taken from Reference 1 in Section 10.0 below. They are given as a guide for an instrumental limit. The actual method detection limits are sample dependent and may vary as the sample matrix varies.

[c]Highly dependent on operating conditions and plasma position.

3.0 INTERFERENCES

3.1 Spectral interferences are caused by: (1) overlap of a spectral line from another element; (2) unresolved overlap of molecular band spectra; (3) background contribution from continuous or recombination phenomena; and (4) stray light from the line emission of high-concentration elements. Spectral overlap can be compensated for by computer-correcting the raw data after monitoring and measuring the interfering element. Unresolved overlap requires selection of an alternate wavelength. Background contribution and stray light can usually be compensated for by a background correction adjacent to the analyte line.

Users of simultaneous multielement instruments must verify the absence of spectral interference from an element in a sample for which there is no instrument detection channel. Potential spectral interferences for the recommended wavelengths are given in Table 2. The data in Table 2 are intended as rudimentary guides for indicating potential interferences; for this purpose, linear relations between concentration and intensity for the analytes and the interferents can be assumed.

3.1.1 The interference is expressed as analyte concentration equivalents (i.e., false analyte concentrations) arising from 100 mg/L of the interference element. For example, assume that As is to be determined (at 193.696 nm) in a sample containing approximately 10 mg/L of Al. According to Table 2, 100 mg/L of Al would yield a false signal for As equivalent to approximately 1.3 mg/L. Therefore, the presence of 10 mg/L of Al would result in a false signal for As equivalent to approximately 0.13 mg/L. The user is cautioned that other instruments may exhibit somewhat different levels of interference than those shown in Table 2. The interference effects must be evaluated for each individual instrument since the intensities will vary with operating conditions, power, viewing height, argon flow rate, etc.

3.1.2 The dashes in Table 2 indicate that no measurable interferences were observed even at higher interferent concentrations. Generally, interferences were discernible if they produced peaks, or background shifts, corresponding to 2 to 5% of the peaks generated by the analyte concentrations.

3.1.3 At present, information on the listed silver and potassium wavelengths is not available, but it has been reported that second-order energy from the magnesium 383.231-nm wavelength interferes with the listed potassium line at 766.491 nm.

3.2 Physical interferences are effects associated with the sample nebulization and transport processes. Changes in viscosity and surface tension can cause significant inaccuracies, especially in samples containing high dissolved solids or high acid concentrations. If physical interferences are present, they must be reduced by diluting the sample, by using a peristaltic pump or by using the standard additions method. Another problem that can occur with high dissolved solids is salt buildup at the tip of the nebulizer, which affects aerosol flow rate and causes instrumental drift. The problem can be controlled by wetting the argon prior to nebulization, using a

TABLE 2. ANALYTE CONCENTRATION EQUIVALENTS ARISING FROM INTERFERENCE AT THE 100-mg/L LEVEL

Analyte	Wavelength (nm)	Interferent [a,b]									
		Al	Ca	Cr	Cu	Fe	Mg	Mn	Ni	Tl	V
Aluminum	308.215	—	—	—	—	—	—	0.21	—	—	1.4
Antimony	206.833	0.47	—	2.9	—	0.08	—	—	—	0.25	0.45
Arsenic	193.696	1.3	—	0.44	—	—	—	—	—	—	1.1
Barium	455.403	—	—	—	—	—	—	—	—	—	—
Beryllium	313.042	—	—	—	—	—	—	—	—	0.04	0.05
Boron	249.773	0.04	—	—	—	0.32	—	—	—	—	—
Cadmium	226.502	—	—	—	—	0.03	—	—	0.02	—	—
Calcium	317.933	—	—	0.08	—	0.01	0.01	0.04	—	0.03	0.03
Chromium	267.716	—	—	—	—	0.003	—	0.04	—	—	0.04
Cobalt	228.616	—	—	0.03	—	0.005	—	—	0.03	0.15	—
Copper	324.754	—	—	—	—	0.003	—	—	—	0.05	0.02
Iron	259.940	—	—	—	—	—	—	0.12	—	—	—
Lead	220.353	0.17	—	—	—	—	—	—	—	—	—
Magnesium	279.079	—	0.02	0.11	—	0.13	—	0.25	—	0.07	0.12
Manganese	257.610	0.005	—	0.01	—	0.002	0.002	—	—	—	—
Molybdenum	202.030	0.05	—	—	—	0.03	—	—	—	—	—
Nickel	231.604	—	—	—	—	—	—	—	—	—	—
Selenium	196.026	0.23	—	—	—	0.09	—	—	—	—	—
Silicon	288.158	—	—	0.07	—	—	—	—	—	—	0.01
Sodium	588.995	—	—	—	—	—	—	—	—	0.08	—
Thallium	190.864	0.30	—	—	—	—	—	—	—	—	—
Vanadium	292.402	—	—	0.05	—	0.005	—	—	—	0.02	—
Zinc	213.856	—	—	—	0.14	—	—	—	0.29	—	—

[a]Dashes indicate that no interference was observed even when interferents were introduced at the following levels:

Al - 1000 mg/L,
Ca - 1000 mg/L,
Cr - 200 mg/L,
Cu - 200 mg/L
Fe - 1000 mg/L
Mg - 1000 mg/L,
Mn - 200 mg/L,
Tl - 200 mg/L,
V - 200 mg/L

[b]The figures recorded as analyte concentrations are not the actual observed concentrations; to obtain those figures, add the listed concentration to the interferent figure.

tip washer, or diluting the sample. Also, it has been reported that better control of the argon flow rate improves instrument performance; this is accomplished with the use of mass flow controllers.

3.3 Chemical interferences include molecular compound formation, ionization effects, and solute vaporization effects. Normally, these effects are not significant with the ICP technique. If observed, they can be minimized by careful selection of operating conditions (incident power, observation position, and so forth), by buffering of the sample, by matrix matching, and by standard addition procedures. Chemical interferences are highly dependent on matrix type and the specific analyte element.

4.0 APPARATUS AND MATERIALS

4.1 Inductively coupled argon plasma emission spectrometer:

4.1.1 Computer-controlled emission spectrometer with background correction.

4.1.2 Radio frequency generator.

4.1.3 Argon gas supply: Welding grade or better.

4.2 Operating conditions: The analyst should follow the instructions provided by the instrument's manufacturer. For operation with organic solvents, use of the auxiliary argon inlet is recommended, as are solvent-resistant tubing, increased plasma (coolant) argon flow, decreased nebulizer flow, and increased RF power to obtain stable operation and precise measurements. Sensitivity, instrumental detection limit, precision, linear dynamic range, and interference effects must be established for each individual analyte line on that particular instrument. All measurements must be within instrument linear range where coordination factors are valid. The analyst must (1) verify that the instrument configuration and operating conditions satisfy the analytical requirements and (2) maintain quality control data confirming instrument performance and analytical results.

5.0 REAGENTS

5.1 Acids used in the preparation of standards and for sample processing must be reagent grade or better. Redistilled acids may be used.

5.1.1 Concentrated hydrochloric acid (HCl).

5.1.2 Hydrochloric acid (1:1): Add 500 mL concentrated HCl to 400 mL Type II water and dilute to 1 liter.

5.1.3 Concentrated nitric acid (HNO_3).

5.1.4 Nitric acid (1:1): Add 500 mL concentrated HNO_3 to 400 mL Type II water and dilute to 1 liter.

5.2 ASTM Type II water (ASTM D1193): Water should be monitored for impurities.

5.3 Standard stock solutions may be purchased or prepared from ultra-high purity grade chemicals or metals (99.99 to 99.999% pure). All salts must be dried for 1 hr at 105°C, unless otherwise specified.

(CAUTION: Many metal salts are extremely toxic if inhaled or swallowed. Wash hands thoroughly after handling.)

Typical stock solution preparation procedures follow. Concentrations are calculated based upon the weight of pure metal added, or with the use of the mole fraction and the weight of the metal salt added.

Metal

$$\text{Concentration (ppm)} = \frac{\text{weight (mg)}}{\text{volume (L)}}$$

Metal salts

$$\text{Concentration (ppm)} = \frac{\text{weight (mg) x mole fraction}}{\text{volume (L)}}$$

5.3.1 Aluminum solution, stock, 1 mL = 100 ug Al: Dissolve 0.10 g of aluminum metal, weighed accurately to at least four significant figures, in an acid mixture of 4 mL of (1:1) HCl and 1 mL of concentrated HNO_3 in a beaker. Warm gently to effect solution. When solution is complete, transfer quantitatively to a liter flask, add an additional 10 mL of (1:1) HCl and dilute to 1,000 mL with Type II water.

5.3.2 Antimony solution, stock, 1 mL = 100 ug Sb: Dissolve 0.27 g $K(SbO)C_4H_4O_6$ (mole fraction Sb = 0.3749), weighed accurately to at least four significant figures, in Type II water, add 10 mL (1:1) HCl, and dilute to 1,000 mL with Type II water.

5.3.3 Arsenic solution, stock, 1 mL = 100 ug As: Dissolve 0.13 g of As_2O_3 (mole fraction As = 0.7574), weighed accurately to at least four significant figures, in 100 mL of Type II water containing 0.4 g NaOH. Acidify the solution with 2 mL concentrated HNO_3 and dilute to 1,000 mL with Type II water.

5.3.4 Barium solution, stock, 1 mL = 100 ug Ba: Dissolve 0.15 g $BaCl_2$ (mole fraction Ba = 0.6595), dried at 250°C for 2 hr, weighed accurately to at least four significant figures, in 10 mL Type II water with 1 mL (1:1) HCl. Add 10.0 mL (1:1) HCl and dilute to 1,000 mL with Type II water.

5.3.5 Beryllium solution, stock, 1 mL = 100 ug Be: Do not dry. Dissolve 1.97 g $BeSO_4 \cdot 4H_2O$ (mole fraction Be = 0.0509), weighed accurately to at least four significant figures, in Type II water, add 10.0 ml concentrated HNO_3, and dilute to 1,000 mL with Type II water. Mole fraction = 0.0509.

5.3.6 Boron solution, stock 1 mL = 100 ug B: Do not dry. Dissolve 0.57 g anhydrous H_3BO_3 (mole fraction B = 0.1748), weighed accurately to at least four significant figures, in Type II water and dilute to 1,000 mL. Use a reagent meeting ACS specifications, keep the bottle tightly stoppered, and store in a desiccator to prevent the entrance of atmospheric moisture.

5.3.7 Cadmium solution, stock, 1 mL = 100 ug Cd: Dissolve 0.11 g CdO (mole fraction Cd = 0.8754), weighed accurately to at least four significant figures, in a minimum amount of (1:1) HNO_3. Heat to increase rate of dissolution. Add 10.0 mL concentrated HNO_3 and dilute to 1,000 mL with Type II water.

5.3.8 Calcium solution, stock, 1 mL = 100 ug Ca: Suspend 0.25 g $CaCO_3$ (mole Ca fraction = 0.4005), dried at 180°C for 1 hr before weighing, weighed accurately to at least four significant figures, in Type II water and dissolve cautiously with a minimum amount of (1:1) HNO_3. Add 10.0 mL concentrated HNO_3 and dilute to 1,000 mL with Type II water.

5.3.9 Chromium solution, stock, 1 mL = 100 ug Cr: Dissolve 0.19 g CrO_3 (mole fraction Cr = 0.5200), weighed accurately to at least four significant figures, in Type II water. When solution is complete, acidify with 10 mL concentrated HNO_3 and dilute to 1,000 mL with Type II water.

5.3.10 Cobalt solution, stock, 1 mL = 100 ug Co: Dissolve 0.1000 g of cobalt metal, weighed accurately to at least four significant figures, in a minimum amount of (1:1) HNO_3. Add 10.0 mL (1:1) HCl and dilute to 1,000 mL with Type II water.

5.3.11 Copper solution, stock, 1 mL = 100 ug Cu: Dissolve 0.13 g CuO (mole fraction Cu = 0.7989), weighed accurately to at least four significant figures), in a minimum amount of (1:1) HNO_3. Add 10.0 mL concentrated HNO_3 and dilute to 1,000 mL with Type II water.

5.3.12 Iron solution, stock, 1 mL = 100 ug Fe: Dissolve 0.14 g Fe_2O_3 (mole fraction Fe = 0.6994), weighed accurately to at least four significant figures, in a warm mixture of 20 mL (1:1) HCl and 2 mL of concentrated HNO_3. Cool, add an additional 5.0 mL of concentrated HNO_3, and dilute to 1,000 mL with Type II water.

5.3.13 Lead solution, stock, 1 mL = 100 ug Pb: Dissolve 0.16 g $Pb(NO_3)_2$ (mole fraction Pb = 0.6256), weighed accurately to at least four significant figures, in a minimum amount of (1:1) HNO_3. Add 10 mL (1:1) HNO_3 and dilute to 1,000 mL with Type II water.

5.3.14 Magnesium solution, stock, 1 mL = 100 ug Mg: Dissolve 0.17 g MgO (mole fraction Mg = 0.6030), weighed accurately to at least four significant figures, in a minimum amount of (1:1) HNO_3. Add 10.0 mL (1:1) concentrated HNO_3 and dilute to 1,000 mL with Type II water.

5.3.15 Manganese solution, stock, 1 mL = 100 ug Mn: Dissolve 0.1000 g of manganese metal, weighed accurately to at least four significant figures, in acid mixture (10 mL concentrated HCl and 1 mL concentrated HNO_3) and dilute to 1,000 mL with Type II water.

5.3.16 Molybdenum solution, stock, 1 mL = 100 ug Mo: Dissolve 0.20 g $(NH_4)_6Mo_7O_{24}\cdot 4H_2O$ (mole fraction Mo = 0.5772), weighed accurately to at least four significant figures, in Type II water and dilute to 1,000 mL with Type II water.

5.3.17 Nickel solution, stock, 1 mL = 100 ug Ni: Dissolve 0.1000 g of nickel metal, weighed accurately to at least four significant figures, in 10.0 mL hot concentrated HNO_3, cool, and dilute to 1,000 mL with Type II water.

5.3.18 Potassium solution, stock, 1 mL = 100 ug K: Dissolve 0.19 g KCl (mole fraction K = 0.5244) dried at 110°C, weighed accurately to at least four significant figures, in Type II water and dilute to 1,000 mL.

5.3.19 Selenium solution, stock, 1 mL = 100 ug Se: Do not dry. Dissolve 0.17 g H_2SeO_3 (mole fraction Se = 0.6123), weighed accurately to at least four significant figures, in Type II water and dilute to 1,000 mL.

5.3.20 Silica solution, stock, 1 mL = 100 ug SiO_2: Do not dry. Dissolve 0.47 g $Na_2SiO_3\cdot 9H_2O$ (mole fraction Si = 0.09884), weighed accurately to at least four significant figures, in Type II water. Add 10.0 mL concentrated HNO_3 and dilute to 1,000 mL with Type II water.

5.3.21 Silver solution, stock, 1 mL = 100 ug Ag: Dissolve 0.16 g $AgNO_3$ (mole fraction Ag = 0.6350), weighed accurately to at least four significant figures, in Type II water and 10 mL concentrated HNO_3. Dilute to 1,000 mL with Type II water.

5.3.22 Sodium solution, stock, 1 mL = 100 ug Na: Dissolve 0.25 g NaCl (mole fraction Na = 0.3934), weighed accurately to at least four significant figures, in Type II water. Add 10.0 mL concentrated HNO_3 and dilute to 1,000 mL with Type II water.

5.3.23 Thallium solution, stock, 1 mL = 100 ug Tl: Dissolve 0.13 g $TlNO_3$ (mole fraction Tl = 0.7672), weighed accurately to at least four significant figures, in Type II water. Add 10.0 mL concentrated HNO_3 and dilute to 1,000 mL with Type II water.

5.3.24 Vanadium solution, stock, 1 mL = 100 ug V: Dissolve 0.23 g NH_4VO_3 (mole fraction V = 0.4356), weighed accurately to at least four significant figures, in a minimum amount of concentrated HNO_3. Heat to increase rate of dissolution. Add 10.0 mL concentrated HNO_3 and dilute to 1,000 mL with Type II water.

5.3.25 Zinc solution, stock, 1 mL = 100 ug Zn: Dissolve 0.12 g ZnO (mole fraction Zn = 0.8034), weighed accurately to at least four significant figures, in a minimum amount of dilute HNO_3. Add 10.0 mL concentrated HNO_3 and dilute to 1,000 mL with Type II water.

5.4 Mixed calibration standard solutions: Prepare mixed calibration standard solutions by combining appropriate volumes of the stock solutions in volumetric flasks (see Table 3). Add 2 mL (1:1) HNO_3 and 10 mL of (1:1) HCl and dilute to 100 mL with Type II water (see NOTE, below). Prior to preparing the mixed standards, each stock solution should be analyzed separately to determine possible spectral interference or the presence of impurities. Care should be taken when preparing the mixed standards to ensure that the elements are compatible and stable together. Transfer the mixed standard solutions to FEP fluorocarbon or previously unused polyethylene or polypropylene bottles for storage. Fresh mixed standards should be prepared, as needed, with the realization that concentration can change on aging. Calibration standards must be initially verified using a quality control sample (see Paragraph 5.8) and monitored weekly for stability. Some typical calibration standard combinations are listed in Table 3. All mixtures should then be scanned using a sequential spectrometer to verify the absence of interelement spectral interference in the recommended mixed standard solutions.

NOTE: If the addition of silver to the recommended acid combination results in an initial precipitation, add 15 mL of Type II water and warm the flask until the solution clears. Cool and dilute to 100 mL with Type II water. For this acid combination, the silver concentration should be limited to 2 mg/L. Silver under these conditions is stable in a tap-water matrix for 30 days. Higher concentrations of silver require additional HCl.

TABLE 3. MIXED STANDARD SOLUTIONS

Solution	Elements
I	Be, Cd, Mn, Pb, Se and Zn
II	Ba, Co, Cu, Fe, and V
III	As, Mo, and Si
IV	Al, Ca, Cr, K, Na, and Ni
V	Ag (see Note to Paragraph 5.4), B, Mg, Sb, and Tl

5.5 Two types of blanks are required for the analysis. The calibration blank is used in establishing the analytical curve, and the reagent blank is used to correct for possible contamination resulting from varying amounts of the acids used in the sample processing.

5.5.1 The calibration blank is prepared by diluting 2 mL of (1:1) HNO_3 and 10 mL of (1:1) HCl to 100 mL with Type II water. Prepare a sufficient quantity to flush the system between standards and samples.

5.5.2 The reagent blank must contain all the reagents and in the same volumes as used in the processing of the samples. The reagent blank must be carried through the complete procedure and contain the same acid concentration in the final solution as the sample solution used for analysis.

5.6 The instrument check standard is prepared by the analyst by combining compatible elements at concentrations equivalent to the midpoint of their respective calibration curves (see Paragraph 8.6.2.1 for use).

5.7 The interference check solution is prepared to contain known concentrations of interfering elements that will provide an adequate test of the correction factors. Spike the sample with the elements of interest at approximate concentrations of 10 times the instrumental detection limits. In the absence of measurable analyte, overcorrection could go undetected because a negative value could be reported as zero. If the particular instrument will display overcorrection as a negative number, this spiking procedure will not be necessary.

5.8 The quality control sample should be prepared in the same acid matrix as the calibration standards at 10 times the instrumental detection limits and in accordance with the instructions provided by the supplier.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material in Chapter Three, Inorganic Analytes, Sections 3.1 through 3.3.

7.0 PROCEDURE

7.1 Preliminary treatment of all matrices is always necessary because of the complexity and variability of sample matrices. Solubilization and digestion procedures are presented in Sample Preparation Methods (Methods 3005-3050). The method of standard addition (MSA) (Paragraph 8.5.3) shall be used for the analysis of all EP extracts and sample digests unless either serial dilution or matrix spike addition demonstrates that it is not required. An internal standard may be substituted for the MSA.

7.2 Set up the instrument with proper operating parameters established in Paragraph 4.2. The instrument must be allowed to become thermally stable before beginning (usually requiring at least 30 min of operation prior to calibration).

7.3 Profile and calibrate the instrument according to the instrument manufacturer's recommended procedures, using the typical mixed calibration standard solutions described in Paragraph 5.4. Flush the system with the calibration blank (5.5.1) between each standard (see NOTE, below). (Use the average intensity of multiple exposures for both standardization and sample analysis to reduce random error.)

NOTE: For boron concentrations greater than 500 ug/L, extended flush times of 1 or 2 min may be required.

7.4 Before beginning the sample run, reanalyze the highest mixed calibration standard as if it were a sample. Concentration values obtained should not deviate from the actual values by more than 5% (or the established control limits, whichever is lower). If they do, follow the recommendations of the instrument manufacturer to correct for this condition.

7.5 Flush the system with the calibration blank solution for at least 1 min (Paragraph 5.5.1) before the analysis of each sample (see Note to Paragraph 7.3). Analyze the instrument check standard (5.6) and the calibration blank (5.5.1) after each 10 samples.

7.6 Calculations: If dilutions were performed, the appropriate factors must be applied to sample values. All results should be reported in ug/L with up to three significant figures.

8.0 QUALITY CONTROL

8.1 All quality control data should be maintained and available for easy reference or inspection.

8.2 Dilute and reanalyze samples that are more concentrated than the linear calibration limit or use an alternate, less sensitive line for which quality control data is already established.

8.3 Employ a minimum of one laboratory blank per sample batch to determine if contamination or any memory effects are occurring.

8.4 Analyze one duplicate sample for every 20 samples. A duplicate sample is a sample brought through the whole sample preparation and analytical process.

8.5 It is recommended that whenever a new or unusual sample matrix is encountered, a series of tests be performed prior to reporting concentration data for analyte elements. These tests, as outlined in 8.5.1 through 8.5.3, will ensure the analyst that neither positive nor negative interferences are operating on any of the analyte elements to distort the accuracy of the reported values.

8.5.1 Serial dilution: If the analyte concentration is sufficiently high (minimally, a factor of 10 above the instrumental detection limit after dilution), an analysis of a 1:4 dilution should agree within ±10% of the original determination. If not, a chemical or physical interference effect should be suspected.

8.5.2 Matrix spike addition: An analyte spike added to a portion of a prepared sample, or its dilution, should be recovered to within 75% to 125% of the known value. The spike addition should produce a minimum level of 10 times and a maximum of 100 times the instrumental detection limit. If the spike is not recovered within the specified limits, a matrix effect should be suspected. The use of a standard-addition analysis procedure can usually compensate for this effect.

CAUTION: The standard-addition technique does not detect coincident spectral overlap. If suspected, use of computerized compensation, an alternate wavelength, or comparison with an alternate method is recommended.

8.5.3 Standard addition: The standard-addition technique involves adding known amounts of standard to one or more aliquots of the processed sample solution. This technique compensates for a sample constituent that enhances or depresses the analyte signal, thus producing a different slope from that of the calibration standards. It will not correct for additive interferences which cause a baseline shift. The simplest version of this technique is the single-addition method, in which two identical aliquots of the sample solution, each of Volume V_x, are taken. To the first (labeled A) is added a small volume V_s of a standard analyte solution of concentration c_s. To the second (labeled B) is added the same volume V_s of the solvent. The analytical signals of A and B are measured and corrected for nonanalyte signals. The unknown sample concentration c_x is calculated:

$$c_x = \frac{S_B V_s c_s}{(S_A - S_B)\, V_x}$$

where S_A and S_B are the analytical signals (corrected for the blank) of solutions A and B, respectively. V_s and c_s should be chosen so that S_A is roughly twice S_B on the average. It is best if V_s is made much less than V_x, and thus c_s is much greater than c_x, to avoid excess dilution of the sample matrix. If a separation or concentration step is used, the additions are best made first and carried through the entire procedure. For the results of this technique to be valid, the following limitations must be taken into consideration:

1. The analytical curve must be linear.

2. The chemical form of the analyte added must respond the same way as the analyte in the sample.

3. The interference effect must be constant over the working range of concern.

4. The signal must be corrected for any additive interference.

The absorbance of each solution is determined and then plotted on the vertical axis of a graph, with the concentrations of the known standards plotted on the horizontal axis. When the resulting line is extrapolated back to zero absorbance, the point of interception of the abscissa is the concentration of the unknown. The abscissa on the left of the ordinate is scaled the same as on the right side, but in the opposite direction from the ordinate. An example of a plot so obtained is shown in Figure 1.

8.6 Check the instrument standardization by analyzing appropriate quality control check standards as follows.

8.6.1 Check instrument calibration using a calibration blank and two appropriate standards.

8.6.2 Verify calibration every 10 samples and at the end of the analytical run, using a calibration blank (5.5.1) and a single point check standard (5.6).

8.6.2.1 The results of the check standard are to agree within 10% of the expected value; if not, terminate the analysis, correct the problem, and recalibrate the instrument.

8.6.2.2 The results of the calibration blank are to agree within three standard deviations of the mean blank value. If not, repeat the analysis two more times and average the results. If the average is not within three standard deviations of the background mean, terminate the analysis, correct the problem, recalibrate, and reanalyze the previous 10 samples.

8.6.3 Verify the interelement and background correction factors at the beginning and end of an analytical run or twice during every 8-hour work shift, whichever is more frequent. Do this by analyzing the interference check sample (Paragraph 5.7). Results should be within ±20% of the true value obtained in 8.6.2.1.

8.6.4 Duplicate spiked samples are to be analyzed at a frequency of 20%.

8.6.4.1 The relative percent difference between duplicate determinations is to be calculated as follows:

$$RPD = \frac{D_1 - D_2}{(D_1 + D_2)/2} \times 100$$

where:

RPD = relative percent difference.
D_1 = first sample value.
D_2 = second sample value (duplicate).

(A control limit of ±20% for RPD shall be used for sample values greater than 10 times the instrument detection limit.)

8.6.4.2 The duplicate matrix spike sample recovery is to be within ±20% of the actual value.

8.6.5 The method of standard addition (Paragraph 8.5.3) shall be used for the analysis of all EP extracts.

9.0 METHOD PERFORMANCE

9.1 In an EPA round-robin Phase 1 study, seven laboratories applied the ICP technique to acid-distilled water matrices that had been spiked with various metal concentrates. Table 4 lists the true values, the mean reported values, and the mean percent relative standard deviations.

9.2 In a single laboratory evaluation, seven wastes were analyzed for 22 elements by this method. The mean percent relative standard deviation from triplicate analyses for all elements and wastes was 9±2%. The mean percent recovery of spiked elements for all wastes was 93±6%. Spike levels ranged from 100 ug/L to 100 mg/L. The wastes included sludges and industrial wastewaters.

10.0 REFERENCES

1. Winge, R.K., V.J. Peterson, and V.A. Fassel, Inductively Coupled Plasma-Atomic Emission Spectroscopy: Prominent Lines, Final Report, March 1977 - February 1978, Ames Laboratory, Ames, IA, sponsored by Environmental Research Laboratory, Athens, GA, EPA-600/4-79-017, March 1979.

2. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-82-05, December 1982, Method 200.7.

3. Patel, B.K., Raab, G.A., et al., Report on a Single Laboratory Evaluation of Inductively Coupled Optical Emission Method 6010, EPA Contract No. 68-03-3050, December 1984.

TABLE 4. ICP PRECISION AND ACCURACY DATA[a]

Element	Sample No. 1			Sample No. 2			Sample No. 3		
	True Value (ug/L)	Mean Reported Value (ug/L)	Mean SD[b] (%)	True Value (ug/L)	Mean Reported Value (ug/L)	Mean SD[b] (%)	True Value (ug/L)	Mean Reported Value (ug/L)	Mean SD[b] (%)
Be	750	733	6.2	20	20	9.8	180	176	5.2
Mn	350	345	2.7	15	15	6.7	100	99	3.3
V	750	749	1.8	70	69	2.9	170	169	1.1
As	200	208	7.5	22	19	23	60	63	17
Cr	150	149	3.8	10	10	18	50	50	3.3
Cu	250	235	5.1	11	11	40	70	67	7.9
Fe	600	594	3.0	20	19	15	180	178	6.0
Al	700	696	5.6	60	62	33	160	161	13
Cd	50	48	12	2.5	2.9	16	14	13	16
Co	700	512	10	20	20	4.1	120	108	21
Ni	250	245	5.8	30	28	11	60	55	14
Pb	250	236	16	24	30	32	80	80	14
Zn	200	201	5.6	16	19	45	80	82	9.4
Se[c]	40	32	21.9	6	8.5	42	10	8.5	8.3

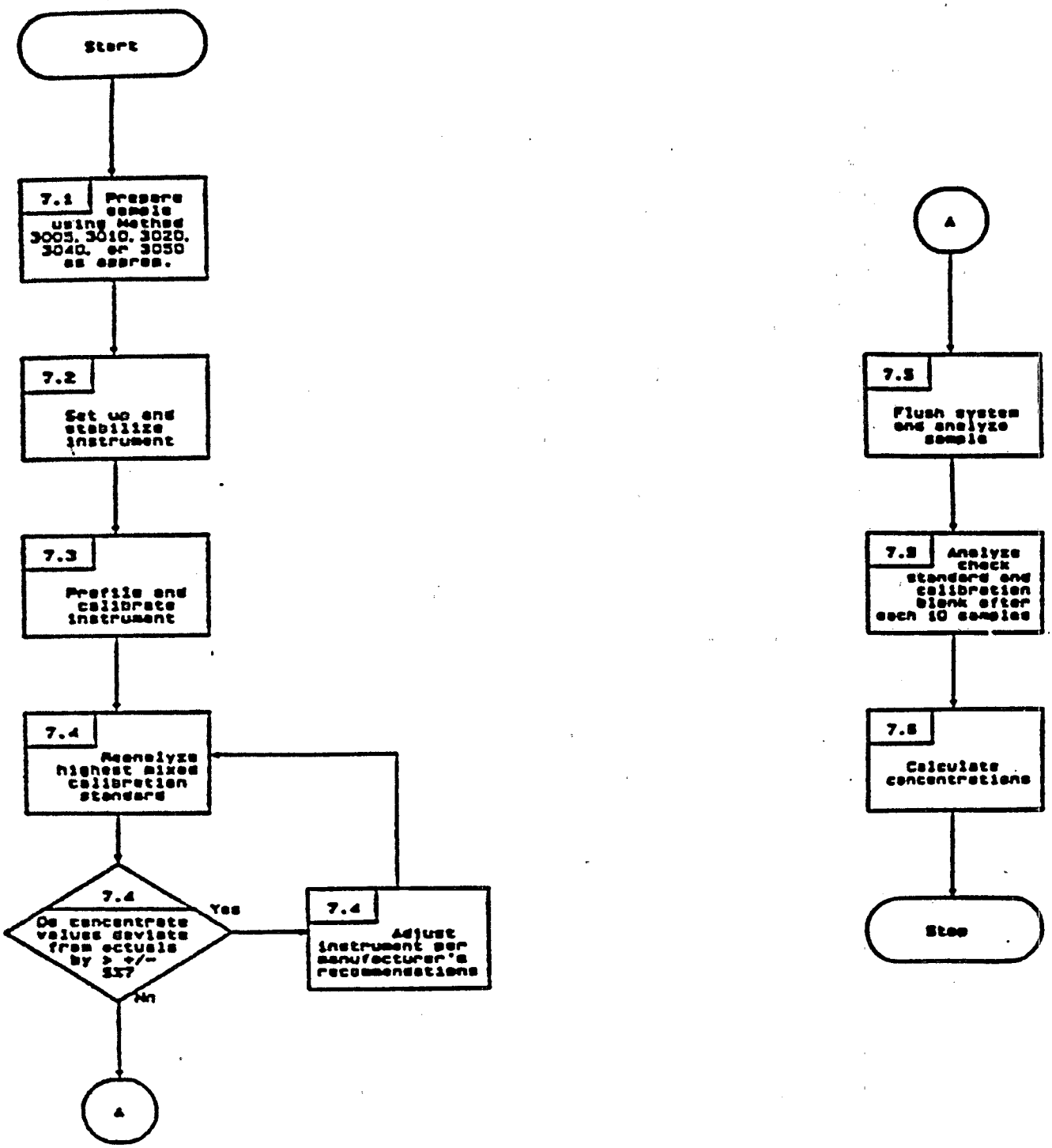
[a]Not all elements were analyzed by all laboratories.

[b]SD = standard deviation.

[c]Results for Se are from two laboratories.

METHOD 6010

INDUCTIVELY COUPLED ATOMIC EMISSION SPECTROSCOPY



APPENDIX B-3

STANDARD OPERATING PROCEDURE:
LABORATORY SCREENING METHOD FOR LEAD IN HOUSE DUST

USING ENERGY DISPERSIVE X-RAY FLUORESCENCE
(KEVEX 0700)

(d) computerized data system for analyzing, comparing and storing sample spectra.

4.2 8 inch Floppy Data diskettes, IBM, or equivalent.

4.3 Sample cups, plastic, consisting of cup, o-ring, and cap, Spectra-Cup, Cat. No. 340, Somar Labs. Inc., New York, or equivalent.

4.4 Mylar film, 6 micron.

5.0 REAGENTS

5.1 U.S. Department of Commerce, National Bureau of Standards, Standard Reference Materials

SRM	Unit Type	Certified Lead Size	Concentration
1579	Powdered Lead Base Paint	35g	11.87%
1633a	Coal Fly Ash	75g	72.4 ug/g
1645	River Sediment	70g	714 ug/g
1646	Estuarine Sediment	75g	28.2 ug/g
1648	Urban Particulate	2g	0.655%

5.2 US EPA, Environmental Monitoring and Surveillance Laboratory (EMSL), Quality Control Reference Standards

5.3 Instrument Calibration Standards

Dust M-10	2500 ppm	10 mg.
Dust M-50	2500 ppm	50 mg.
Dust H-10	25,000 ppm	10 mg.
Dust H-50	25,000 ppm	50 mg.

6.0 Sample Collection and Transfer of Custody to the U.S. EPA

Samples are collected in the field by Lead-Free-Kids staff, placed in labeled individual envelopes, and submitted with chain-of-custody (COC) documentation to the U.S. EPA New England Regional Laboratory (NERL) for XRF analysis. U.S. EPA personnel or their contractors will acknowledge receipt of custody by signing and dating the COC document in the presence of the LFK dust sample courier. The COC document is retained until sample analysis has been completed and results have been entered onto it. Then the original COC is returned to LFK with a cover letter.

6.1 Sample Preparation

6.1.1 Samples are assigned unique laboratory identification numbers, a sequential five-digit number, which is subsequently recorded on the sample envelope, chain-of-custody document, XRF Dust preparation worksheet, XRF analytical result summary sheet, and on the cover of the sample analysis container.

6.1.2 Under the ventilation hood, the sample envelope is carefully opened at one end (with scissors) and the dust is placed into a 60 mesh sieve.

6.1.3 The sieve is manually shaken for approximately 15 to 20 seconds.

6.1.4 All the fines are then transferred to the pre weighed sample analysis container using a glass powder funnel centered over and touching the center of the mylar window of the sample container.

6.1.5 Information from the chain-of-custody, including weight of sample, and laboratory ID number is recorded on the analytical results summary form.

6.1.6 All of the excess (non-filtered) soil/dust from the sample preparation is discarded in a special barrel in the laboratory. In some cases filtered

dust may be removed for the analysis container if the quality of dust interferes with container fabrication. However, all the dust amount be weighed before excess dust is removed. must

6.1.7 The powder funnel and sieve are cleaned between samples to remove soil and dust particles, using clean, compressed breathing air (grade D), or the like.

6.1.8 The sampling cup is sequentially placed in the sample tray according to the laboratory ID number for XRF analysis. Empty envelopes are retained and returned to LFK staff along with sample results.

6.2 Sample Container Preparation

The sample containers consist of two small o-rings with tabs, two pieces of 6 micron mylar film, a sample cup (which is slightly larger than the o-rings), and a container cap.

6.2.1 Place a piece of 6 micron mylar film over one o-ring (tabs down).

6.2.2 Snap the sample cup into place on top of the o-ring.

6.2.3 Weigh sample cup parts excluding cap and round to 4 decimal places.

6.2.4 Place dust sample onto mylar film via glass powder funnel. Be sure that sample is centered on film.

6.2.5 Place another piece of mylar onto sample cup over the dust and snap the second o-ring onto the top of the cup (tabs up).

6.2.6 Reweigh sample container and round to 4 decimal places.

6.2.7 Snap container cap into place on top of cup.

Note: The container cap is only used for identification and handling of the sample. All analyses must be performed with container cap removed.

6.2.8 Label the sample container cap with the correct sequential laboratory sample ID number.

6.3 Standards Preparation

Study Control standards are prepared from previously analyzed and concentration verified house dust samples. Standard concentrations should be prepared at concentration levels and weigh ranges as presented below.

			Std.	Sample Calibration Weight Range
Dust M-10	2500 ppm	10 mg	M-10 or	0.0 - 0.24g
Dust M-50	2500 ppm	50 mg	H-10	
Dust H-10	25,000 ppm	10 mg	M-10 or	0.25g or greater
Dust H-50	25,000 ppm	50 mg	H10	

6.4 Sample Preservation and Handling

No preservation is required. Handling of the sample, once it is placed in the analysis cup, must be done in a gentle manner to keep the sample centered in the middle of the mylar. This is especially important for samples requiring replicate analysis.

7.0 ANALYSIS PROCEDURE

7.1 The use of the Kevex 7000 XRF is relatively straightforward. The Kevex is normally left in the standby mode (target .8, 30 kV, and 0.5 mA) between analyses to prevent x-ray tube damage. House dust samples for lead are analyzed under the following instrumental conditions: target .4, 30 kV, .5 mA. (Detailed instructions can be found in the User's Manual for Kevex XRF Software.)

7.2 Instrument Set-Up

7.2.1 Turn the video monitor and plotter power on.

7.2.2 Insert the Master floppy disk into disk drive No. 0 (DY0)

7.2.3 Insert formatted floppy disk into disk drive No. 1 (DY1).

7.2.4 Boot the operating system by pressing the "Shift" and "Reset" keys simultaneously. Next, press the "Q Vantx" and then the "Enter" key.

7.2.5 When prompted on the screen, enter the current date.

7.2.6 After the current date has been entered, the spectral region of interest for lead must be established. This is accomplished by pressing the blue double-headed arrow (<------->) key. The region of interest that should be obtained is from 7.04 Kilo-electron Volts (KeV) to 17.28 KeV, where the lead L-alpha (L-a) peak is 10.25 KeV and the lead L-beta (L-b) is 10.___ KeV. After the spectral region has been established for lead analysis, wait for the asterisk (*) prompt and type in ATO, PBSOIL4. Type in sample ID Numbers as 5 digit numbers followed by -D- for each number at the end.

ex: Lab ID # 143 entered as 00143-D-

7.2.7 The first carousel run on the Kevex for the day must contain all four calibration standards. Each additional carousel run must include one of the four study control standard on a rotating basis. Calibration standards are run manually and not on the ATO program.

7.3 Loading the Kevex Sampler (Carousel)

7.3.1 Push the "Reset" key (red) to shut-off the x-ray beam. (As a safety precaution, the lid will not open when the x-ray beam is functioning).

7.3.2 Open the Kevex top and place sample cups into the sixteen (16) available slots (numbered 0 through 15) on the circular carousel.

7.3.3 Set the Kevex XES to ATO (white key). Then proceed with the analysis.

7.4 Manual Analysis of Dust Samples

The analysis will be performed using the ATO and manual modes. The manual method requires that the operator be presented while performing this type of analysis.

Keyboard commands required to initiate and perform XRF analyses are detailed below:

7.4.1 Await (*); type "Clr", then press the "Enter" key.

7.4.2 Make sure white switch is on manual position.

7.4.3 Push yellow key next to sample number. Use numbered key pad on KEVEX to enter desired position then hit enter.

7.4.4 Push yellow key to target display and enter 4 using numbered key pad again.

7.4.5 Continue in this manner and enter 30 for KEV and .5 for mA.

7.4.6 On the screen keyboard hit the yellow ACQ button. When running the standards you will manually stop them at their designated ppm concentration (2500 for medium and 25,000 ppm for high) using the yellow stop key next to the acquire key. Using the blue arrows (up and down) to increase and shrink the size of the peak, let the sample run for between 20 and 30 seconds. Stop the peak when it reaches the 2.5 mark designated by the numbered lines on the left side of the viewing screen.

7.4.7 When you have stopped the peak at its desired height (2.5) type SMO to smooth the curve. If the peak now falls below 2.5 it may be necessary to continue acquiring the peak for a couple more seconds and again hit stop to halt peak. Alternating between acquire, stop and smooth may be done an unlimited number of times until the peak appears in the right position as long as the time count is below 30 seconds. Time of analysis may not run over 30 seconds.

Note: Only calibration standards will be run on manual not dust samples.

7.4.8 Await (*); type "REA"d, press "Enter".

7.4.9 Await (*); type "SAV"e, press "Enter".

7.4.10 Prompt: General Comments.

7.4.11 Response: Section is ignored, press "Enter".

7.4.12 Prompt: Enter Unit: (1) or (2).

7.4.13 Response: Type "1", press "Enter".

* 7.4.14 Prompt: Enter Sample ID":

7.4.15 Response: type in Sample ID as assigned in XRF dust preparation worksheet.

* Manual analysis does not automatically add a 4 onto the end of the identification label and therefore the 4 is not needed for recall purposes.

7.5 Automatic Analysis Procedure

7.5.1 At asteric on screen type ATO,PBSOIL4 Enter.

7.5.2 Enter the last sample position but do not include standards that will run manually.

7.5.3 Enter lab ID. numbers for each corresponding position.

7.5.4 As the program runs you must be present to observe each lead sample peak as it acquires for 30 seconds.

7.5.5 With screen parameters of <7.04 and 17.28> the compton scatter peak will be the last peak visible on the right hand side. The lead peak will appear directly above the blue arrow at the bottom of the screen.

7.5.6 If the lead peak rises faster then the compton peak it will be calibrated using the high standard. If the lead sample peak does not rise above the compton peak, the medium standard will be used.

7.5.7 To determine if the 10 standard or the 50 standard is to be used, identify the weight of the sample. The sample is:

0.00g - 0.024g use 10 standard
0.025g - 0.100g or above use 50 standard.

7.6 <u>Manual Quantitation and Comparison of Dust Samples</u>

7.6.1 Await (*); type "RCL" (recall), press "Enter".

NOTE: The RCL (recall) command is used to recall a previously analyzed spectra that has been stored on the floppy diskette (DY1). In this case, a previously analyzed lead in dust calibration or reference standard for comparison to the various dust samples analyzed and stored on the same diskette.

7.6.2 Prompt: Enter Unit: 1 or 2.

7.6.3 Response: Type "1", press "Enter".

7.6.4 Prompt: Enter ID:

7.6.5 Response: Type the standard/label ID, press "Enter".

7.6.6 Prompt: Smooth Recalled Spectrum (Y/N)?

7.6.7 Response: Press "Enter".

7.6.8 Await (*); type "OVR" (overlay), press "Enter". The overlay command is used to compare and normalize spectra from the disk. The normalization feature (OVR) allows the operator to mark regions within the displayed spectrum as a basis for normalization. This feature aids in the visual interpretation of data and reduces channel-to-channel statistical fluctuations.

7.6.9 Prompt: Enter ID: add -D-4 to the end of each ID.

7.6.10 Response: Enter the sample ID, press "Enter".

7.6.11 Prompt: Smooth Recalled Spectrum (Y/N)?

7.6.12 Response: Press "Enter".

7.6.13 Prompt: Mark Peak(s) or Region(s) Hit Enter When Ready a cursor will appear on the screen.

7.6.14 Response: Mark the regions to be used for normalization by moving the cursor with the left and right green arrow function keys. The peak to be painted is the compton scatter peak. The screen parameters should be 9.60 - 19.84 use the green" equal (=) key to paint the desired area. Note: the paint cursor will move in the direction it was last set. Press the "Enter" key when finished.

7.6.15 The screen display will now include the standard spectrum overlaid by the sample spectrum normalized to the same energy region of the spectrum. Direct comparison of the lead (L-a) peaks can be made and a concentration (in ppm) can be determined.

Note: The red peak is the standard peak which should read 2.5 (use the Blue up and down arrows to set this). The white peak is the sample peak. Use the blue up and down arrows to best compare the sample peak value ppm. Although the height of

the red and white peaks will change the ppm value of the red (standard) will always remain the same 2500 ppm or 25,000 ppm depending on the standard used.

7.6.16 The OVR sequence can be repeated for each sample on the disk (DY1).

7.7 A Modified Quantitation Procedure - This is basically the same procedure as described above.

Dr. T. Spittler, USEPA Region I, Technical Services Branch Chief, Lexington, Massachusetts initiated the use of a quick and easy method for the semi-quantitative analysis of lead in soil samples.

Dr. Spittler has determined that, when acquiring data for the 2000 ppm lead in soil standard at an attenuation of 512 and the energy level for the compton's back scattering energy peak at 15 KeV is at 50 percent intensity, each horizontal screen division is equivalent to the response of ca. 800 ppm lead. To utilize this technique for dust, follow the XRF instrument set-up guidelines as previously described in Sections 7.2, 7.3, and 7.4 (7.4.1 to 7.4.5). To acquire, quantify, and store data, utilize the following procedure:

7.7.1 Check sampler position at "0".

7.7.2 Await (*); press the yellow "ACQ" key.

7.7.3 Wait for energy level at 15.- KeV to reach 50 percent scale at a range of 512.

7.7.4 Press the yellow "Stop" key.

7.7.5 Await (*); type "SMO", press "Enter".

7.7.6 Await (*); type "REA", press "Enter".

7.7.7 Await (*); type "SAV", press "Enter".

7.7.8 Prompt: General Comments.

7.7.9 Response: Section is ignored, press "Enter".

7.7.10 Prompt: Enter Unit: (1) or (2).

7.7.11 Response: Type "1", press "Enter".

7.7.12 Prompt: Enter Sample ID:

7.7.13 Response: type in sample ID as assigned in the XRF logbook.

7.7.14 Quantify the L(a) lead peak using the following scale:

Attenuation	Concentration Range of Lead (vertical scale division concentration)
64	0 to 700 (100 ppm)
128	0 to 1400 (200 ppm)
256	0 to 2800 (400 ppm)
512	0 to 5600 (800 ppm)
1024	0 to 11,200 (1600 ppm)

7.7.15 Await (*); type "CLR" (clear), press "Enter".

7.7.16 Advance the sample tray one space and repeat the analysis procedure.

8.0 QUALITY CONTROL

8.1 All quality control data should be maintained and available for easy reference or inspection.

8.2 At the beginning of each operating shift all 4 study control standards are analyzed on the first carousel. On following carousel runs analyze one standard (one per sixteen) This is done to assess method accuracy and to correct for normal standard drift and results should agree within ± 20 percent of the true value.

8.3 At least one laboratory replicate should be analyzed for every 20 samples to verify precision of the method. Replicate samples may be run at the end of an analytical day in their own carousel.

8.4 At least one laboratory replicate should be analyzed at a frequency of 1 per 20 samples to verify precision of

the method. Replicate samples maybe run at the end of an operation shift.

NOTE: True replicates of soil and dust samples are usually not possible since chemicals such as lead are typically not uniformly distributed in these materials. Additional handling of the sample may cause the dust to migrate away from the center of the mylar. Care must be taken when handling samples. Care must be taken in the interpretation of soil and dust replicate analytical results.

9.0 METHOD REFERENCE

9.1 Precision and accuracy data are not available at this time.

9.2 The performance characteristics for a dust sample free from interferences are:

Optimum Concentration Range: N/A ug/g
Detection Limit: NA ug/g
N/A: not available at this time.

APPENDIX B-4

STANDARD OPERATING PROCEDURE: LABORATORY SCREENING METHOD FOR LEAD IN SOIL USING ENERGY DISPERSIVE X-RAY FLUORESCENCE OXFORD LX1000

1.0 SCOPE AND APPLICATION

1.1 Metals in a solution may be readily determined by energy dispersive x-ray fluorescence (XRF) spectrometry. The method is simple, rapid, and applicable to a large number of metals in various matrices with little or no sample preparation (i.e., digestion is not required prior to analysis).

1.2 Detection limits, sensitivity, and optimum ranges of the metals will vary with the sample matrices and the models of XRF spectrometers utilized.

1.3 This method is applicable to Region I ESD and ESAT staff performing laboratory screening analyses for lead in soil samples collected as part of the LFK Demonstration project.

2.0 SUMMARY OF METHOD

This method is used for the semi-quantitative screening of lead in soil. The soil sample is homogenized, an aliquot is removed and placed in a sampling container. The sample is then analyzed using XRF.

3.0 INTERFERENCES

Certain elements, such as _____, present in the soil sample could interfere with the analysis, if present in concentrations greater than _____ times that of lead.

4.0 APPARATUS AND MATERIALS

4.1 Energy Dispersive X-Ray Fluorescence

An Oxford Analytical Instrument LAB-X 1000 equipped with:

- excitation source: Cadmium 109
  typical activity: 3 milli Curies (3MCi)
  half life: 1.3 years
  principal energy level: silver, K, 22 KeV
  atomic no range: (K) spectra, 24-42; (L) spectra, 72-92
- detector: xenon filled proportional counter
- six (6) position motorized turntable
- microprocessor control consisting of:

- display: 40 column, 2 line liquid crystal display
- printer: 40 column, 2 color dot matrix with graphics, uses 70mm wide plain paper
- keypad: 20 key alphanumeric membrane pad.

4.2 Printer paper, 70mm wide.

4.3 Printer ribbon.

4.4 Sample cups, plastic, spectro-cup, Cat. No. 340, Somar Lab. Inc., New York or equivalent.

4.5 Mylar film, 6 micron

4.6 A stable power supply, whose requirements of 100-120 volt AC, 45-165 Hz, 50 VA maximum consumption are critical to instrument performance. Extreme temperature ranges also effect instrument performance.

5.0 REAGENTS

5.1 U.S. Department of Commerce, National Bureau of Standards, Standard Reference Materials

SRM	Type	Unit Size	Certified Lead Concentration
1579	Powdered Lead Base Paint	35g	11.87%
1633a	Coal Fly Ash	75g	72.4 ug/g
1645	River Sediment	70g	714 ug/g
1646	Estuarine Sediment	75g	28.2 ug/g
1648	Urban Particulate	2g	0.655%

5.2 US EPA, Environmental Monitoring and Surveillance Laboratory (EMSL), Quality Control Reference Standards

5.3 Instrument Calibration Standards

Not available at this time.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 Samples are collected in the field, placed in labelled, individual, zip-lock plastic bags, and submitted to the ESD laboratory for analysis. Samples are logged into the laboratory logbook and assigned a laboratory identification number.

6.2 Soil samples are thoroughly mixed (homogenized) in the zip-lock bag. An aliquot of the soil, 2 to 3 table spoons (10 to 15 grams), is removed with a spoon or spatula and placed in a wang dish or appropriate drying vessel. The dish is marked with the laboratory identification number and allowed to air dry overnight at ambient laboratory temperature.

6.2.1 Excess sample in the zip lock bag will be stored until the analytical report has been finalized then discarded. However, selected soil samples maybe kept longer for additional testing.

6.3 <u>Sample Preparation</u>

Dried soil samples will be passed through a 60 mesh sieve until approximately 1 gram of fines have been passed. The sieve will be manually shaken, typically 10 to 15 seconds is adequate. The fines are then transferred to the analysis sample container using a glass powder funnel which is placed over the sample container.

6.3.1 All excess soils from sample preparation will be discarded in a special barrel in the laboratory.

6.3.2 The powder funnel, sieve, drying vessel, and spoon (or spatula) will be cleaned between samples to remove soil particles. The funnel and sieve will be blown free of dust with compressed air. The spoon will be wiped with disposal tissues and drying vessel washed vigorously with hot water.

6.4 <u>Sample Container Preparation</u>

6.4.1 Invert cup and place a piece of 6 micron mylar film over the bottom aperture.

6.4.2 Snap a retaining o-ring over the film onto the base of the cup (o-ring teeth down).

6.4.3 Place cup upright and add enough soil to uniformly cover the mylar film bottom of the cup.

6.4.4 Snap cap into place on top of the cup.

6.4.5 Label the sample cup with the sequential laboratory I.D. No. and record that in the XRF instrument logbook.

NOTE: Information to be recorded in the XRF logbook would include:

- field identification numbers;
- laboratory identification numbers;
- date samples prepared;
- date samples and analyzed;
- analysis parameters; and
- analyst's initials affiliation and date.

6.5 Standards Preparation

Calibration standards are prepared from previously analyzed and concentration verified soil samples or known reference standards. Standard concentrations should be prepared at concentration levels of lead at approximately:

- 50 - 100 ppm (ug/g)
- 100 - 500 ppm
- 500 - 1000 ppm
- 1000 - 2000 ppm
- 2000 - 5000 ppm

6.6 No special preservation or handling procedures are required.

7.0 ANALYSIS PROCEDURE

The use of the Oxford Analytical Instrument Model LAB-X 1000 XRF is relatively simple. (Detailed instructions for its use can be found in the LAB-X 1000 Instruction Manual.)

7.1 Instrument Set-Up

7.1.1 Turn power on.

7.1.2 Wait for menu to appear in video display.

7.1.3 Press key "3" to select Utilities routine.

7.1.4 The instrument will print the date and time and display the menu:

1 = Position Turntable
2 = Set Date and Time
3 = Printer Check
4 = Turn Page

Select option 3 to check correct function of printer

Press key "3".

7.1.5 If date and time printed at the start of these routines are incorrect, they can be reset by pressing key "2".

7.1.6 Exit from the utilities routine by pressing option 4 until the main menu (as shown below) is displayed.

1 = Analyses 2 = Calibrate
3 = Utilities 4 = Turn Page

The LAB-X is now ready to begin analyses.

7.2 Manual Analysis of Soil Samples

7.2.1 Place one of the assembled safety windows in position 0 in the sample loading port.

7.2.2 Place the sample cup into the cell or secondary window holder which fits into the safety window of the sample loading port. The cell assembly should be lightly tapped on a clean, hard surface to settle the contents of the cup (i.e., evenly distribute the soil on the mylar film).

7.2.3 Selection option 1, Analyses, on the Main Menu. Press key "1".

7.2.4 Another menu appears, select option 2, Spectrum Scan. Press key "2".

7.2.5 Prompt: enter "Analysis Head".

7.2.6 Response: press key "2".

7.2.7 Prompt: enter "Sample Label".

7.2.8 Response: enter sample ID from XRF log.

7.2.9 Prompt: Is "Sample Label" Inserted?

7.2.10 Response: press "Yes" key.

7.2.11 The measurement cycle now begins. The turntable will rotate 60 degrees, carry out an Energy Lock for Ca. 10 seconds prior to further rotation which transports the sample to the required sampling head. The operator may terminate a measurement by pressing the "Esc"ape key before the programmed time has elapsed.

7.2.12 After completion of the measurement cycle, select option 2, Print Scan. Press key "2".

7.2.13 After the scan has been printed, determine if the lead L-alpha peak is on scale and measurable. If not, select one of the three (3) scaling options: 5, 10, or 20. Press the appropriate key.

7.2.14 After the scale scan has been printed, select option 4, Turn Page, to return to the Analyses Menu. Press key "4".

7.2.15 Place another sample into the sample holder and repeat the analysis process.

7.3 Quantification

7.3.1 A series of calibration standards are analyzed at each scaling factor; 0, 5, 10, and 20. An average response factor (RF) is determined using a minimum of three (3) concentrations and one (1) reagent blank analyzed at least three times.

7.3.2 The peak height of the lead L-alpha (at _____) is measured for each sample. This peak height is multiplied by the RF to determine the concentration of lead (ppm) in the sample.

8.0 QUALITY CONTROL

8.1 All quality control data should be maintained and available for easy reference or inspection.

8.2 A set of calibration standards at each scaling factor should be analyzed in the laboratory prior to initiating field studies. These calibration standards should consist of a minimum of three (3) standards and one (1) reagent blank ("clean soil").

8.3 A minimum of one (1) reagent blank and one (1) standard at or near the mid-range of the calibration curve should be analyzed daily to verify instrument reproducibility. These values should agree within ± 20 percent of the initial calibration.

8.4 If forty-five (45) or more samples per day are analyzed or if samples from more than one site are to be analyzed in one day, then the working standard curve must be verified by analyzing a mid-range standard for every thirty (30) samples or for each site, whichever is more frequent. These check standard results must be within ± 20 percent of the true value.

8.5 At least one (1) field laboratory duplicate sample should be analyzed with every twenty (20) samples to verify the precision of the method.

NOTE: True replicates of soil samples are usually not possible since chemicals such as lead are typically <u>not</u> uniformly distributed in these materials. Care must be taken in the interpretation of soil replicate analytical results.

8.6 At least one (1) lead-in-soil standard reference sample should be analyzed daily or per site, which ever is more frequent. The result should agree within ± 20 percent of the true value.

9.0 METHOD PERFORMANCE

9.1 Precision and accuracy data are not available at this time.

9.2 The performance characteristics for a soil sample free from interferences are:

Optimum Concentration Range: N/A ug/g

Detection Limit: N/A ug/g

NA: not available at this time.

LEAD FREE KIDS STUDY

EXTERNAL QUALITY ASSURANCE/QUALITY CONTROL

QUALITY ASSURANCE FOR BLOOD LEAD ANALYSIS (CENTERS FOR DISEASE CONTROL)

A. INTRODUCTION

The lead in soil demonstration project of its nature requires blood lead data of the highest quality. Expected differences in blood lead levels from successful abatement are of the order of 2-4 μg/dL, thus placing unusually stringent requirements on long term laboratory precision. The quality control issues including establishment and maintenance of a high degree of precision over the entire duration of the project. The key function of the quality assurance system is to ensure the absence of any "drift" (downward or upward) with analytical values with time, such that any difference in blood lead values over time cannot be attributed to changes in the analytical system. Simply stated, this will help insure that statistically speaking, observed changes in blood lead are real- that is, due to intervention and not attributable to changes in the laboratory method over time. Since the CDC has extensive experience in such activities from the National Health and Nutrition Examination Survey (NHANES) and other long term studies, we were asked by the USEPA to provide assistance. The material following is a summary of laboratory related issues that were included in the overall QC program.

B. ELEMENTS OF A QUALITY CONTROL SYSTEM

In order for any analytical measurements to be valid and interpretable, the sources of error for each unique measurement system must be identified and minimized. This, then, is the major function of quality control. In the specific example of blood lead measurements, the following have been shown from experience to be the major sources of error:

1) contamination of the specimen during collection, storage, or analysis

2) deterioration of the specimen by clotting, denaturation, or other processes

3) instability of the measurement system, either over a short (within run/day) or long time span

4) improper calibration of the measurement system

5) errors in data handling, storage, or reporting

Quality control therefore must include a number of components, both within and external to the laboratory: 1) collection of an uncontaminated specimen; 2) preservation and shipping (if needed) of the specimen under conditions that assure integrity; 3) monitoring of analytical method performance, to include instrumental stability, maintenance, and performance of the analyst(s); and 4) accuracy and completeness of all data, to include specimen identification, data reduction, and data interpretation.

Some critical components of each of these areas include:

1. Specimen Collection

Proper screening of all specimen collection equipment to define any detectable levels of the analyte, and estimate variability of this contamination.

Written protocols for specimen collection which describe in detail all sampling equipment and its use, precautions to avoid contamination, and other requirements (time of day, fasting/non-fasting state of subject) which might affect specimen integrity.

2. Specimen Preservation and Shipping

Proper packing, storage and shipping temperatures, suggested means of conveyance for timely receipt of specimens.

Detailed shipping and specimen log forms to allow description of each specimen to record any variances from collection or shipping protocols.

3. Analytical Method Performance

Method selected must demonstrate precision and accuracy in the appropriate analytical range and should be simple, rugged, rapid and cost-effective. Ideally, the detection limit should be ca. 2 μg/dL with precision about 5% at the 10 μg/dL level for the proposed study.

Instrumental stability, and by inference "method" stability, should be documented by analysis of control materials, both "bench" and "blind". It is desirable that materials with certified values of the analyte of interest be analyzed regularly to demonstrate method accuracy. It is suggested that at least 10% of the specimens be quality control pools.

4. Bench and Blind Quality Control Materials

Blind quality control pools should be inserted at a rate of 5% by a source external to the laboratory. These specimens should be in the same container type and labelled with pseudopatient numbers such that they are indistinguishable from patient samples. It is suggested that the blind (and bench) pools have two concentrations - one in the "expected" range of values for the majority of patient samples and one at or near the "decision level" for undue exposure. It is important that the blind materials by truly blind to the analyst for maximum effectiveness in the detection of analytical system error. The "pseudopatient" numbers used in labelling of the blinds will be decoded by the supervisor only, and that analytical run evaluated on the basis of pre-established control limits.

Use of quality control charts for means (X bar) and ranges (R) is essential; it is suggested that 20 runs be made for characterization of all quality control materials, and that these data be analyzed by two-way analysis of variance (ANOVA) to produce these charts. These charts should be in use by the analyst for each run for the evaluation of "bench" or known blood controls (and

by the supervisor for blinds) by use of mean and range control limits, such that corrective actions needed may be made in a timely way.

Criteria for repeat analytical runs (due to "out of control" condition as indicated by results from quality control samples) are dependent on the number of pools in the quality control system.

Inclusion of blind splits (duplicate samples within run, with different identification numbers such that identification by the analyst is prevented) is suggested at a 5% rate; some split specimens may be submitted to an external laboratory for verification of accuracy or comparability. If specimen collection constraints allow, it is recommended that at least 10% of the specimens be split with an external laboratory.

Criteria should be established as to "acceptable" agreement with the external laboratory.

5. Accuracy and Blanks

Blanks, consisting of samples in which ultrapure water is processes through the entire analytical procedure, are a useful part of quality assurance. The data from these determinations can be used to evaluate potential contamination in the laboratory environment as well as estimate the limit of detection of the analytical method.

Establishment of accuracy through the regular analysis of reference materials or proficiency testing pools is an essential part of good laboratory practice, and will help establish the accuracy of the method. The pools used for this accuracy assessment should be as close to identical to the survey samples as possible.

6. Data Integrity

Data logging should be performed for each run in approved notebooks or other data forms as soon as possible following each run. Electronic data entry may be desirable either as an adjunct to or replacement for "hard copy". It is recommended, however, that instrumental data be collected on hard copy in such a way that all data can be independently verified or reconstructed.

Data reduction should be standardized; all records of calculations should be secured and available for review.

C. DESCRIPTION OF QUALITY CONTROL SYSTEM USED

From previous experience in "long-term" quality control, a system was established that is similar to that used in the NHANES surveys, The cardinal features of such a system include written protocols for specimen collection, shipping, and analysis, a systematic screening of all specimen collection equipment and containers, establishment of statistical "control" limits by each individual laboratory, and supervision of all QC activities by a local laboratory supervisor. Since the three laboratories already had QC systems in place, there was a need to establish a common set of protocols and procedures for the entire project.

1. Initial Activities

Each laboratory was provided with a description of the sample collection and shipping protocols developed at CDC[1], as well as a reprint of our analytical method for blood lead (Appendix A). Summary descriptions of the QC system used in NHANES, as well as general descriptions of the NHANES quality control system were distributed (Appendix B, C).

Four whole bovine blood pools were collected at CDC, evaluated for lead content, and aliquoted into 2 mL Vacutainer brand whole blood collection containers (blind pools) or plastic screw-capped vials (bench pools). The Vacutainer specimen containers (as well as the plastic vials for the bench controls) were screened by established protocol[1], and had been purchased in sufficient quantity to allow all the projects to use them as standard specimen containers. Pools such as these (whole bovine blood, stabilized with 1.5 mg/mL disodium EDTA) have been shown to be stable at least two years at 4°C, the recommended storage temperature. Data from this screening are presented in Table 1. Aliquots of these four pools were distributed to the laboratories, and duplicate analysis of the four pools was performed over a series of twenty analytical runs. The data generated from these analyses were used to calculate the QC limits for both means (X bar) and ranges of duplicate measurements of these pools. The method of calculation is presented in Appendix D, using POOL "A" from Standard Reference Material (SRM) 955 from the National Institutes of Standards and Technology (NIST). The calculations are based on two-way analysis of variance (ANOVA) as described by Shewhart[2,3].

Results of the calculated limits for these four pools were sent to the three laboratories to be used as part of the laboratory quality control program. Results of the calculations for the three laboratories, as well as CDC, are presented in Table 2. The quality control limits could then be used in two ways:

1) the limits for the "blind" pools were used to evaluate the blind quality control pools, which were inserted into each analytical run by the supervisor; and

2) the limits for the "bench" pools could be used by the analyst (along with those for any additional pools) to evaluate the degree of statistical control of the analysis.

Insertion of the "blind" pools was random, using a random number table numbering scheme presented by Taylor[4], with identical labels as study subject specimens and identical Vacutainers (2 mL liquid EDTA, lot # 8E014 EXP 5/90). If names were provided on the sample labels, then fictitious names were provided for the "blinds" by the supervisor. The source of names could be random names from a metro phone book, or any other appropriate source.

2. Calibration

Since three different analytical methods were used in the study, the issue of calibration of the analytical systems was very important. The CDC recommendation to all three laboratories was that either SRM 3128 (from NIST) or equivalent aqueous standards for lead be used. In the case of the graphite furnace AAS methods (Boston and Baltimore), a version of the CDC published method was used for analysis, which includes "matrix matched" standards and lead nitrate aqueous

standards. The DPASV method used by Cincinnati[5] includes standards analyzed by isotope dilution mass-spectroscopy (IDMS). In all three laboratories, the ultimate test of the accuracy of calibration is generation of accurate values for reference materials. As can be seen from Table 2, all three laboratories agreed well (within 5%) with each other, and generated comparable results on the four pools provided by CDC (Figure 1).

3. Interpretation of Data

The quality control system outlined here has multiple uses:

1) evaluation of "day-to-day" statistical control of the analytical system;
2) verification of analytical performance on "blinds" - known samples inserted in each analytical run to verify precision
3) evaluation of any "trends" in the analytical performance of the method over time - either short term (days/weeks) or long term (months/years)

With the use of common rules for the verification of statistical control[4], all the laboratories would follow a statistically valid and proven method for data evaluation. Any problems not resolved at the local level were presented to CDC for resolution.

D. RESULTS OF QUALITY CONTROL SYSTEMS

Data from the initial characterization of the four whole blood pools used in this project are presented in Table 2. Each laboratory can be individually compared as to within-run precision, among runs precision, and total precision. Using the definition of the limit of detection as 3 SD(wr) developed by Winefordner[6], the laboratory detection limits may also be compared.

Of equal importance are the long-term quality control data, especially in terms of time trends. The Shewhart plots for the three laboratories are presented in Figure 2. As can be readily seen, no long-term trends in analytical values with time are evident. Statistical tests of the null hypothesis (that is, a "0" slope of X bar versus time) revealed no statistically significant trends with time.

The conclusions that can be drawn from these three systems are as follows:

1) comparable values were obtained on common quality control materials, which covered the analytical concentration range of interest;

2) laboratory data for blood lead were produced from analytical systems in statistical control (as defined by Shewhart); and

3) no statistically significant time trends were observed in the data - that is, the difference in pre- and post abatement blood lead values are real and not the product of unstable analytical systems.

TABLE 1: DATA FROM LEAD SCREENING

2 mL Vacutainers (B D lot #8E016 Exp. 5/90) Catalog #6384

Analytical result N=42 tubes;
soaked overnight (12 hr in 1% v/v nitric acid)

X = 0.0964 μg/dL lead (SD=0596 μg/dL CV=62%)

3 mL plastic vials (linear polyethylene) Falcon Catalog #

Analytical result N=42 tubes;
soaked overnight (12 hr in 1% v/v nitric acid)

X = 0.51 ng/mL Equivalent to 0.025 μg/dL (SD=0.36 ng/mL CV=71%)

Capillary Collection (Butterflies B D Catalog #7251; 7253)

Analytical Results; One mL 1% v/v nitric acid passed through each collector)
N = 5 results/collectors each size

X = < 0.1 ng/mL (cat 7251)
X = < 0.1 ng/mL (cat 7253)

TABLE 2: QUALITY CONTROL LIMITS - MEANS AND RANGES

LAB	POOL	MEAN MEAN	95% CONF LIMITS RANGE	95% CONF LIMITS MEAN	99% CONF LIMITS RANGE	99% CONF LIMITS MEAN
CDC	BLIND	4.6	3.0-6.2	1.6	2.5-6.7	2.1
	BENCH2	43.5	38.2-48.8	2.2	36.5-50.5	2.9
	BENCH1	1.8	1.0-2.5	1.4	0.8-2.7	1.9
	BLIND2	10.7	8.5-12.9	1.4	7.8-13.6	1.8
MD	BLIND1	5.1	4.2-5.9	0.87	4.0-6.2	1.1
	BENCH2	45.7	43.9-47.6	1.1	43.3-48.2	1.5
	BENCH1	2.0	1.45-2.63	0.6	1.27-2.8	0.8
	BLIND2	11.1	9.6-12.6	1.0	9.2-13.1	1.4
CN	BLIND1	3.5	1.9-5.1	3.2	1.4-5.6	4.2
	BENCH2	43.3	40.5-46.1	2.2	39.6-46.9	2.9
	BENCH1	2.4	0.9-4.0	2.0	0.4-4.5	2.6
	BLIND2	8.9	7.1-10.7	3.1	6.5-11.2	4.1
BOS	BLIND1	4.0	2.4-5.6	0.8	1.9-6.1	1.0
	BENCH2	47.0	42.9-51.2	2.9	41.6-52.6	3.8
	BENCH1	0.2	-1.2-1.5	0.85	-1.6-1.9	1.1
	BLIND2	10.6	8.6-12.5	1.3	8.0-13.1	1.7

E. REFERENCES

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LEAD FREE KIDS STUDY

EXTERNAL QUALITY ASSURANCE/QUALITY CONTROL
QA/QC FOR SOIL, DUST, AND HANDWIPES (US EPA/EMSL/LV)

Section 1
Preparation Laboratory Operations

1.1 Sample Receipt

Three cities are involved in the Superfund Lead Abatement Program; Baltimore, Boston, and Cincinnati. EMSL-LV supplies the field samples in each city with 30-gallon plastic barrels for soil samples and 1-gallon metal containers for interior dust samples. A minimum of two soil and two dust samples are collected in each city and shipped to EMSL-LV. The preparation laboratory manager records the arrival data of all samples received.

1.2 Sample Labeling

1.2.1 Soil and Dust

Each soil sample is labeled and identified by a unique sample code as described below.

	A BOS H 01 001 (example)
digits	1 234 5 67 8-10

Digits	Representation
1	Sample type - "A" - audit "C" = calibration
2-4	City code - "BOS", "BAL, "CIN"
5	Concentration - "H" = high, "M" = medium, "L" = low
6-7	2 kg sample - represents number of the 2 kg container in which soil was subsampled. If sample is dust the number would represent the 100g container.
8-10	20 g aliquot - numbered aliquot from soil 2 kg container or 2 g aliquot from dust 100 g container.

Analytical laboratories at each city provide sample labels and containers to be used for that city. Prior to shipping, the EMSL labels are removed and the city labels are affixed to the sample containers. Also, the EMSL-LV codes and corresponding city codes are recorded in a log book for each sample.

1.2.2 Handwipes

Each handwipe sample is labeled and identified by a unique sample code as described below.

	A BOS H 001 (example)
digits	1 234 5 6-8

Digits	Representation
1	Sample type - "A" - audit "C" = calibration
2-4	City code - "BOS", "BAL, "CIN"
5	Concentration - "H" = high, "M" = medium, "L" = low
6-8	Internal ID - the last three numbers of the internal LESC ID.

Analytical laboratories at each city provide sample labels and containers to be used for that city. Prior to shipping, the EMSL labels are removed and the city labels are affixed to the sample containers. Also, the EMSL-LV codes and corresponding city codes are recorded in a log book for each sample.

1.3 Sample Tracking

1.3.1 Soil and Dust

The preparation laboratory manager tracks each sample as it progresses through the preparation procedures and records progress in a logbook.

The following information is recorded on a daily basis.

Sample Type - soil, interior dust

City - Boston, Baltimore, Cincinnati

Concentration - high, medium, low

Dried - whether sample has been dried (yes/no)

Crushed - whether sample has been crushed (yes/no)

Bulk homogenization - whether bulk sample has been homogenized (yes/no)

Pulverized - whether sample has been pulverized (yes/no)

2 kg split - whether bulk sample has been split into 2 kg samples. If this step is partially complete, the number of aliquots prepared will be recorded.

100 g split - whether 2 kg soil aliquots have been split into 100 g aliquots or whether the bulk dust sample have been split into 100 g aliquots. If this step is partially complete, the number of aliquots prepared will be recorded.

20 g split - whether 100 g soil aliquots have been split into 20 g aliquots or 100 g dust aliquots have been split into 2 g aliquots. If this step is partially complete, the number of aliquots prepared will be recorded.

The appropriate types of information will be made available for dust and handwipe samples. As aliquots are sent to analytical laboratories, this information will also be recorded (see sample shipment).

1.3.2 Handwipes

The preparation laboratory manager tracks each sample as it progresses through the preparation procedures and records progress in a logbook.

The following information is recorded on a daily basis.

Sample Type - handwipe

City - Boston, Baltimore, Cincinnati

Concentration - high, medium, low

Spiked - whether sample has been spiked (yes/no)

The appropriate types of information will be made available for dust and handwipe samples. As aliquots are sent to analytical laboratories, this information will also be recorded (see sample shipment).

1.4 Sample Custody

Custody is transferred from the field samples to the preparation laboratory manager when the samples are received. The samples remain in the custody of the preparation laboratory manager until they are shipped to the analytical laboratories.

1.5 Sample Storage

All samples are placed in cold storage upon receipt until there is room for them in the drying room. After air drying, the samples are returned to cold storage until processing.

1.6 Sample Shipment

As samples are shipped a shipping form (Figure 1.1) is sent to both the laboratory manager and QA manager. The form sent to the laboratory manager contains only the types and numbers of samples sent and the city sample code information for each sample. The form sent to the QA manager contains information as well as the EMSL sample code, which identifies the concentrations of each sample.

LEAD ABATEMENT QA SAMPLE SHIPMENT FORM

LAB_____ SAMPLE TYPE_____

BATCH_____

DATE SHIPPED_____

NO OF SAMPLES_____

Sample Code	City Sample Code	EMSL Sample Code
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
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25		
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28		
29		
30		
31		
32		

Figure 1.1 Lead Abatement Sample Shipment Form

Section 2
Soil Audit Sample Preparation Procedures

2.1 Overview

Specific areas of the preparation laboratory are designated for sample processing. Sample integrity during processing is ensured by: (1) the use of detailed sample labels, (2) documenting the status of each sample during the processing, (3) following the preparation protocols, and (4) avoiding physician or chemical contamination during each processing step.

Bulk soil samples are processed as outlined in Figure 2.1. Each step is detailed in sections 2.2 - 2.8.

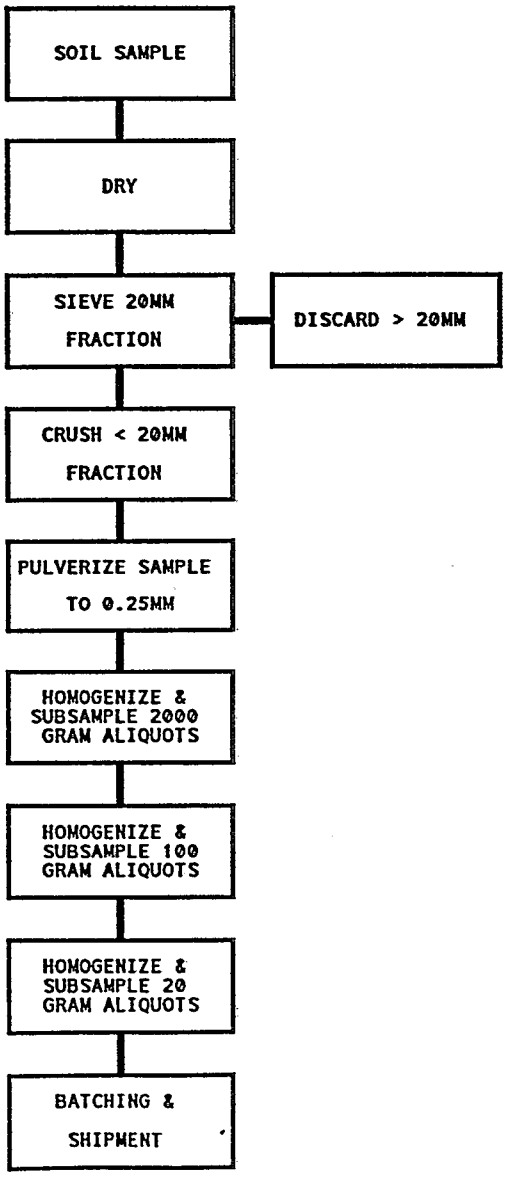

Figure 2.1 Soil Audit Sample Preparation Flow

2.2 Sample Drying

2.2.1 Summary

Sample tables constructed of PVC and heavy nylon mesh are used to air dry the samples. Use of the mesh enhances air circulation and increases the rate of sample drying. These tables are located in a dust free drying room.

Chemicals as well as food, drinks and smoking are prohibited in the drying area. A separate pair of gloves is worn when handling each sample. Care is exercised during the cleaning operation to avoid contamination of samples. Only one sample at a time is dried to avoid cross contamination. Weekly vacuuming or sweeping is performed to clean the floors of the drying room. Sweep EZ, (a sweeping compound) is used at least once a week to control dust accumulation in the drying area.

2.2.2 Equipment

Drying tables with nylon mesh surface
Kraft paper, 36-inch wide rolls
Rubber gloves, unpowdered

2.2.3 Procedure

Label a bulk sample processing data form for each sample to be air dried. Place two fresh sheets of kraft paper, approximately 1 square meter in area, on the drying table. Wearing gloves, slowly spread the sample on top of the paper, taking care not to lose any soil off the paper or contaminate any adjacent samples. Disaggregate any large peds. Soils high in clay may harden nearly irreversibly if allowed to dry without a preliminary disaggregation of medium and coarse peds. Place an additional sheet of kraft paper loosely over the sample. Daily stir the soil sample to facilitate drying. During the first few days replace the bottom sheet of paper in order to alleviate excessive moisture accumulation. Note any observations of fungal or algal growth on the data form.

Allow the sample to air dry for a minimum of four days. Prior experience indicates that samples dry to a constant moisture content (1-2.5%) within three days at the EMSL-LV preparation laboratory.

2.2.4 Quality Control

When samples are received, labels are checked and recorded. Wearing gloves, the samples are spread out on kraft paper, which is an effective barrier separating the samples from the PVC mesh tables. A cover sheet of kraft paper is used to reduce potential contamination. When handling the samples, gloves are always worn.

2.3 Initial Disaggregation and Sieving

2.3.1 Summary

When a bulk soil sample is air dry, it is disaggregated and sieved in order to remove large rock fragments and to prepare the sample for crushing, pulverization, homogenization and subsampling.

This procedure is accomplished in two steps: (1) disaggregation and sieving through a 20mm sieve and, (2) crushing, pulverizing, and sieving through a 2mm sieve.

2.3.2 Equipment

Fumehood
Kraft paper
Plastic bags
Respirator
Rolling pin
Rubber stopper
Tyvek suite
2mm sieve
20mm sieve

2.3.3 Procedure

Place a 1 m^2 sheet of kraft paper on the sieving table under a vented fumehood. Place a 60 cm^2 sheet of kraft paper on the larger piece of paper and spread a portion of one bulk sample within the confines of the 60 cm^2 sheet. Carefully examine the nature of the rock fragments within the sample and determine the amount of pressure necessary in order to disaggregate the soil peds without fracturing or crushing the fragments. Place another 60 cm^2 sheet of kraft paper over the sample and gently roll the rolling pin across the sample. Enough force should be applied to break up the peds, but not so much that weathered rock fragments are crushed. Place this crushed sample in the 20mm mesh sieve and push the soil through the sieve with a rubber stopper onto the kraft paper. Attempt to include any soil adhering to rock fragments. Place the sieved material in a clean container and repeat the process until all of the soil of from one bulk sample is sieved. All rock fragments and other material larger than 20mm is placed in a plastic bag and properly discarded.

Crush the minus 20mm fraction (The Crushing procedure is described in section 2.4) then passed through a 2mm sieve using the procedure described above.

2.3.4 Quality Control

The disaggregation and sieving areas should be covered with kraft paper and cleaned after each sample has been sieved. When sieving, gloves must be worn, as well as an appropriate mask and protective clothing. The laboratory manager will frequently check the sieving operation for proper equipment and for adherence to protocol. A member of the EMSL-LV QA staff will visit the preparation laboratory to ensure adherence to protocol.

2.4 Crushing

2.4.1 Summary

After soils are sieved through the 20mm sieve, the < 20mm material is passed through a rock crusher. The intent of crushing is to further reduce the particle size to < 2mm.

2.4.2 Equipment

Brush
Compressed air
Crusher
Gloves
Mask
Protective Clothing
Plastic bags
Scoop
2mm sieve

2.4.3 Procedure

With a scoop, place a portion of the minus soil fraction to the crusher opening. Turn the crusher on. The crusher deposits the resulting crushed material into a collection bin at the bottom of the machine. After the first scoop is crushed, shut the machine off and sieve the crushed material through the 2mm sieve (described in Section 2.4). If all the material passes through this sieve, the crushing plates are sufficiently close enough to continue processing. If not, adjust the plates and repeat the procedure on the same sample until all the material passes through the 2mm sieve. Once the collection bin is full, turn the machine off and deposit the material into a clean labeled plastic bag. Repeat the operation until all soil from one bulk sample is crushed. Thoroughly clean the machine with compressed air and a brush between samples.

2.4.4 Quality Control

When crushing, gloves must be worn, as well as a mask and protective clothing. The machine opening should be tightly fastened to minimize dust. The laboratory manager will frequently check processing equipment for proper operations, for adherence to protocol including proper maintenance. A member of the EMSL QA staff will visit the preparation laboratory to ensure adherence to protocol.

2.5. Pulverizing

2.5.1 Summary

The routine soil samples that are analyzed by the cities are ground to a particle size of less than 0.25mm. Therefore, it is necessary to provide audit materials with the same particle size fraction. The preparation laboratory pulverizes the minus 2mm soil fraction to a particle size of less than 0.25mm.

2.5.2 Equipment

Brush
Compressed air
Gloves
Mask
Protective Clothing
Plastic bags

Pulverizer
Scoop
0.25mm sieve

2.5.3 Procedure

With a scoop, place a portion of the minus 2mm soil fraction material into the pulverizer opening. Turn the power on. The pulverizer grinds the soil and deposits it into a collection bin at the bottom of the machine. After the first scoop is pulverized, shut the machine off and sieve the material through the 0.25mm sieve. If all the material passes through this sieve, the grinding plates are sufficiently close enough to continue pulverization. If not, adjust the plates and repeat the procedure on the same sample until all the material passes through the 0.25mm sieve (described in Section 3.6). Once the collection bin is full, turn the machine off and deposit the pulverized material into a clean labeled container. Repeat the operation until all soil is pulverized. Thoroughly clean the machine with compressed air and a brush.

2.4.4 Quality Control

When pulverizing, gloves must be worn, as well as a mask and protective clothing. The machine opening should be tightly fastened to minimize dust. The laboratory manager will frequently check processing equipment for proper operations, for adherence to protocol including proper maintenance. A member of the EMSL QA staff will visit the preparation laboratory to ensure adherence to protocol.

2.6 Final Sieving

2.6.1 Summary

To ensure that the pulverized audit sample has a particle size < 0.25mm it is resieved through a 0.25mm sieve.

2.6.2 Equipment

Fumehood
Kraft paper
Paint brush
Plastic bags
0.25mm sieve
3 X 5 card

2.6.3 Procedure

Place a 1 m^2 sheet of kraft paper on the sieving table under a vented fumehood. Place a 60 cm^2 sheet of kraft paper on the larger piece of paper. Place a portion of the soil material in the 0.25mm sieve and screen the material using a rocking motion. Use a paint brush or 3 X 5 card to gently push the material through. Place any material > 0.25mm into a separate pile. Continue this procedure until the complete sample is sieved. Save the material not passing through the .25mm sieve for further pulverization.

2.6.4 Quality Control

When sieving, gloves must be worn, as well as a mask and protective clothing. The laboratory manager will frequently check the sieving processing equipment for proper operation and for adherence to protocol. A member of the EMSL QA staff will visit the preparation laboratory to ensure adherence to protocol.

2.7 Homogenization and Subsampling to 2kg Aliquots

2.7.1 Summary

Prior to splitting the 2kg aliquots into 20g aliquots, the bulk soil (minus 0.25mm fraction) is homogenized using a combination of three techniques; drum-rolling, cone and quartering, and riffle-splitting. After homogenizing, the bulk sample is split into 2kg aliquots using a riffle splitter.

2.7.2 Equipment

Drum homogenizer
Gloves
Kraft paper
Labels
Large riffle splitter
Mask
Protective clothing
Shovel
Top loading balance
2-L sample bottles

2.7.3 Procedure

2.7.3.1 Drum homogenization/Cone and Quartering

Place all of the < 0.25mm fraction from one soil sample into the drum homogenizer. Slowly rotate the drum for five minutes. Pour the entire sample onto piece of kraft paper so that the sample takes on the shape of a cone. Homogenize the cone by dividing the cone into four equal quarters by lines going clockwise from 1 to 4. Using a shovel, remove the first quarter to form a new cone. The third, second and fourth quarters are piled sequentially over the first quarter. This procedure is performed seven times in succession.

2.7.3.2 Riffle Splitting

Position the two collecting bins under the large riffle splitter. Pour the entire sample evenly across the baffles of the riffle splitter. Transfer the soil from each collecting bin into the distribution pan and replace the receiving pans under the riffle splitter. Repeat this procedure five times in succession.

2.7.3.3 Subsampling

After the homogenization, 2kg aliquots are obtained. If the cone and quartering technique is used,

place a clean 2-L sample bottle at the bottom of the cone and, with an upward movement, collect a sample weighing approximately 2000 grams (+/- 20 grams). If the riffle splitting technique is used, place a clean 2-L sample bottle at one end of the collecting bin and move to the other end to fill the bottle. The sample is labeled using the procedure described in Section 2.2. The first 2kg aliquots for each audit concentration is identified with "01" and subsequent aliquots numbered consecutively. The other information within the sample code will ensure a unique sample identity. Repeat this procedure for the entire amount of homogenized audit sample. Store the audit samples in cold storage until further processing.

2.7.4 Quality Control

When homogenizing, gloves must be worn, as well as a mask and protective clothing. Prepare labels for the 2kg samples prior to the processing step in order to avoid mislabeling. The laboratory manager will frequently check the homogenization operation for proper processing equipment and for adherence to protocol. A member of the EMSL QA staff will visit the preparation laboratory to ensure adherence to protocol.

2.8 Homogenization and Subsampling to 100g and 20g Aliquots

2.8.1 Summary

Each 2kg aliquot prepared in section 2.7 is further homogenized in a medium sized riffle splitter and split into 100g aliquots. The 100g aliquots are then homogenized in a small riffle splitter and split into 20g aliquots. These two procedures are done simultaneously in order toe avoid the use of intermediate sample containers and the possibility of mislabeling.

2.8.2 Equipment

Gloves
Fumehood
Laboratory containers (20g samples)
Open pan balance
Plastic bags
Riffle splitters, medium (24 chute 13-1/2" X 15-3/8") and small (32 chutes 6-5/8" X 9")
Scoop

2.8.3. Procedure

2.8.3.1 Homogenization and Subsampling to 100 grams

2.8.3.1.1 **Initial Homogenization** - Position the two receiving pans under the medium riffle splitter. Pour the entire 2kg sample evenly across the baffles of the riffle splitter. Transfer the soil from each receiving pan into the distribution pan and replace the receiving pans under the riffle splitter. Repeat this procedure five times in succession.

2.8.3.1.2 **Splitting to 500g Aliquots** - Pour the sample evenly across the baffles and place the soil from one receiving pan aside. Transfer the soil in the other receiving pan to the distribution pan and split once more. This should produce approximately a 500g sample in each receiving pan. Place these samples on separate sheets of kraft paper. Split the soil form the other receiving pan

similarly. This produces a total of four 500g aliquots from each 2kg aliquot.

2.8.3.1.3 **Splitting to 100g Aliquots** - Pour the 500g sample evenly across the baffles and place the soil from one receiving pan into a plastic bag. Transfer the soil in the other receiving pan to the distribution pan and continue splitting as necessary until approximately 100g of soil occupies one of the receiving pans. Place the entire contents of this pan into the distribution pan of the small riffle splitter (see section below). Repeat the procedure until all of the 2kg aliquot is split into 100g aliquots.

2.8.3.2 Homogenization and Subsampling to 20 grams

2.8.3.2.1 **Initial Homogenization** - Position the two receiving pans under the small riffle splitter. Pour the entire 100g aliquot from the distribution pan evenly across the baffles of the riffle splitter. Transfer the soil from each receiving pan into the distribution pan and replace the receiving pans under the riffle splitter. Repeat this step five times in succession.

2.8.3.2.2 **Splitting into 20g Aliquots** - Pour a 100g aliquots evenly across the baffles of the small riffle splitter. Place the soil from one receiving pan into a plastic bag. Transfer the soil from other receiving pan to the distribution pan and continue splitting as necessary until approximately 20g of soil occupies one of the receiving pans. Place the entire contents of the pan into the pre-labeled sample container provided by the analytical laboratories. Repeat the procedure until all of the 100g sample is split into five 20g aliquots.

2.8.4 Quality Control

When homogenizing and subsampling, gloves must be worn, as well as a mask and protective clothing. The laboratory manager will frequently check the operation for proper use of equipment and for adherence to protocol. A member of the EMSL QA staff will visit the preparation laboratory to ensure adherence to protocol. As samples are characterized, precision estimates for each audit sample type will be developed. If the pooled relative precision estimate (RSD) for an audit sample whose concentration is above 10 times the detection limit (~ 100ppm) is greater than ten percent, the preparation laboratory will combine all 20g aliquots, rehomogenize, then resplit the sample.

Section 3
Dust Audit Sample Preparation Procedures

3.1. Overview

Dust samples of different concentrations will be supplied to EMSL-LV from each city. From these samples, EMSL-LV will provide three audit samples with Pb at low, mid, and high concentration ranges and three calibration standards at similar concentrations. The bulk samples are air dried, sieved, homogenized and split into 2 gram aliquots as outlined in Figure 4.1. Participating laboratories supply EMSL-LV with sample containers, labels, and the appropriate labeling techniques for the samples.

A random subsample of the audit samples will be characterized by EMSL-LV. Fifty samples at each concentration range will be analyzed for Pb by XRF. A subset of these samples will be analyzed by ICPES after nitric acid extraction. Characterization data will be supplied to the Lead Abatement QA manager.

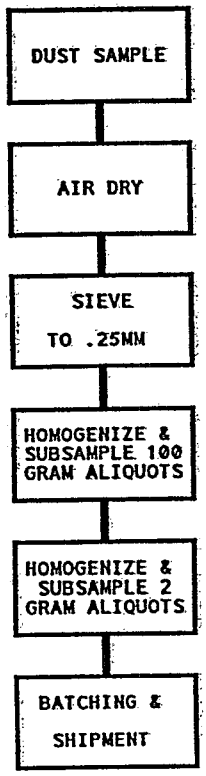

Figure 3.1 Dust Audit Sample Preparation Flow

3.2 Sample Drying

Interior dust audit samples will be sent from the participating cities of Boston, Baltimore and Cincinnati in one gallon containers. Upon arrival, remove the lid of each container and allow it to air dry before further preparation. The samples are kept in the shipping container during air-drying to prevent loss of sample.

3.3. Sieving to 0.25mm

3.3.1 Equipment

Fumehood
Kraft paper
Paint brush
0.25mm Sieve
3 X 5 index cards

3.3.2 Procedure

Place a $1m^2$ sheet of kraft paper onto the preparation table. On top of this sheet, place a $60cm^2$ sheet of kraft paper. Set a 0.25mm mesh sieve on top of the smaller sheet of kraft paper. Portions of the dust sample are placed into the sieve and gently pushed through with either a paint brush or a 3 X 5 card. Material greater than 0.25mm is placed in a plastic bag for proper disposal.

3.4 Homogenization and Subsampling to 2 Gram Aliqouts

Each bulk dust sample is homogenized in a medium sized riffle splitter and split into 100g aliquots and then these 100g aliquots are homogenized in a mini riffle splitter and split into 2g aliquots.

3.4.1 Equipment

Fumehood
Gloves
Laboratory containers (2 gram samples)
Open pan balance
Plastic bags
Riffle splitter, medium (24 chute 13-1/2" X 15-3/8")
Riffle splitter, mini (14 chutes, 2-1/16" X 3-3/4")
Scoop

3.4.2 Procedure

3.4.2.1 Homogenization and Subsampling to 100 grams

Position the two receiving pans under the small riffle splitter. Pour the entire contents of the minus 0.25mm dust fraction evenly across the baffles of the riffle splitter. Transfer the dust from each receiving pan into the distribution pan and replace the receiving pans under the riffle splitter. Repeat this step five times in succession with the material in each receiving pan.

Pour the sample evenly across the baffles and place the dust from one receiving pan into a plastic bag. Transfer the soil in the other receiving pan to the distribution pan and splitting as necessary until approximately 100g of dust occupies one of the receiving pans. Place the entire contents of this pan into the distribution pan of the mini riffle splitter (see section below). Repeat the procedure until all of the dust sample is split into 100g aliquots.

3.4.2.2 Homogenization and Subsampling to 2 Grams

Position the two receiving pans under the mini riffle splitter. Pour the 100g dust aliquot evenly across the baffles of the riffle splitter. Transfer the dust from each receiving pan into the distribution pan and replace the receiving pans under the riffle splitter. Repeat this step five times in succession with the material in each receiving pan.

3.4.2.2.1 Splitting to 25g Aliquots - Pour the 100g aliquot evenly across the baffles and place the dust from one receiving pan aside. Transfer the dust in the other receiving pan to the distribution pan and split once more. This produces a 25g aliquot in each receiving pan. Place the 25g aliquots on separate sheets of kraft paper. Similarly split the remaining dust to produce an additional total of two 25g aliquots.

3.4.2.2.2 Splitting to 2g Subsamples - Pour the 25g aliquot evenly across the baffles of the mini riffle splitter and place the soil from one receiving pan into a plastic bag. Transfer the soil in the other receiving pan to the distribution pan and continue splitting as necessary until approximately 2g of soil occupies one of the receiving pans. Place the entire contents of this pan into the pre-labeled sample container provided by the analytical laboratories. Similarly split the dust set aside in the plastic bag. Repeat the procedure until all of the 25g aliquots are split into 2g samples.

3.4.3 Quality Control

When homogenizing and subsampling, gloves must be worn, as well as a mask and protective clothing. The laboratory manager will frequently check the operation for proper use of equipment and for adherence to protocol. A member of the EMSL QA staff will visit the preparation laboratory to ensure adherence to protocol. As samples are characterized, precision estimates at each concentration will be developed. If the pooled precision estimate for an audit sample whose concentration is above 10 times the detection limit (~ 100ppm) is greater than ten percent relative standard deviation, the preparation laboratory will resplit and rehomogenize the sample.

Section 4
Handwipe Audit Sample Preparation

4.1. Summary

As part of the Superfund Lead Abatement program, children's hands are swabbed with handwipes which are then analyzed for lead. As part of the quality control, handwipes audit samples are included with the unknown handwipe samples for analysis. Handwipe audit samples are spiked with lead at three different levels; 5μg, 20μg, and 40μg lead.

4.2 Equipment

Box of wet handwipes
200 mg/L and 1000 mg/L lead solutions
ml pipette
Ziploc type plastic bags
Plastic gloves

4.3. Procedure

4.3.1 Reagents

- 1000 mg/L Pb - Certified standard obtained commercially.
- 200 mg/L Pb - Dilute 1000 mg/L Pb solution 1:5 with reagent water.

4.3.2 Spiking Procedure

- Unopened containers of wet-wipes are provided by the participating cities.
- Working in a laminar flow clean hood, wearing clean gloves, pull out 6 wet wipes from the same container and place into a stack (i.e., one on top of the other). Using a micropipet, add the spike to the center of the wet wipe stack (between the third and fourth wipe). The spike volumes are given below;

- 5μg spike - 25 μL of 200 mg/L Pb standard
- 20μg spike - 20μL of 1000 mg/L Pb standard
- 40μg spike - 40μL of 1000 mg/L Pb standard

- Fold and crumple the wet wipe stack and place into a zip-lock bag. Seal and label the bag with lab ID number. Record the lab ID and spike level into a lab notebook.

Section 5
Urban Soil, Urban Dust, and Wet-Wipe

Audit Sample Characterization

5.1 Sample Preparation

5.1.1 Reagents

Concentrated nitric acid (ACS Reagent grade)
Concentrated nitric acid (Double deionized)
Hydrofluoric acid (48% high purity)
Reagent water (ASTM type II)

5.1.2 Hot Nitric Acid (HNO_3) Extraction

Place 1g sample (weighed to nearest 0.1 mg) or packet of wet wipes into a clean 100mL beaker. Add 50mL 7N HNO_3 to soil or dust samples. Add 50mL 1N HNO_3 to wet wipe samples. Push wet wipes down with glass stirring rod to ensure complete coverage. Cover with a watch glass and heat gently at 95°C for 2 hours. Maintain at least 25mL volume in the beaker by adding 7N HNO_3 (1N for wet wipe samples) as necessary. After digesting, cool and add 10mL of water. Filter through Whatman No. 1 filter paper into a 100mL volumetric flask. Rinse beaker and filter with additional water. Dilute to volume with water.

5.1.3 Total Digestion of Urban Soil and Dust Samples

- Add 0.5g (weighed to nearest 0.1 mg) sample into a clean teflon microwave digestion vessel. Add 9mL of concentrated HNO_3, and 4mL of 48% HF. Cap and seal the vessels. Weigh capped vessel to the nearest .01g and place in microwave oven. A total of 12 vessels must be placed in oven. Use blanks if extra spaces must be filled. Heat at 520 Watts for 30 minutes. Let the samples cool and irradiate again at the same setting.

- Cool. Weigh capped vessels. Rinse condensate from cap and vessel walls into vessel. Transfer quantitatively to a 100mL polypropylene volumetric flask. Dilute with reagent water to the mark.

- If not determined previously, determine percent solids as in Section 6.2..

5.1.4 Preparation of Loose Powder Samples for XRF Analysis

- Pour a 5g soil sample or 2g dust sample into a powder cup and seal with 3.6 μm mylar film.

5.2 Percent Solid Determination

Determine the percent solids in the soil or dust samples by drying a 5g aliquot at 105°C for 24 hours. Place a 5g sample (weighed to the nearest mg) in a tared aluminum weighing dish. Dry at 105°C for 24 hours. Cool in a desiccator. Reweight to the nearest mg.

Percent solids = {100 (wet wt. - dry wt.) /wet wt.}.

5.3 Sample Analysis

5.3.1 Summary

Samples were analyzed by XRF to determine Pb concentrations and homogeneity. The XRF soil audit concentrations were verified by ICP or GFAAS. From the fifty aliquots of each soil analyzed by XRF, a subset of 7 aliquots were analyzed by ICP and GFAAS.

5.3.2 ICPAES and GFAAS Analysis

The acid digests are analyzed by either ICPAES or GFAAS depending on the lead concentration in the digestate. Solutions containing Pb concentrations greater than 10 times the ICPAES IDL are analyzed by ICPAES (IDL is about 50 ppb). Lower concentrations are measured by GFAAS. The instruments are calibrated and the digestates analyzed. HF resistant components are used for the total digest solutions. Quality control is described in Section 5.5.

5.3.3 XRF Analysis

Loose powder samples are analyzed by XRF. The analysis conditions for lead are: Ag secondary target, X-ray tube voltage = 35 Kev, X-ray tube current = 3 mA, atmosphere = air, counting time = 200 sec. live time. The lead L-beta peak/Ag compton peak ratio is calculated. The lead concentration is determined from the ratio and the calibration curve (Ratio vs. Concentration). Quality control is described in Section 6.5.

5.4 Instrument Calibration

5.4.1 ICPAES and GFAAS Analysis

The instruments are calibrated following the manufacturer's guidelines. A series of calibration standards are analyzed and a calibration line calculated using linear regression of intensity vs. standard concentration.

5.4.2 XRF Analysis

The XRF is calibrated by acquiring spectra from a series of urban soil standards with known lead concentrations. Acquisition conditions are given in Section 5.3.3. The Pb L-beta peak and Ag compton peak are measured from the spectra and the Pb LB peak/Ag Compton peak ratios are calculated. A calibration line is calculated using linear regression of ratio vs. standard concentration.

5.5 Quality Control

5.5.1 Sample Related Quality Control

The following QC samples are prepared for ICPEAS and GFAAS analysis

- Matrix Spike Sample - one sample per 20 will be spiked with lead prior to digestion.
- Reagent Blank Sample - One reagent blank will be prepared per group of 20 samples.

• Laboratory Control Sample (LCS) - One LCS sample will be prepared and analyzed per group of 20 sample.s

5.5.2 Analysis Related Quality Control

The following QC samples are analyzed along with routine samples:

5.5.2.1 ICPAES and FGAAS Analyses

Initial Calibration Verification (ICV) Standard - After calibration, the ICV is analyzed. The percent recovery must be 90-110%. The ICV solution is a standard from a different source than the calibration standards.

Initial Calibration Blank (ICB) - After analysis of the ICV, the ICB is analyzed. The measured concentration must be less than 2 times the IDL.

Interference Check Solution (ICS) - An ICS solution is analyzed after the ICV and ICB are analyzed. The ICS contains 500 ppm of major interferents (Mg, Ca, Fe, Al) and a known Pb concentration. The % recovery of Pb must be 75-125%.

Detection Limit Sample (DL) - A DL sample is analyzed after the ICS solution. The concentration of the DL solution is twice the IDL.

Continuing Calibration Verification Standard (CCV) - A CCV is analyzed every 10 samples and after the last sample. The CCV concentration is in the mid-calibration range. The % recovery must be 90-110%. If not, the instrument must be recalibrated and all samples up to the last acceptable CCV must be reanalyzed.

Continuing Calibration Blank Sample (CCB) - A CCB is analyzed after every CCV. The concentration must be less than twice the IDL.

5.5.2.2 XRF Analyses

Reference Monitor (RM) - Prior to analysis, a reference monitor sample is measured. The reference monitor intensity provides a standard measure of the x-ray flux that irradiates the samples being analyzed. The reference monitor provides a method of standardizing and/or compensating for changes in the x-ray tube flux.

High Initial Calibration Verification Standard (ICVH) - An ICVH sample is analyzed after the RM and after the last sample in a run. The concentration of Pb is at the high end of the range of interest.

Low Initial Calibration Verification Sample (ICVL) - An ICVL is analyzed after the ICVH. The concentration of Pb is at low end of the range of interest.

Section 6
Audit Sample Window Generation

6.1. Soil, Dust, and Handwipe Audit Samples

At least 50 aliquots from each soil and dust are analyzed by XRF, wet wipes are analyzed by ICPES. A biweight statistical procedure is used to calculate audit windows. The biweight approach has an advantage over the classical approach in that it identifies outliers and weights them in a manner that gives them less influence on the accuracy window.

After analysis, enter the data into the program, which then generates three estimates of prediction intervals for single future observation from a univariate normal population (Figure 7.1).

(1) Classical - Based on all data Reference: Whitmore, G.A. "Prediction Limits for a Univariate Normal Observation", The American Statistician, Vol. 40, No. 2, May 1986, pp. 141-143.

(2) W/O Outliers - Outliers Removed by Grubbs' Test Reference: Barnett, V. and Lewis, T. "Outliers in Statistical Data", 2nd Ed., John Wiley and Sons, New York, 1984, p. 167.

(3) Biweight - Robust Estimation Using Biweight Procedure Reference: Kafadar, K. "A Biweight Approach to the One Sample Problem", Journal of the American Statistical Association, Vol. 77, No. 378, pp. 416-424.

PREDICTION INTERVAL SUMMARY REPORT

DATA FILE:

TYPE OF ESTIMATOR	# OF DATA	SAMPLE MEAN	SAMPLE STD DEV	95% INTERVAL LOWER	95% INTERVAL UPPER	99% INTERVAL LOWER	99% INTERVAL UPPER
CLASSICAL	50	927.1480	41.4193	843.0907	1011.2050	814.9757	1039.3200
W/O OUTLIERS	50	927.1480	41.4193	843.0907	1011.2050	814.9757	1039.3200
BIWEIGHT	50	923.4212	43.1311	835.8742	1011.9680	806.5920	1040.2500

Figure 7.1 Example of Audit Sample Prediction Interval Summary Report

The program also performs the following:

1) Tests for normality using the Kolmogorov-Smirnov and the Anderson-Darling statistic

2) Presents a histogram of the data

3) Lists the data and the biweight weighting factors

The information is sent to the project QA manager for review before audit samples are sent to laboratories for inclusion in sample batches.

Section 7

Safety

7.1 Laboratory Safety

Environmental samples invariably involve undesirable if not hazardous materials and must be handled with respect. Special equipment and facilities are provided to prevent cross contamination of space and other samples. Special training in the use of the above may be needed (Section 1.3.3).

Personnel engaged in handling hazardous samples undergo initial and periodic medical examinations to insure that they have not contracted medical problems related to the materials with which they are involved.

7.1.1 Equipment and Supplies

Dust mask
Full face respirator
Laboratory coat
PVC gloves
Tyvek suits

7.1.2 Preparation Laboratory

Dedicated equipment and special facilities are used during sample preparation. The LESC warehouse has two rooms dedicated to sample drying, sieving, homogenization, riffle splitting, and sample aliquoting. During each of the above procedures the following equipment is required: full face respirator, tyvek suit, and PVC gloves.

7.1.3 Characterization Laboratory

The analytical laboratory requires personnel to: 1) work in a laminar hood and wear a dust mask while splitting samples, 2) wear PVC gloves while handling samples.

LEAD FREE KIDS STUDY

SEPTEMBER 1990

PARTICIPANT IDENTIFICATION, SIGN-UP AND ELIGIBILITY PROTOCOL

The following protocol describes the process by which children are identified, eligibility criteria assessed, and children enrolled in the Lead Free Kids Study. A flow chart describing the protocol and the eligibility and consent forms are attached at the end of this document. Children can become ineligible for a variety of reasons; a list of such reasons (and accompanying ineligibility codes) is also attached at the end of this document.

I. Office of Environmental Affairs Screening Data

Potential participants will be identified from screening data sent from health care providers (e.g. neighborhood health centers, hospital-based outpatient departments, and health maintenance organizations) to the Office of Environmental Affairs (OEA), the office through which the Boston Childhood Lead Poisoning Prevention Project (BCLPPP) is administered. Starting in January 1989 the Office of Environmental Affairs began subsetting screening data so as to identify children with the following characteristics:

A. born on or after August 1, 1985

B. resident of Dorchester, Roxbury, Jamaica Plain or Mattapan

C. blood lead level between 10 and 20ug/dl

D. no history of lead poisoning

II. Drive by Assessment

If a child meets all of the above criteria, then LFK staff drive by the child's home. This procedure, which is referred to as a "drive-by" assessment, is employed to determine if the following eligibility criteria are met:

A. the child resides in a dwelling with eight or fewer residential units;

B. the cumulative amount of chipping paint on the exterior walls (excluding trim, including porches) does not exceed 30% of the total surface area;

C. there is a yard of at least ten square feet composed of dirt, grass, or a combination thereof, which is accessible to a child; and

D. the total amount of chipping exterior trim and/or wall paint does not exceed 40% on any adjacent wall of an abutting building within 6 feet of the premises and/or within 12 feet of the property line.

III. Preliminary Soil Sample

If all the above criteria are met then preliminary soil samples are taken. (See Preliminary Soil Sampling and Analysis Protocol for details.)

IV. Family Interview

If the soil analysis indicates that at least 50% or two of the soil samples contain > 1500 ppm lead and/or the average of the soil samples is greater than or equal to 1500 ppm lead, a home visit will be made by a team of two case managers. The family will be interviewed to determine if**:

A. there are other children (besides the screened child) living in the dwelling who are less than four years old;

B. the child and his/her family have resided in the dwelling for at least 3 months as of the baseline blood draw;

C. the child and his/her family have no definite plans to move within the next three months;

D. the child is mobile* (this applies only to non-infants);

E. the child has no known history of lead poisoning;

F. the premises where the child lives is not scheduled to receive an environmental intervention (i.e. deleading) during the eligibility phase and/or project; and

G. the parents or guardians of the child are willing to participate.

* defined as not confined to a crib, bed, or wheelchair
** B-F are additional eligibility requirements

V. Search for Other Children on Premises

If screened children live in multi-unit dwellings, case managers will contact other residents in the building to ascertain if other children under four years old reside on the premises. These children are referred to as "other children" and the process by which they are identified and signed up is described in this section. Attempts to identify other children will be made by knocking on doors and interviewing other families in the building as well as by asking the screened child's family to identify other children. For each "other child" identified, the eligibility process will be started by interviewing the families. The case manager will determine if the child meets the three month residency criterion, his/her family has no plans to move within the next three months, is mobile, has no known history of lead poisoning, and his/her parents or guardians consent to participate. The case manager will also determine that no environmental interventions are scheduled to take place during the eligibility phase and/or project. OEA screening results will be reviewed to determine if the other child has a history of lead poisoning.

VI. Landlord Recruitment

If a child meets all the above criteria then the landlord of the dwelling will be contacted and his/her participation will be solicited and consent obtained.

Landlords will be contacted in person or by a letter or telephone call. The study will be described in writing and/or verbally. LFK staff will follow-up with meetings and/or telephone calls to discuss further the project with both on-premises and absentee landlords, and to see if landlord consent can be obtained. (see Landlord Consent form).

VII. Consent

If all the above criteria are met then case managers will conduct a home visit to obtain final family consent. If the family gives formal consent to participate (i.e. signs attached IRB approved consent form), the child will receive a pre-abatement blood lead test then be randomized into the study or control groups.

VIII. Pre-abatement Blood

In fall 1989 a blood lead level will be performed by an LFK phlebotomist to determine if the child's blood lead level has remained in the eligibility range (7-24ug/dl). The results of the test will be forwarded to the child's primary care provider and parents.

Drafted June 1990
Revised August 1990

LEAD FREE KIDS STUDY

LEAD PAINT AND SITE INSPECTION PROTOCOL

LFK participants' homes will be inspected to provide information on the extent of leaded paint to deleading contractors and the project epidemiologist. The contractors will be given this information so that they can make informed estimates on the cost of interior and exterior deleading. The project epidemiologist will use the measurements for scientific purposes to estimate the contribution of leaded paint to participant children's blood and hand lead levels.

The first part of this document describes how lead paint inspections will be conducted to gather information for the deleading contractors. The second part describes how this and additional information will be used for scientific purposes.

Lead Paint Inspection

Lead paint inspections will be performed according to current Massachusetts Department of Public Health requirements by registered inspectors. The following forms will be used to record the needed information on all properties:

1. Adapted Massachusetts lead paint inspection forms
2. LFK interior deleading information form
3. LFK exterior deleading information form

Instructions for filling out these forms are as follows:

Make sure the address of each property is recorded on each page of each form and that the participant child's room is designated on the appropriate form. Also record which machine (PGT or Microlead) was used to measure the amount of leaded paint. The sides of the house will be labelled as follows: A - front, B - left, C - rear, and D - right. Window and doors in each room will be numbered from left to right. Window measurements should be taken from the header to the sill and from casing to casing. A list of definitions and abbreviations that may be used on these forms is attached.

Lead Paint Measurements

Lead in paint will be measured using x-ray fluorescence (XRF). Two different brands of XRF machines will be used to measure lead in paint for the deleading contractors: Princeton Gamma-Tech (PGT) XK-3 and Microlead. The two different brands will be used because they are the only machines that are available to the study and both are needed to conduct the inspections in a timely fashion. Only PGT XK-3 measurements will be used for the scientific study data since the two machines are not sufficiently comparable for research purposes.

Differences between the machines are as follows: The possible measurements on the PGT range from 0 to 10 mg/cm^2 and those on the Microlead range from 0 to approximately 50 mg/cm^2. In general, the Microlead XRF reads leaded paint many more inches below the surface than the PGT does. When we tested the comparability of the two machines, we observed that repeated Microlead readings of the LFK conference room windowsill were 2.5, 2.2, 2.2 and 2.9 and repeated PGT readings of the same spot were 0.2, 0.7, 1.4, and 0.6. (Note: the first two readings were taken on one day and the second two readings were taken two days later).

XRF Machine Calibration

Both machines will be calibrated twice a day: once in the morning and again in the early afternoon. An XRF calibration form will be filled out each time a machine is calibrated (see attached). Calibration will involve making two sets of ten readings. The first set of ten readings will be done using a zero standard and the other set will be done using known lead standards of various levels (i.e. 1.45, 3.5 mg/cm^2).

XRK Machine Use in the Field

XRF readings of lead paint concentrations are read directly from the digital read-out on the machine. If the reading is 2.0 mg/cm^2 or less, three readings will be taken and the average will be recorded on the lead paint inspection form. If the inspector believes that there is lead present on a surface despite a negative or very low XRF reading, sodium sulfide will be used to test for leaded paint. The results of both the XRF measurement and the sodium sulfide test will be recorded on the inspection form.

XRF measurements will be taken on painted and on (non-vinyl) wallpapered surfaces. The determination of what constitutes an appropriate surface will be made by the inspector. Measurements will be taken on the interior and exterior of the participant's dwelling. The interior is defined as the apartment or living quarters of the LFK participant. The exterior is defined as the common hallways, stairs, entrances, porches, accessible basements as well as the exterior walls of the building. The exterior may also include any other buildings (i.e. garages) and fences on the property. Interior measurements will be taken on walls and woodwork including baseboards, windowsill, etc. in each room of the participant's unit. Ceiling measurements will be taken only if the paint on the ceiling is peeling.

Additional Deleading Information and Instructions

Besides taking the lead paint readings, the inspectors will record other pertinent information/instructions for the deleading contractors. Examples of such instructions are:

1. In general, baseboards will be made intact and capped with quarter round moldings. When lead painted decorative moldings are present, record the width that will be needed for replacement.

2. When porch rails or other items require replacement, specify materials and workmanship common to the area. Also note that this will require further negotiation with the landlord.

3. Indicate whether the door and window trim are decorative or flat. Flat boards will be replaced with #2 pine. Decorative moldings will be dipped off-site.

4. Ceilings will be tested for lead only if they are peeling. If peeling ceilings are not accessible, note that they should be made intact on the comment sheet.

5. Lead painted basement windows wherever possible will be covered with plexiglass.

6. Measure rails and count ballisters on exterior porches.

7. Exterior window sills and wells will be covered with aluminum and caulked.

Lead Paint Measurements for Scientific Purposes

Since the Microlead and PGT XRF machines are not sufficiently comparable, only the PGT measurements taken by the lead paint inspectors will be used for the project's scientific data. Thus, only about 50% of the properties initially inspected will have measurements useful to test the study hypothesis. Once the lead paint inspectors finish gathering all the data needed for deleading, they will return to the properties where the Microlead was used to take the measurements and will re-take six measurements using the PGT XK-3.

The six measurements will re-taken in each of the following rooms since it is likely that the participant child spends most of his/her time there: the child's bedroom, the kitchen, and the living room. One measurement will be taken on the lower part of the wall and one on the window sill (i.e. woodwork) in each of these rooms. The calibration and

measurement procedures described previously will also be followed during this round of measurements. Special study data collection forms will be developed for recording these data. These same data will be abstracted from the inspection forms for the properties that were originally tested using the PGT.

Abbreviations and Definitions for Lead Paint Inspections

n/a = not accessible
cov = covered
rep = replace
y = yes
n = no
dip = off-site removal of lead from surface by an approved method
R & R = remove and replace (unless otherwise noted, the replacement material will be #2 pine)
neg = negative
pos = positive
upper walls = walls above five feet
lower walls = walls below five feet
mit = make intact

porch = the area extending from the house, the wall the porch is attached to is the exterior of the house.

scrape = delead on-site

interior = the apartment or living quarters of only the LFK participant, excludes common areas within the building.

exterior = the common hallways, stairs, entrances and porches as well as the exterior walls of the building, and all other buildings and fences located on the property.

All other abbreviations are described on the individual forms.

Summary of 1989 and 1990 Soil Removal Projects

Soil Abatement was conducted on 36 properties in the Study group during the fall of 1989, and on 58 properties in the Control groups during the fall of 1990. The overall goal of the work was the same during the two abatements, however there are significant differences in how the work was carried out. This outline begins with a description of the general goals and methods during the two years, which is followed by a discription of what actually occurred in each case.

Objectives of Soil Abatement

The objective of soil abatement was to significantly reduce exposure to lead through soil on LFK project properties. This was achieved by removing most or all of the lead-contaminated soil from project yards, then replacing that soil with a layer of clean topsoil and sod. The initial plan was to remove six inches of soil, then test the remaining soil at a six-inch depth, and continue to remove soil until a level of under 500 ppm lead was achieved.

This approach called for on-site soil testing, to be carried out with all of the workers and equipment standing by for the results of the analysis. After a pilot testing of this method during the fall of 1989, it was decided that this approach was far too time-consuming to be practical, given the large number of properties to be abated. It was eventually decided that lead-contaminated soil would be removed to a set depth of six inches, and replaced with 8" of clean topsoil. The objective remained to eliminate childrens' contact with contaminated soil. This was accomplished through removal of most contaminated soil, followed by the addition of a thick protective layer of clean soil over whatever remained.

Description of soil removal process, fall 1989

Soil was removed, to a depth of 6", from all unpaved areas of the project properties, with the exception of gardens. In garden areas soil was removed to a depth of 12". Immediately after excavation a layer of geotextile fabric was put down over all excavated areas. This was done because there was a possibility of some contaminated soil remaining after excavation. The fabric is a non-woven polyethlylene/polypropylene material which is water-permeable and very durable. It has the appearance of a

thick gray felt. The geotextile served as a barrier between the clean soil and any remaining contaminated soil, and prevented mixing of the old and new soil.

Clean soil was spread to a depth of 8" over the geotextile fabric. In garden areas 16" of new soil would be spread. The clean soil was obtained by the contractor. It was tested for lead and other metals, volatile organic compounds, and other contaminants. Laboratory documentation was given to LFK indicating that no lead was detected in the soil, and that it all came from the same source. Where there was sufficient sunlight to support grass, the soil was covered with sod.

There were many yards where sod would not grow well due to insufficient sunlight. There were also many unpaved driveways and paths where the soil had to be abated, and something other than new soil and sod was needed to cover the geotextile fabric.

The solution for parts of the yard where grass would not grow was to use bark mulch, which is the shredded tree bark used for shrub beds and gardens in landscaping. In areas where bark mulch was used, 6" of clean soil would be put down, followed by 4" of bark mulch.

For driveways and heavily travelled walkways, gravel was

used. During the fall of 1989 the geotextile fabric was covered with 2" of soil, then 6" of gravel.

Site preparation

The site preparation started well before the abatements. Homer Lopez, the abatement coordinator, attempted to meet with all of the property owners prior to abatement. He had mixed success, because he often found the owners difficult to reach. Homer also had the assistance of one site monitor. Many yards were found to have abandoned cars, trash, and other debris which had to be removed before abatement. This work was done in large part by ACP Cleaning, Inc., the contractor for the interior loose paint and dust abatements. Cars were generally moved off the area to be abated. The procedure for having abandoned cars towed and disposed of was too time-consuming, so this was not pursued.

Health and Safety Plan

The health and safety plan served two purposes. First, it contained measures to prevent contaminated soil from being spilled outside the work area, or from becoming

airborne. Second, it protected the workers from lead exposure and accidents while work was being done. The plan was changed very little between the 1989 and 1990 soil abatements. The main difference was that respiratory protection was listed as required in the 1989 plan. It was found to be unnecessary after air monitoring was conducted on the first site abated in 1989, and was abandoned for the duration of 1989 and for 1990.

The soil was prevented from becoming airborne through frequent spraying with water during the excavation of the property. This worked well in most instances, as evidenced by air monitoring during the first few properties in the 1989 abatements. When the ground was very dry, as it was during the first days of the 1990 abatements, the ground needed to be watered for several hours the day before abatement was to take place. Very dry soil will become airborne even as a result of water being sprayed onto it unless the water is given time to soak in.

Safety measures for preventing soil from being tracked or spilled off-site consisted of establishing work areas, and surrounding the areas with plastic dropcloths. Decontamination areas were set up on the plastic, where workers would wash off, then remove, their boots and tyvek suits. The decontamination area consisted of wading pools filled with water, with scrub-brushes for the boots, and

trash bags for the tyvek suits worn by the workers.

The waste water from the decontamination pools was poured back into the area which was just abated, prior to the geotextile fabric being put down. Equipment such as shovels, rototillers, and Bobcat bulldozer blades and tires were hosed off in a place where the wash water would drain back into the work area.

Site Verification

Several different methods were use to verify that the appropriate amount of soil had been taken out. One method involved running a string between two reference points on onjects such as the edge of a sidewalk or a fencepost. By measuring down from the string to the soil surface before and after excavation a determination could be made as to how much soil was removed. This method was adequate for level yards, but for any uneven terrain it was not practical.

The technique that was used for most of the sites also involved using permanant features of the property as reference points. Orange paint was sprayed onto fenceposts, building foundations, and tree trunks at ground level, and notes were made on existing slopes and hills before excavation. In most yards this worked well, but it was

necessarily approximate on very uneven yards. In general, the contractor was urged to err on the side of taking out too much soil.

When the ground froze and heavy equipment was use for excavation, it was often impossible to take out less than 12" of soil, because large thick slabs of frozen soil would come up.

Soil Disposal

The ability to dispose of the lead-contaminated soil in a cost-effective manner was critical to the success of the project. During both years of soil removal this proved to be a difficult problem. A disposal site had been selected at Barry's Quarry in Hyde Park, Massachusetts. This was an inactive granite quarry which was being filled in for use as a cemetary. This site was ideal because it was very close to the project sites, and was not an area where anyone would be exposed to the soil. We began using this site in October of 1989. The owners of the quarry had bulldozers operating every day to change the grade of the property. The project arranged for our soil to be placed in a designated area of the site where it would be buried with un-contaminated soil from other parts of the quarry each day.

On November 3, 1989, the quarry was closed to our use temporarily, and we were left to scramble for an alternate disposal site. The soil was not considered a hazardous

waste by the Environmental Protection Agency or by the Massachusetts Department of Environmental Management. Still, it turned out to be difficult to find an alternate permanent disposal site. Most landfills in the area are closed. The landfills which are open are unwilling to accept lead-contaminated soil, because the operators of these facilities fear that by accepting the soil they would be exposing themselves to penalties under future regulations. It is in the nature of the disposal industry that material legally accepted by a landfill today might be declared hazardous tomorrow, with potentially costly results to the owner of the landfill.

The project resorted to using a temporary storage facility until access to the quarry was regained. The temporary disposal site was a parking lot at the Mattapan Chronic Care Hospital in Mattapan, MA. Permission to use the site was gained from the Commissioner of Health and Hospitals. The Project had a trench cut in the pavement, and installed a silt fence to prevent run-off. Plastic drop-cloths were used to cover the soil and to prevent dust being blown off the site. The parking lot was surrounded by woods on two sides, and an abandoned building on another. It was well within the grounds of the hospital, near a little-travelled road. The combination of the precautions taken to keep the soil in place and the remote location made

this a good temporary solution.

On December 2, 1990, permission was granted at a community meeting to resume use of the quarry. Soil from 14 properties which had been stored at Mattapan were moved to the quarry on December 7 and 8, 1989.

Overview of Fall 1989 Soil Removal

Several different abatement methods were used during the 1989 soil removal. The initial method was to loosen the soil with rototillers, then vacuum it into a truck using an industrial vacuum similar to what is used by municipalities to pick up leaves. The second method used was to dig up large areas with a Bobcat (brand-name) bulldozer, and use shovels for areas with narrow access. The third method was adopted for digging up properties after the ground has frozen. This calls for jackhammers to loosen the soil and backhoes to remove it. Paving parts of the property was another option used after the ground froze. This is an account of which properties were done with each method, with comments of the effectiveness of each method.

For the first two weeks of soil abatement, the soil was picked up using a truck-mounted (Supersucker) vaccuum. The

soil first had to be loosened with rototillers. This method was abandoned relatively quickly for a number of reasons. The soil had to be gathered into piles, then fed into the vaccuum. At best of times this meant handling each shovelfull of soil twice. After heavy rains the soil would be wet, and extra labor was needed to feed the soil into the vaccuum. Rental of the vaccuum itself was extremely expensive. The machine was so big that it could not move around the property, so all the soil from the back yard would have to be taken to the front to be fed into the machine. The following properties were abated using this method before it was abandoned.

2\4 Tupelo St. Dor. (double property)

7 Doris St. Dor.

5 Claridge Terr. Dor.

133 Seldon St. Dor.

17-19 Chilcott Pl. J.P. (double property)

2A Thane St. Dor.

Most of the properties were excavated using the Bobcat bulldozer combined with hand labor. The Bobcat was able to lift the soil into a dump truck with a capacity of 10 cubic yards. In areas of the yard which were done by hand, soil was dug out with shovels, then taken by wheelbarrow to a point where the Bobcat could scoop it up and place it in the

truck. This is definitely the preferred method for doing the excavation, because it can be adapted to almost any property. We were forced to stop using this combination when the ground froze in December of 1989. These are the properties which were excavated using Bobcat and hand-labor.

27-29 Mt. Bowdoin St. Dor. (double property)

62 Armandine St. Dor.

368 Park St. Dor.

75 Cheney St. Dor.

46 Chestnut Ave. J.P.

126 Bird St. Dor.

23 Rockdale St. Mat.

60 Waverly St. Rox

671 Columbia Rd. Dor.

40 Mozart St. J.P.

12 Homestead St. Dor.

42 Clarkson St. Dor.

47 Cameron St. Dor.

22 Darlington St. Dor.

27-29 Bowdoin St. Dor (double property)

78 Ballou St. Dor.

32 E. Cottage St. Dor

64 Idaho St. Mat.

The last twelve properties in 1989 were abated during an unusually severe cold spell that began in late November and continued through December. The ground quickly froze to a depth of over 14", which made it impossible to penetrate using Bobcats or hand tools. Jackhammer crews and backhoes were added to the work force. The work was very slow, and it became difficult to remove exactly six inches of soil. The backhoe would often remove a slab of frozen soil 12" thick and 10 square feet in area. The workday was shortened because the temperatures of -40 degrees Farenheit stressed workers and equipment.

During this period we offered some property owners the option of having part or all of their property paved with asphalt. We ended up paving one entire property and parts of three others. This provided at least as permanent encapsulation of soil as our normal procedure, and saved quite a lot of labor in excavation. Since we could not plant sod during this period, we settled for spreading grass seed on the new soil, then reseeding as needed in the spring. Decontamination procedures were cut back because water was not available. The properties abated in this way were as follows.

50 Elmore St. Rox.

46 Brook Ave. Rox.

52 Hewins St. Dor. (paved back yard, new soil in front)

45 Julian St. Dor. (paved driveway, new soil back and front)

67 Fayston St. Dor. (paved back yard, new soil in front)

124-126 Minden St. Rox. (entire area paved)(double property)

11 Dalrymple St. J.P.

26 Melbourne St. Dor.

34 Melbourne St. Dor.

406 Centre St. J.P.

3 Page St. Dor.

28 Charles St. Dor.

Fall 1990 Soil Removal

Description of abatement process, 1990

The general techniques used in the 1990 were similar to those used during most of 1989. The contractor used a Bobcat bulldozer to excavate large areas. Smaller areas were excavated by hand, and soil was wheelbarrowed to a place where the Bobcat could scoop it up and lift it into a

truck. On some occasions a rototiller would be used to loosen the soil in preparation for hand digging.

There were a few important changes from 1989. In place of gravel for driveways and walks, a better material, called "crushed bank", was used. This is a mixture of ground stone (or stone dust) and gravel. It forms a packed surface which is not subject to being scattered, as gravel can be. When this was used, a layer 8" deep would be spread over the geotextile fabric, then packed down with a compacting machine. It creates an attractive and durable gray gravel-like surface. This was used extensively to resurface dirt paths and driveways.

Another important change was more organizational than material: We had a single contractor doing all of the work. A variety of types of contractors bid on the project, including landscapers, hazardous waste firms, and deleading firms. The contract was awarded to Franklin Environmental Inc., of Wrentham, MA. This company performs underground storage tank removals, hazardous waste removal and hauling, and asbestos work. Having one contractor made it much easier to have the landscaping follow the excavation promptly, and cleared lines of communication.

Preparations For Soil Abatement

The schedule for the soil abatement required that every property be prepared for abatement well in advance. Based on experience from 1989, it was clear that additional staff would be needed to do advance work and monitor abatement. An ad was placed in the Boston Globe for site monitors. Three site monitors, Jack Bonjura, Gary Ameral, and Joe Grillo were were hired on August 27, 1990. They started visiting properties to be abated and meeting with landlords. The following is a list of items to be addressed during site visits.

Note presence of:

Debris blocking access to yards
Locked gates
6 foot access for bobcat bulldozer
Dogs
Abandoned cars
Cars blocking access to yard
Bad traffic or busy intersections
Narrow streets
Access to outdoor spigot

Also obtain:

Preferences of owner for sod, crushed bank, bark mulch
Plan for access to water if not available outside
Drop off letter explaining process to owner
If owner does not want soil removal, obtain signed cancellation form

Health and Safety

There were two major changes in the health and safety plan from 1989. One was that respirators were not required at any time for workers, and hardhats were required for workers when the Bobcat was in operation. Respiratory protection had been required in 1989 until air monitoring revealed that the dust generated by abatement was negligible.

Procedures for monitoring\verifying soil removal

One of the most persistant problems with the soil removal during the fall of 1989 was how to verify that 6" of soil was removed from the site. Various methods were tried last year, including spray-painting benchmarks on building foundations, fence posts, and other permanent structures. None of these methods proved entirely satisfactory for uneven ground.

On the first property to be abated, we started off using marked stakes in several parts of the yard. Most of the stakes did not survive the first hours of the Bobcat moving around the yard. We ended up using our prior estimate for the number of cubic yards to be removed, and comparing this with the number actually taken out. While this matched quite well, it was clear that there had to be a more substantive way to verify the depth of soil removed. We decided to try using a transit level and taking measurements before and after abatement. On August 13 we rented a transit level and began using this for site verification at 52\54 Bowdoin Ave. Dorchester, using the following method.

First we would select a benchmark in a location where no abatement was to take place, such as the sidewalk in front of the house. We would place a measuring rod, marked in tenths of a foot, on the benchmark and set up the level some distance away. Once the transit level was set up, we would note the elevation of the level using the measuring rod. We would then spray orange paint on the benchmark for future reference. We would then place the measuring rod on various locations around the property and take readings of the elevations before abatement. These elevations would be noted on the map of the property.

When excavation was nearly complete, we would again set

up the transit level at the same elevation(to make the math easy) using the benchmark. We would check the elevation of the ground in the places measured before abatement. If the surface was 0.5 ' lower than when we started, that area was excavated to the proper depth. If further excavation was needed it would be done immediately while the level was set up. In this way we were able to assure that the proper amount of soil was removed without making the contractor return to a site and set up their equipment again.

This is definitely the best way to verify the depth of soil removed. Unfortunately, we were not able to do this with every site. In some cases there was no place to set up the level. In other cases the site monitors were occupied with other tasks and were not available to check a property. (Two people are required to use the transit level.) We finally settled on checking at least every fifth property with the level, and using the estimated number of yards to be removed on the others. These two methods agreed extremely well. Often our estimate was within one or two cubic yards of the actual amount removed.

Soil Disposal

We had planned to dispose of our soil in Barry's Quarry in Hyde Park, MA., as we had done in 1989. Once again we discoved in August that our disposal site was not accepting material. It appeared that the site had been closed to dumping due to a problem with an unstable slope of material which was threatening to fall into the back of a shopping center. We delayed the start of the project by one week while we searched for alternative sites and worked to gain access to Barry's Quarry. Franklin Environmental Services, the contractor for the job, pushed it back another week. The work finally began on September 10, 1990.

Jack Bonjura, one of the site monitors, obtained tentative permission to use the Holbrook Rifle Club grounds as a disposal site for our soil during a club meeting on August 28, 1990. The Rifle Club needed soil to build up berms behind their rifle ranges which had become worn down over the years. The existing berms had large quantities of lead in them from many years' accumulation of bullets being fired into them. The site was away from homes and schools, and was kept locked. It appeared to be an ideal disposal site.

Preliminary estimates of the cost of using Mattapan as a

staging area and shipping soil to Holbrook indicated that it would be extremely expensive. We tentatively budgeted $30,000.00 for this purpose, and it was unclear whether this would be sufficient. In the meantime, we continued to press for the reopening of Barry's Quarry in Hyde Park.

We eventually received permission to use an area of the site which was well away from the slope. We were told that we could use the quarry on October 1, 1990. This year the quarry owners did not have bulldozers operating on the site, and the Project had to rent a bulldozer to cover the contaminated soil. One of the site monitors was a liscensed bulldozer operator, and he covered the soil between 3 and 5 times per week.

While the quarry was closed, we once again used a parking lot in the Mattapan Chronic Care Hospital as a temporary storage area. This involved repairing the silt fence to contain run-off from the site. This year, we used heavy-duty tarps to cover the soil, and weighted them with tires to keep them from blowing away. On October 4 we moved the soil from Mattapan to the quarry. In the following weeks we cleaned the Mattapan site and had the trench in the pavement repaired.

Overview of 1990 soil removal

During the fall of 1990 lead-contaminated soil was removed from 58 residential properties in Dorchester, Roxbury, Jamaica Plain and Mattapan.

The schedule for the fall 1990 soil removal included 63 separate sites. Two of these were considered "double properties" because they were much larger than average. The planned start date for this project was August 27, 1990. The planned finish date was November 16, 1990. This meant that an average of five properties per week had to be abated. The original schedule called for the soil removal to be done soon after the last blood sample was taken and after the exterior deleading was complete. The schedule of five properties per week was almost maintained, in spite of several difficulties which caused delays at various points during the project.

Three site monitors were employed to assist with the soil removal. Their duties were meant to be limited to contacting property owners in preparation for the soil removal, and watching each site as work went on to ensure that work was being done according to the specifications.

When Barry's Quarry was openned to us, we needed to have a bulldozer covering over the soil on a regular basis. One of the site monitors, Gary Ameral, was a lisensced heavy equipment operator. We rented a bulldozer, and Gary spent much of his time at the quarry covering over the soil as it arrived.

Soil removal began on September 10, 1990. The first day the crew from Franklin consisted of four people. The foreman was operating the Bobcat, and the other three laborers were digging. It was a large site, and this was obviously an inadequate number of people. Franklin quickly rectified the situation, and the crew size ranged from 6 to 12 people, and averaged 8 or 9. This typically included a foreman, who coordinated movement of materials and people, a truck driver, a Bobcat operator, and about 5 laborers. The contractor would work on as many as four sites at once. Often four sites would be excavated in two to three days, then they would all be landscaped in another two days.

The sites varied in size and difficulty. Some sites had to be abated entirely by hand, because there was no access for the Bobcat. This meant taking all of the soil out by wheelbarrow, and bringing all of the clean soil back in by wheelbarrow. Fortunately most sites were a combination of areas that could be done by Bobcat and smaller areas to be done by hand.

There were only a few minor delays after the start date. The last property was abated on December 11, 1990. The average time it took to complete one site was about a day. The largest sites took two to three days.

The following are the addresses of the properties which were scheduled to be abated during the fall of 1990.

102 George St Rox.

79 Church St. Dor.

104 Devon St. Dor. -----Dropped out

73 Topliff St. Dor.

11 Emrose Terr. Dor.

30 Holborn St. Dor.

1 Lynnville Terr.Dor.

20 Minot St. Dor.

15 Morse St. Dor.

36 Theodore St. Dor.

68 Clarkwood St. Mat.

31 Hiawatha Rd. Mat.

11 Landor Rd. Mat.

79 Barry St Dor.

15 Bellflower St. Dor.

70 Bloomfield St. Dor.

7 Capen St. Dor.

95 Dakota St. Dor.

54 East St. Dor.

43 Hutchings St. Rox.

12 Jerome St. Dor.

11 Homes Ave. Dor.

13 Ridgewood St. Dor.

142 Spencer St. Dor.

6 Winter St. Dor.

200 Boylston St. J.P.

6 Hosmer St. Mat.---------Dropped out

52 Bowdoin Ave. Dor.

10 Erie Pl. Rox.

74 School St. Rox.

99 Adams St. Dor.

7 Kenberma Rd. Dor.

10 Gannett St. Dor.

53 Woolson St. Mat.

39 Woodbine St. Rox.

28 Ballou Ave. Dor.

117 Hancock St. Dor.

37 Standish St. Dor.

33 Thetford Ave. Dor.

578 Warren St. Dor.

24 Algonquin St. Dor.

47 Aspinwall Rd. Dor.

46 Clarkson St. Dor.

6 Dahlgren St. Dor.

8 Elwyn Rd. Dor.

20 Fairmount St. Dor.

20 Faulkner St. Dor.

26 Fernboro St. Dor.----Dropped out

37 Humphreys St. Dor.

14 Inwood St. Dor.

10 Johnston Rd. Dor.

28 Mt Ida Rd. Dor.

24 Salcombe St. Dor.

83 Sumner St. Dor.

130 Talbot Ave. Dor.

43 Wilcock St. Dor.

64 Williams St. J.P.

26 Temple St. Mat.

16 Rockland St. Rox.

1745 Dorchester Ave. Dor.

3 Trull St. Dor.

APPENDIX B

LEAD FREE KIDS DEMONSTRATION PROJECT

SOIL SAMPLING AND REMOVAL

SAFETY PLAN

BOSTON, MASSACHUSETTS

MARCH 1989

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A. EMERGENCY PHONE NUMBERS

In the event of a medical emergency, the Field Supervisor or designee will notify the appropriate authority. The following list of phone numbers will be completed and distributed to all supervisory personnel.

1. Fire _____
2. Ambulance _____
3. Hospital _____
4. Lead-Free Kids Project Contact:

   Natalie Zaremba (617) 424-5970
5. EPA Contact: David McIntyre (617) 860-4363

   EPA 24 hour hotline (617) 223-7265
6. Poison Information:.
7. Site Abatement Contractor:

B. DIRECTIONS TO THE HOSPITAL

The LFK Project will distribute to all supervisory personnel as part of this Safety Plan a base map of the City of Boston with area hospitals identified. It is the responsibility of the Field Supervisor to identify the nearest hospital and determine the most timely route between the work site and the hospital.

C. INTRODUCTION AND PROJECT BACKGROUND

The Boston Lead-in-Soil Demonstration (Lead Free Kids (LFK) Project is a major epidemiological study authorized under the 1986 SARA Amendments to determine if the removal of lead contaminated soil from inner city neighborhoods is an effective preventive treatment for lead poisoning in young children. The project will involve measurement of blood lead levels of participating children, removal of approximately six inches of lead contaminated soil from their properties, and continued measurement of blood lead levels over a one year period to see if they decline. Further information is available from the project office at 20 Church St 3rd Floor, Boston, MA, 02116 or by calling (617)426-8686.

D. LEAD HAZARDS

Exposure of humans to lead occurs predominantly through ingestion or inhalation of lead dust and/or fumes. Acute exposure is most common in children with history of pica (mouthing of non-food items). Acute exposure symptoms include anorexia, vomiting, malaise, and convulsions due to increased intercranial pressure. Chronic exposure in children results in weight loss, weakness, anemia, permanent learning disabilities, and permanent brain damage. Lead poisoning in adults is usually occupational due to inhalation of lead dust or fumes. Exposure can result in toxic effects to the brain, central and peripheral nervous system, gastrointestinal tract, kidneys, and hematopoietic system. Peripheral neuropathy also results from lead poisoning.

E. PURPOSE OF PLAN

The purpose of this plan is to assign responsibilities to field personnel relative to safety and site security, establish personnel safety and protection standards, state mandatory safety operating procedures relative to physical and chemical hazards encountered on the properties, distinguish various zones of contamination, establish decontamination procedures, and provide for contingencies which may arise during the course of this project.

F. APPLICABILITY

This Plan addresses the safety procedures that will be followed by any and all soil abatement personnel involved in this project. All contractor supervisory personnel or other personnel specified by LFK who enter the work sites shall read and sign this safety plan. It does not supersede any Federal OSHA or state and local regulations but it is in addition to them. In the event of a conflict between this Plan and a regulation, the more stringent of the two will be enforced. The Plan is in accordance with, and refers to, the terminology used in the Office of Emergency and Remedial Response (OERR), Standard Operating Safety Guides.

G. RESPONSIBILITIES

1. Field Supervisor/Safety Officer

During this project, the primary Field Supervisor responsibilities relative to safety include the following:

a. to ensure that all personnel allowed to enter the work site are aware of the potential hazards associated with lead in soil;

b. to ensure that said personnel are aware of the provisions of this plan and are instructed in the safety practices defined in the plan, including its emergency procedures;

c. to ensure that the appropriate safety equipment is available and properly utilized by all personnel on site;

d. to direct the safety monitoring efforts of the Site Safety Officer; and

e. to correct any work practices or conditions under his control that may result in exposure to hazardous substances or injury to personnel.

In accordance with EPA's Occupational Health and Safety Manual as ordered by the Executive Order 12196: "The Safety Officer is responsible for implementing the safety plan on the site".

During this Project, the primary Safety Officer responsibilities include the following:

a. monitor compliance of workers relative to pre-established personnel protection levels (i.e., use of necessary clothing and equipment to ensure the safety of personnel); and

b. evaluate weather, lead, and other hazard information, and if necessary, modify work plans and personnel protection levels to maintain personnel safety.

The Field Supervisor/Safety Officer for this project is

John B. Hoskins (Bart), or designated LFK staff

H. SAFETY PROCEDURES AND LEVEL OF PROTECTION

1. Training

Personnel will have either formal training or on-the job training for those tasks they are assigned to perform on site.

2. General Safety Rules and Equipment

a. Do not work alone when performing tasks in areas that require protective clothing unless the work will be of short duration and another person has been informed of your location, or while performing any task that could be potentially incapacitating.

b. There will be no eating, drinking, or smoking in the Exclusion Zones (see below).

c. A first-aid kit will be on-scene at all times during operational hours.

d. Parking of vehicles should be in accordance with City of Boston ordinance.

e. No work will be performed at properties during hours of darkness unless adequate lighting is provided.

f. All personnel shall use caution and wear hard hats when working near heavy equipment in compliance with OSHA 26 CFR 1926 Subpart O.

g. No unauthorized personnel will be allowed on site during sampling/construction activities.

h. Overnight storage of soils in dumpsters shall require dumpsters to be secured.

i. All equipment will be secured at the end of day to prevent injury to the public.

j. Any steep changes in grade shall be properly flagged or marked to alert the public.

k. Any excavations deeper than 18 inches will be filled at the day's end.

l. Soils being removed from the Exclusion Zone (see below), and/or present in the Clean Zone accessway will be kept wetted during abatement to minimize off-site migration of particles. Soils inadvertently spilled or carried into the accessway, sidewalk, or area outside of dumpster shall be cleaned up daily.

3. Site Access

Site access must be controlled to eliminate the risk of spreading contaminants and to protect the public. Access will be the responsibility of the ranking supervisory person on site (Field Supervisor/Safety Officer, etc.)

4. Designation of Work Zones

Generally, each site will be divided into two zones. However, specific situations may arise in which a single site may have multiple zones due to its layout:

a. The Exclusion Zone (EZ) shall be that area which is known to be or has a potential for becoming contaminated, during the sampling phase, the entire site shall be considered the EZ and treated as such. In addition, the soil dumpster, which will be located on the street, will be considered part of the EZ.

b. The Clean Zone (CZ) shall be any area which is not contaminated due to abatement activity.

Should travel through a portion of the CZ be required to access the EZ, special care must be taken to minimize contamination to this accessway. Any contaminated soil which inadvertently is deposited on the accessway (or other clean areas) through accidental spillage, or on the tires of equipment, etc., shall be removed from the accessway and deposited in the soil dumpster. Any soil inadvertently deposited on the sidewalk or outside of the dumpster, shall be collected and deposited in to the dumpster. That area deemed Clean Zone Which will not be used as access shall be flagged or otherwise marked, and not entered.

5. Personnel Protection

Personnel protective equipment and safety requirements must be appropriate to protect against the known or potential hazards of a site. Prior to sampling and analysis on this project, it is assumed that lead from the weathering of lead-bearing paint is present in the soil and is the sole contaminant at the properties. There has been no indication that other contaminants have been deposited. Protective equipment has been selected based on the concentrations and possible routes of personnel exposure to lead contaminated soils, and on physical (earth moving, etc.) hazards likely to be encountered.

The main route of exposure to site workers other than to be in direct contact with the soil is through dust.

The typical, nonhazardous particulates which are present in ambient air, such as soils, etc., are considered nuisance dusts. According to the American Conference of Governmental Industrial Hygienists (ACGIH), nuisance particulates (also known as nuisance dusts) are those particulates which, when inhaled in excessive amounts, have little adverse effect on lungs and do not produce significant disease or toxic effects when exposures are kept under reasonable control. The lung tissue reaction caused by inhalation of nuisance dusts has the following characteristics:

the structure of the air space remains intact;

scar tissue is not formed to significant extent; and

the tissue reaction is potentially reversible.

Ten (10) mg/m3 of total dust with less than 1 percent quartz is the recommended threshold limit for substances considered nuisance dusts.

Although 10 $^{mg/m3}$ of dust in air is typical of a normal indoor work area, it will not be reached in typical <u>outdoor</u> ambient air situations. Using it for out door estimates therefor provides a safety margin. Also, excavated soils will be moistened throughout the excavation process, thus minimizing particulates in air.

By knowing the concentration of soil lead at a property and estimating the airborne dust level, it is possible to calculate the concentration of lead-bearing dusts which could be present. At residential properties in Boston which were previously sampled and analyzed, the average concentration of lead in soils was 4000 ppm or less. (An anomolously high value of 16,000 ppm was detected at one site but will not be used in these calculations because the soil lead concentrations on this project will be known prior to abatement, allowing appropriate adjustments to be made if necessary).

The 1986-1987 ACGIH time-weighted average (TWA) value (allowable value) for worker exposure to lead dust and fumes during a ten-hours work day is 0.15 mg/m^3, or 150 ug/m^3.

If 10 mg/m^3 of dust is presumed to be present in the air at the Lead Free Kids sites, multiplying this by 4,000 ppm, or 4 ug/mg, gives 40 ug/m^3. This is less than one third of the TWA value of 150 ug/m^3 per 10 hour day recommended by the ACGIH.

6. <u>Selection of the Level of Personnel Protection</u>

selected as the entry level of protection for this project. Samplers operating prior to abatement may use street clothes. Subsequent information may result in changing the originally specified level. The following equipment shall be used in this level:

Personnel Protective Equipment - Level D

Coveralls or work clothes. Workers shall not work in street clothes;

Leather work boots - with steel toes and shank;

Overboots, unless exempted by the Safety Officer; and

Hard hats (optional when no earth moving equipment is in use).

Criteria of Use

no significant indication of airborne health hazards present;

work functions preclude splashes, immersion, or unexpected inhalation of any hazardous substance; and

none of the criteria for using level of protection A,B, or C is met.

7. Alternative Levels of Protection

The site safety Officer may determine if alternate levels of protection are necessitated under adverse site conditions. Should this occur, the protocol will follow procedures outlined in U.S. EPA Standard Operating Safety Guides.

I. DECONTAMINATION PROTOCOL

The decontamination procedure shall be communicated to employees and implemented before any employees or equipment may enter areas on site (EZ) where potential for exposure to hazardous substances exists.

The decontamination procedures shall be monitored by the Field Supervisor/Safety Officer.

All equipment or supplies used for decontamination shall be decontaminated or disposed of properly.

Protective clothing and equipment shall be decontaminated, cleaned, laundered, maintained or replaced as needed to maintain their effectiveness.

Commercial laundries or cleaning establishments that decontaminate protective clothing or equipment should be informed of the potentially harmful effects of exposures to lead.

The decontamination protocol will be adhered to by all personnel exiting the EZ.

Decontamination Steps for Personnel:

1. Employees whose clothing becomes soiled shall brush off excess soil while in the EZ.

2. Proceed through the boot brush-off area (at the edge of the EZ.)

3. Wash hands.

4. Change clothes prior to departing for home.

Decon Steps for Equipment:

1. Equipment decontamination shall be accomplished by rinsing equipment with water in the EZ to remove soil particles. Care should be taken to ensure that the rinse water does not enter the Clean Zone.

2. Soil deposits resulting from equipment decontamination shall not be left on the surface. They shall either be removed to the dumpster or covered by replacement soil.

J. HEAT STRESS

It is the duty of the Safety Officer, or his designee, to see that heat stress does not occur in site personnel. As a result, full cooperation by all such personnel will be given at all times. All personnel will be familiar with, and abide by, the following information so that the problem of heat stress does not arise. Instances of uncooperativeness will be reported to contractor and LFK management for resolution.

Following the guidelines for prevention and monitoring given below will greatly minimize the possibility of heat stress. However, personnel will be aware of the symptoms of the various forms of heat stress, and be able to readily carry out treatments, also noted below.

1. Prevention

a. Provide plenty of liquids. Available at temperatures above 85F will be a 0.1 percent solution of salt and water, a 50 percent solution of fruit punch/juice or the like in water, plain water to be taken with salted foods such as pretzels, potato chips, or the like, or other suitable noncarbonated liquids.

b. Work in pairs. Activities requiring vigorous physical exertion in unshaded areas on days when the temperature exceeds 85F should not be accomplished alone.

c. Adjustment of the work schedule. As is practical, the most labor intensive tasks should be carried out during the coolest part of the day.

2. Recognition and Treatment

Any personnel who observes any of the following forms of heat stress, either in themselves or in another worker, will report this information to the Field Supervisor/Safety Officer or ranking site person as soon as possible.

a. Heat Rash (or Prickly Heat)

Cause: Continuous exposure to hot and humid air; aggravated by chafing clothing.

Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.

b Heat Cramps (or Heat Prostration)

Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.

Symptoms: Sudden development of pain and/or muscle spasms in the abdominal region.

Treatment: Remove the worker to the Clean Zone. Decrease body temperature and allow a period of rest in a cool location.

c. Heat Exhaustion - SERIOUS

Cause: Over-exertion in a hot environment and profuse persperation accompanied by inadequate replenishment of body water and electrolytes.

Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing.

Treatment: (Perform the following while simultaneously making arrangements for transport to a medical facility.) Remove the worker to the clean zone. Lay the worker down on his or her back, in a cool place, and raise the feet 6 to 12 inches. Loosen all clothing. If conscious, provide sips of a salt water solution of one teaspoon in 12 ounces. Transport the worker to a medical facility.

d. Heat Stroke - EXTREMELY SERIOUS

Cause: Same as heat exhaustion

Symptoms: No Perspiration, dry mouth, pain in the head, dizziness, nausea.

Treatment: (Perform the following while making arrangements for transport to a medical facility.) Remove the worker to the Clean Zone. Lie the worker down in a cool place and raise the head and shoulders slightly. Cool without chilling. Apply ice bags or cold wet cloths to the head. Sponge bare skin with cool water or rubbing alcohol. If possible, place the worker in a tub of cool water. Do not give stimulants. Transport to a medical facility.

K. EMERGENCY CONTINGENCY PLAN

1. Procedures for Handling Emergency Incidents

The Field Supervisor shall identify, to the extent possible, all hazardous conditions present at each of the properties entered.

Based on the hazardous conditions present, the Field Supervisor shall assure that the personal protective equipment worn is appropriate for the hazards to be encountered. No provisions have been made for entering sites that require a level of protection of "C" or greater. Should observations indicate an entry to the site requiring greater than Level "D", entry will not be made.

When activities are judged by the Safety Officer/Field Supervisor to be unsafe and/or to involve an imminent danger condition, then he/she will suspend or terminate those activities. The Safety Officer/Field Supervisor will immediately inform the LFK management of any actions taken to correct these hazards during emergency operations.

L. Signatures

Contractor supervisory personnel working on-site in any capacity and any other personnel ordered to by the Field Supervisor/Safety Officer are required to read this Safety Plan and verify that they understand and will comply with its contents by signing below.

NAME & ORGANIZATION DATE

1. _____
2 _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

M. APPROVAL PAGE

I approve this Safety Plan for the Lead in Soils Project in Boston, Massachusetts. It adequately provides for the health and safety of persons who will or may be affected by soil sampling and abatement operations.

_____ _____

David McIntyre Date

Project Manager
Environmental Services Division
U.S. EPA Region I

_____ _____

John L. Christian Date

Vice President and General Manager
Trustees of Health and Hospitals
of the City of Boston, Inc.

April 10, 1991

LFK
LOOSE PAINT
AND
DUST ABATEMENT
PROJECT SUMMARY

Loose paint and dust abatement was performed between October 5, 1989 and January 1990. A total of approximately 129 households were involved. 89 units received loose paint and dust abatements. 40 units received loose paint only. Pre/post sampling was done in eight units that received only loose paint abatement and in fourteen units that received both loose paint and dust abatement.

It became apparent early on that the processes involved in the interior abatements were going to be more time consuming and complicated than one would expect. Also, after close examination of the exterior pilot project, it was decided that the benefits to be gained did not justify the cost and there were interior revisions being made that would require additional expenditures. Cancellations and postponements of the interior work, resulting in the need to reschedule, were common. The LFK Staff attempted several different strategies to limit the number of cancellations but little improvement was realized. All scheduled work was reconfirmed twice and attempts were made to have "backups" that could be used to fill openings in schelules made by cancellations. (see attached memos describing cancellations and associated fees)

Occupants were required to be out of their homes during abatement activities. Many families attempted to cancel because they had no where to go during the several hours it took to perform the abatement. Incentives were offered to participant families to provide entertainment or an activity for them to partake in. Transportation was also provided by LFK. Families were offered lunch at McDonalds and arrangements were made to provide access to the Children's Museum, the New England Aquarium, The Tropical Rain Forrest exhibit at the Franklin Park Zoo, or admission to the Museum of Science.

Two LFK case managers supervised all on-site abatement activities and used documentation forms to record progress.

ACP Cleaning Inc. was the Contractor that performed all interior abatement activities. Their multi-lingual staff

was extremely helpful in translating and communicating with many participant families.

Twenty-two units were sampled before and after the abatement processes took place.

The project coordinator collected all samples. 44 site visits were made to accomplish this. Each site visit took aprox one hour.

The total number of samples collected was 132. Cost of analysis was $15 each. Materials for sample collection were $2.00 each.

Comparisons of pre-post samples:

Analysis of samples was reported in micrograms per sqare foot.

What follows combines results from both processes, loose paint (8 units) and loose paint/dust (14 units)

Each sample set included a one sq ft area on the floor, a measured window sill and a measured window well.
66 pre- samples and 66 post samples were taken: 22 sets of pre samples and 22 sets of post samples.

Twelve post samples showed little or no change (18%)

Ten post samples showed an increase in pb content (most of these increases were slight) the average increase was 100 ug/sq ft (15%)

Forty-four post samples showed a significant reduction in lead content (average reduction was 2787ug/sq ft)(67%)

Two thirds of the post sample results showed a significant inprovement due to the methods involved. (can this be compared with the deleading final sampling results to show any real comparison of methods?)

Loose paint and dust abatement appears to be a valid means of reducing the readily available lead hazard in a child's living environment.

attachments :
specifications
site documentation form
cancellation memos

Cost Report - Lead Free Kids
February 25, 1991

Cost of Interior/Exterior Abatements

Development: The abatement procedures were developed by the Project Investigators and the Project Administrator as part of the initial Project planning. Their time was not tracked on this development. Trustees assisted the Project with the bidding process and securing a contractor.

Exterior Abatement:

Abatement work - 8 units @ $528/unit	$ 4,224
-the work was discontinued due to the small amount of benefit and the need to utilize additional funds on the interior work.	
Pilot cost:	$ 525

Interior Abatement:

Interior Dust and Loose Paint Abatement:	
Abatement work - 84 units @ $ 873	$73,332
4 units @ $1,748	$ 6,992
1 units @ $1,310	$ 1,310
Total	$ 81,634
Pilot Cost:	$ 873
Cancellations (time & materials)	
9 units @$873	$ 7,857
Interior Loose Paint Abatement Only:	
Abatement work - 32 units @ $ 499	$ 15,968
8 units @ $ 988	$ 7,904
Total	$ 23,872
Cancellations (time & materials)	
4 units @ $499	$ 1,996

Preparation time: 407.25 hours @ $20/hour $ 8,145

Participants were expected to prepare their units for work to commence on interior abatements. This routinely did not occur, therefore, after a short time the Project paid the contractor to prepare the unit at a labor charge of $20/hour. This work entailed moving all items to the middle of the room and making abatement preparations possible. These two activities were distinct.

Monitors:

Case managment staff monitored all interior abatement work. Check lists for compliance were maintained on all work.

**One full-time Interior Abatement Coordinator oversaw every detail of the work from August 1989 - January 1990 @$15,832

Total Direct Costs for Interior/Exterior Contract and management-$144,958

April 10, 1991

LEAD FREE KIDS
DELEADING PROJECT
final report
Summary

Deleading was originally offered to 125 households. Thirty of these households either moved or refused to have an inspection performed. Refusals of inspections were generally due to the legal obligation to delead the owner would be under after an inspection detected lead paint.

(the dates of the offers and refusals are not easily retrieved from files - refusals occurred throughout the project - deleading was first offered to participants upon recruitment.)

The 95 remaining units were given full inspections for lead paint. Six of these units had been previously deleaded and 32 refused deleading after inspection (when faced with the move and disruption). 7 refused deleading after bids went out. The reasons for refusal included 1) unwillingness to prepare for the move, 2) disruption to lifestyle, 3) children were in school and transportation would be

A total of 92 deleading operations at 50 locations were accomplished within a five month period under the LFK program. Work started on August 20, 1990. All of the work that could be considered actual "deleading" was finished by December 31, 1990, but punch list items and other loose ends brought the project completion date to February 14, 1991. Forty-five deleading compliance letters were issued at the program's end.

The vast majority of deleading involved a single unit within buildings having two or more living units. However, only four of the addresses involved deleading of 2 units within the same building. Four of the participants families were from single family houses.

There were three addresses that were non-owner occupied. LFK offered to pay up to $ 2000.00 per unit for these. One owner, who had two units at the same address, chose to hire his own deleading contractor to perform the work. LFK paid $4,000 directly to the contractor and monitored the deleading activities in the same manner as the rest of the project. The remaining two non-owner occupied addresses involved the LFK contractors.

One non-owner occupied address was not issued a deleading compliance letter because only the building's exterior was

deleaded under the LFK program. Although the LFK family's unit had been previously deleaded, it was done under an older version of the law and was only to four feet. The law does not permit issuance of a certificate for exterior deleading only and does not provide for grandfathering of work performed under the old law.

In one dwelling, (the only household where no compliance certificate was issued although both interior and exterior deleading was completed) the children's access to the basement was prevented due to a locked door on initial inspection. During the final inspection this door was found to be open and was used as an entrance to office space that had been recently opened up by the owners. The LFK inspectors would not issue a compliance letter because this allowed children access to an area that had not been previously inspected. The owners must now have this area inspected, and deleaded if necessary, in order to obtain a compliance letter. Unfortunately, Lead Free Kids will not be involved in any further inspection or deleading activities so this responsibility is up to the owners. This was the only unit that was deleaded for which LFK could not issue a letter of compliance. The total number of compliance letters was 45.

Weekly progress meetings that were held at the LFK office were extremely helpful. Contractors, inspectors and the

deleading coordinator made up the core of this meeting and whenever necessary, other members of the LFK staff would attend to bring up issues or problems that required attention. This forum was used to update all changes in field activities, schedules moving issues etc., and to keep inspectors, contractors, and the project coordinator informed of other changes that were required to make things flow in the order that was expected. Many problems were resolved and avoided as a result of these meetings.

EXTERIOR DELEADING:

Exterior deleading work involved four separate deleading contracts addressing 46 exterior deleading operations addresses. This work included all common interior areas as well as other buildings on the properties. Exterior window sills were considered part of the exterior work except in the LFK participant unit(s) where they were addressed from the interior of the apartment. Deleading compliance letters were issued for only 42 of the 46 exterior addresses . The owners and occupants at 4 of the addresses declined to have interior deleading done and the law prohibits issuance of compliance certificates for exterior deleading work only.

Exterior deleading ranged from 1 day to 41 days. 1156 days were involved in the exterior operations at 46 sites. The average exterior deleading time was 25 days. These figures include all of the work activities performed on the exteriors, including non-hazardous finish work.

All four of the exterior contracts were completed within the scheduled time frame that was prepared by LFK in order to provide sufficient time to accomplish the soil abatement following exterior deleading but before the ground started to freeze.

Exterior deleading work did not require occupants to move or relocate. All work was performed without interruptions to any of the building's occupants except for requiring alternate access when stairways were being worked on.

No exterior deleading took place when a property was undergoing soil removal or landscaping. It was the responsibility of the contractor to check the soil abatement schedule to make sure exterior deleading work did not interrupt the soil work.

Lead painted surfaces above five feet were freed of loose or peeling lead paint and given a primer coat of paint. Priming of any new construction and application of

finish coats of paint were the owner's responsibility.

Common hallways, inside multi-unit buildings were considered part of the exterior. The contractor was responsible to inform other building occupants of the work activities occurring in these areas and to make sure alternate access rules were observed. HEPA exhaust units were installed at the entrance to the building on the first floor. Containment barriers were set up to make sure that the work area was isolated and that no contamination could be spread outside of the work area. A warning sign, as required by the Massachusetts Lead Law, was affixed to the outer flap of the containment area entrance. Work in the common hallways/staircases began on the top floor and proceeded down to the first floor level. Deleading was performed according to the methods developed specifically for the LFK Project and were monitored by the program's inspection team to insure compliance.

INTERIOR DELEADING:

Interior deleading involved the inside of the living units of the program participants only. (common areas within the building were excluded) Exterior window sills of the LFK participant units were included in the interior

deleading. The unit's occupants and all of their belongings had to be relocated for the duration of the interior deleading work. A moving contractor was hired by LFK to remove the occupant's belongings and furniture prior to the deleading contractor's arrival at the site. All belongings were bombed to exterminate insects and placed into storage for the duration of the deleading. Damages caused as a result of the movers were amended in some way prior to final release of a 15% retainer .

The moving contractor billed additional charges for items that remained in storage for over 7 days at a rate of $6.00 per household per day. Additional storage ranged from 1 day per household to 43 days. 41 households were moved under the moving/storage contract. (five households did not require moving assistance.) 391 extra storage days were charged totaling $2,346. Extra storage time averaged 9.5 days per household.

If a site was not prepared on the scheduled start date it was to be eliminated from the deleading project. This rule was bent about as far as possible on several occasions. Case managers and contractors occasionally would be helping families pack as the moving truck arrived. In a five instances, extra charges were incurred when it was necessary to cancel moving due to the occupants being unprepared. The cost for these cancellations was $1,800. There was only one

last minute cancellation required by LFK that was not re-schedule because the occupants absolutely would not get things packed so they could be moved (46 Clarkson St. apt. #2). The other four cancellations were rescheduled. No compensation was made to the deleading contractor in cases where sites were eliminated prior to the scheduled start date. The moving contractor did receive compensation for costs incurred when a move was cancelled or postponed at the site.

The total cost of moving and storage (including additional storage costs and cancellation fees) was $33,666.00.

Interior deleading ranged from 3 days to 58 days. 716 days were involved in the deleading of 46 interior sites. The average deleading time was 15.6 days. This time involves only the actual hazardous deleading work that required occupants to be out of their homes.

Interior deleading work included 46 households that were addressed under 4 separate contracts. A total of 45 compliance letters were issued for these. Most work was started according to schedule, but in several instances work was not completed according to schedule. Some of these time overruns were unavoidable. No penalties were assessed against contractors if the explanations for schedule delays

were reasonable. However, there were cases where these delays were avoidable and penalties in the form of liquidated damages of $ 1000.00 were assessed six times. All of the penalties were assessed against the same contractor and only after other attempts by the LFK staff to rectify problems were exhausted. It should be stressed that these penalties were used as a last resort and only when it was absolutely necessary to do so to maintain the projects best interests. Alterations of time schedules were rarely permitted, and only with approval of the deleading coordinator and were avoided whenever possible.

Interior deleading involved the removal of lead paint from chewable surfaces below five feet, doors and windows within the living unit. Owners had the option to have items that had ornamental detail taken off site to have the lead paint removed by a process called dipping. However, the dipping process did cause some of the older deteriorated materials to separate or dissolve, but this kind of damage was minimal. Items that had little or no ornamental detail were replaced with #2 pine. When doors were dipped, the door jamb was scraped free of lead paint to a height of five feet on site. This was the only general allowance for dry scraping when working on interiors. Dry scraping or the use of chemical solvents was allowed only when there was an architectural or structural reason for not being able to remove the surface from the site or when it was required for

some reason to satisfy the requirements of the Massachusetts Lead Law. Since the LFK deleading coordinator believes dry scraping is an extremely hazardous process, this type of deleading was kept to an absolute minimum whenever possible. When new doors were installed the pre-hung/hollow-core type was used. This eliminated the need for scraping jambs.

Dipping presented some minor problems as far as damage goes. The majority of the materials that were dipped were returned in very good condition even though many of the items appeared to be very old and in poor condition. This process turned out to be even more successful than was originally expected.

All items deleaded off site and replaced, and items that were deleaded on site were given a coat of primer paint by the deleading contractor. This was done to make sure that any fine film, dust or residue left on the surface was sealed in.

New materials were not painted by the contractor. Painting of new construction was the responsibility of the property owner.

Deleading, not painting or home improvement, was the purpose of the Lead Free Kids deleading program. There was an enormous task to be undertaken with limited deleading

funds. We were able to devise a strategy for deleading that would accomplish the task without compromise to safety. However, replacement materials used in the project were not top quality and some finish work, such as painting new materials, was left for the owners to take care of. Making the surfaces above five feet intact involved priming the repaired surfaces only. The entire wall surface required painting by the owner after deleading was completed. The contractors addressed peeling and chipped areas only, and then primed just these areas. Wherever finish painting was needed it was the responsibility of the property owner.

TEMPORARY HOUSING

The ability of participants to find short term housing presented a major obstacle. If LFK was to provide housing, it would have to be confirmed that it had been deleaded or LFK would have to delead it. Community relations found that deleaded units were in extremely short supply in Boston and were not available for short term rental. We looked into the possibility of deleading several units in exchange for use as temporary housing for participant families when their units were deleaded. This option of deleading several units in exchange for use as temporary housing was later ruled out because of insurance issues, liability and other legal reasons. Finally, the policy decided on was to urge

participants to find their own alternate housing. LFK would pay for lodging only after families had demonstrated a sincere effort, and were unable, to find a place to stay. The LFK staff provided participants with a list of hotels/guest houses that had agreed to provide lodging. The families had to make arrangements for their stay and LFK set up purchase orders to handle payment.

Seven families were provided with temporary lodging while deleading was being performed. Their stays ranged from one night to 19 nights. A total of 78 nights of lodging were provided for by LFK. The total cost of lodging was $11,612. The average amount of time of a stay was 11 days.

DAMAGE CONTROL

Pre-existing damage was recorded prior to commencement of deleading. The contractor was responsible to give a written pre-existing damage report to the LFK site representative before beginning work. Damage that was pre existing but uncovered after the work had started was brought to the attention of the LFK site representative and was recorded in the Inspector's daily log..

The LFK staff inspectors were on each site daily, throughout deleading activities to assure that the deleading

activities were done safely and with a minimum amount of damage. However, due to the nature of the work involved some damage was inevitable. This was understood by the LFK participant families and owners beforehand, and it was understood that certain corrections would be the responsibility of the property owner.

In order to avoid damage and excess ripping the contractor was required to cut a seam between door and window casings and wallpapered surfaces before removing them, to limit damage. By requiring this there was only one case where wallpaper was torn during the removal of a window casing and because the owner was aware of possible damage and it was pointed out that there was a possibility that this would occur there was no conflict.

Owners were required to remove telephone and electrical cords that came into contact with lead painted surfaces that were addressed before the scheduled deleading start date. If lines were left in place the contractor would take appropriate action to safely work around these areas. However, there were several cases where phone lines were cut or broken due to there being left in place. The contractors were not held responsible for repairs of these lines except when there was obvious lack of consideration taken when removing the lines.

Any damage to walls was corrected by the contractor by filling with joint compound, again all painting was the property owner's responsibility.

Any damage that occurred through neglect or carelessness of work crews was corrected by the party responsible. In cases where there was a dispute as to where responsibility lies the LFK site monitors' and deleading coordinator would determine what course of action, if any was appropriate.

All work sites were strictly monitored by an on site LFK Representative who would interrupt or redirect work for reasons of safety or to request corrections according to the specifications.

CLEARANCE SAMPLING

Clearance sampling was required in two rooms per floor of each interior unit and in the common hallway areas for the exterior contracts. These were required to meet the lead levels indicated in the Massachusetts Lead Law before the unit was considered complete. Three samples were taken in each room from the floor, window sill and window well. In order to reduce the down time involved in preparation of the samples, equipment was obtained by LFK to initiate the sample preparation by adding hydrochloric acid into the samples and rocking them for 10 minutes starting the 15 hour

digestion period. Analysis was performed by the Lead Lab at Boston City Hospital using atomic absorption spectrophotomotry (spectroscopy).

By starting the digestion of clearance samples at the LFK office, at least one day per unit was reduced from the turn around time involved in preparation and analysis. Each time re-sampling was required, an additional day was saved. (75 days may have been eliminated from the sample preparation process by beginning digestion at the LFK office.)

The original plan was to do clearance sampling only due to cost restraints. as the deleading project progressed it became possible to do some additional sampling that would allow some pre-deleading sampling to be preformed that would provide some information of the pre-existing conditions. Pre deleading sampling was performed at 17 household interiors.

Clearance sampling performed at the 46 household interiors presented the following information: 32 (70%) of the households were found to have acceptable lead dust levels upon initial clearance sampling. 14 (30%) of the households were found to have unacceptable lead dust levels and required a second cleaning and an additional set of samples was taken. 2 (4% of the total households and 14 % of the households that didn't pass initial clearance

sampling) required an additional cleaning before acceptable lead levels were determined.

The incident of final wipe sample failure was very high. All deleading contractors working for LFK were monitored during deleading activities and wipe samples were not taken unless areas were visibly clean of dust and dirt, according to the regulations and project specifications. This, along with limiting dry scraping to areas where it was absolutely necessary should have provided a work area that was as lead dust free as possible. (Work that is not monitored, where dry scraping is done, and final sampling is not performed may be presenting serious lead dust hazards. These situations should be investigated to determine if they are causing more problems than they are curing.)

Clearance sampling was preformed in conjunction with final inspection activities. An estimate of time spent in sample collection and analysis is about 1 hour per 6 samples. This includes collection, digestion and transport. The total increased time was approximately 123 hours to handle 738 samples. If this sampling was to be done separately from other responsibilities the time involved would take about three times as long.

COST SUMMARY

WIPE SAMPLES

A total of 738 samples were taken (including pre and post interior samples, exterior samples and blanks) and analyzed. (5 samples were not used in assembly of data). At $14.50 per sample, total analytical cost was $10,701.

Materials for sampling cost about $2.00 per sample (guesstimate) resulting in a total expense of $1476.00

There is no breakdown of the inspector's time involved in sample collection and preparation.

INSPECTIONS

Inspectors were involved in three separate phases of work activities; 1) Development of the inspection process

April - June

$1,800/wk X 10 weeks $18,000

2) Lead paint inspections

June - August

$2,000/wk X 12 weeks $24,000

3) Monitoring of deleading

September - February 14, '91

$2,000/wk X 24 weeks $48,000

Total inspection/monitoring $90,000

The inspection staff consisted of three inspectors who worked through the project, one inspection assistant who worked from April through July, and one intern inspector who worked as a monitor from September through early December. Only the three inspectors who were present throughout the project incurred any expenses other than travel. The total amount of misc. expenses was $913.51.

LAB EQUIPMENT: $997. (acid dispenser/centrifuge shaker)

DELEADING CONTRACTS

46 exterior deleadings were performed at a total cost of $262,278.

46 interior deleadings were performed at a total cost of $343,242.

The combined total of interior and exterior deleading came to $605,520.

MOVING AND STORAGE

41 moves X 720	$29,520
5 cancellations X 360	$1,800
extra storage	$2,346

total $33,666

CONTRACTORS

The following contractors working on the Lead Free Kids Project were Licensed by the State of Massachusetts to engage in deleading activities:

Action Deleading
Point West Plaza
21 Torrey Street
Brockton, MA 02401 1-800-649-5323
projects B&G

Paint By Numbers
P.O. Box 128
N. Easton, MA 02356 (508) 230-3777
Project A

A. Escalada Painting Co.
633 Ferry Street
Marshfield, MA 02050 (617) 965-6868
Projects C,D&E

Tri-State Restoration
16 Hazel Drive
Hampstead, NH 03841 (603) 329-5626

Projects F&H

Contractor hired by owner of 40 mozart st:

Tolan and Sons Deleading

44 Coburn Street

Framingham, MA 01701 (508) 879-1382

subcontractor to action deleading:

Webster Environmental

161 Granite Ave.

Dorchester, MA 02124 (617) 265-8004

DEVELOPMENT OF THE DELEADING PLAN

PRE-DELEADING PLANNING

Planning of deleading activities began in January, 1990 as the loose paint and dust abatement work came to a close. At this time it was expected that over 100 units would be involved and because of the enormous task that was ahead advice was sought from as many sources possible. All deleading contractors licensed to work in Massachusetts were invited to attend a pre-request for bids "brainstorming" meeting which took place on February 14, 1990. Mark Farfel and Susan Guyeaux, who had been involved in research and development of deleading procedures in Baltimore, were also asked to come to Boston and provide suggestions. Our objective was to lay out tasks and preliminary specifications and get feedback from local contractors and use this information to put together the best project design

possible. Although many issues were settled as a result of this meeting, many more were raised.

It was apparent that no single contractor could handle a project of this size. In fact, several contractors would be required to preform the work.

The most obvious problem was to schedule deleading around the soil abatement project and not cause the soil work to extend into cold weather months when the ground would freeze. It was also necessary to delead the exteriors of buildings <u>before</u> soil removal to prevent possible re-contamination from deleading. These problems lead to developing separate interior and exterior contracts that could be performed independent of each other and prevent delays that could interfere with the soil abatement. It was decided that a total of eight contracts would be needed, four interior and four exterior. This would satisfy the soil abatement needs and allow medium sized, as well as larger deleading companies to bid on the project.

Requests for bids were put out in three phases due to the time involved in preparing lead paint inspections and bid documents. Each phase ended up in competitive negotiations due to budget restraints.

DIVISION OF WORK

Exterior work included the removal of lead paint from chewable surfaces below five feet on the siding , porches, rails, stairs windows and doorways of the building's common areas as well as the exterior surface and required that loose paint above five feet be made intact. In some cases where deteriorated materials existed or when it was too difficult or hazardous to attempt to remove the lead paint from a surface, the item was removed and replaced with new materials similar to materials and workmanship of other like items in the neighborhood or consistent with replacement materials the owner had used. Columns with chewable surfaces were be covered or scraped to a height of 5 feet.

Interior deleading required that more attention be paid to keeping the hazards involved in deleading to a minimum by avoiding dust generating methods whenever possible. Replacement and off site dipping was the general rule, but some use of dry scraping and other hazard generating methods were unavoidable.

DEVELOPMENT OF INSPECTION PROCEDURES

Originally, an inspector from the Office of Environmental

Affairs was going to perform limited inspections and these would provide information on which bids would be based. Several problems arose from this plan. Because these inspections would be performed by a "code enforcement inspector", the law required every unit to be deleaded. Trial limited inspections, performed later, showed that these would not be useful in preparing a deleading plan.

After meetings with the Dept of Public Health it was determined that it was necessary for LFK to hire private inspectors who were not bound by code enforcement inspection requirements. The inspections reports performed by LFK would be filed with the Lead paint Poisoning Prevention Program but would not be perused by the state to force deleading. This allowed LFK to obtain information necessary to the program without putting participant families or owners in legal jeopardy.

In April 1990 private inspectors were hired. Inspection procedures were developed that were consistent with LFK needs and legal requirements. It was expected at the time that the inspectors would perform initial inspections only. LFK case managers would then be trained by an industrial hygiene consulting firm to monitor deleading operations. Final deleading compliance letters would be issued by the OEA inspector after work was completed.

The Department of Labor and Industries refused to grant a waiver of their deleading regulations that would allow on site monitoring (even though there was no provision in the regulation for monitoring). The only possible way to perform on-site safety monitoring, and be in compliance with the law was to keep the inspection staff intact throughout the deleading project. The final compliance letters would then be issued by the inspector who had performed the initial inspection.

Inspections were performed between June and August, 1990. Monitoring of deleading activities took place between August and the end of December.

attachments:

1 Deleading info forms(see Comm relations section in quarterly report)

2 Inspection protocol

3 Specifications

4 Sampling protocol

APRIL 16, 1991

Cost Report - Lead Free Kids
February 25, 1991

Cost of Interventions:

Deleading:

Development,Inspection and Monitoring:

Three-four full-time temporary staff were hired from April 1990 through approximately February 15, 1991 to help LFK develop an appropriate inspection plan that complied with state regulations, was sensitive to the Project participants, supplied the research component with accurate data and could develop a safe deleading operation where indicated and desired. These same individuals carried out the inspections, monitored the deleadings and issued the compliance certificates.

Approximate costs for staffing:	
April - June 1990 for development	
$1,800/week X 10 weeks	$18,000
June - August 1990 for inspections	
$2,000/week X 12 weeks	$24,000
September 1990 - February 15,1991	$48,000
Total salary cost approx.	$90,000
**One full-time Deleading Coordinator	$40,748

Inspection/Monitoring Costs:	
Equipment -	
Portable XRF	$ 4,147
Respirators -	
4 PAPT Respirators @$546/each	$ 2,186

Deleading Contracts:	
Interior Contracts:	
Paint By Numbers - 11 units	$ 66,700
Action Deleading - 22 units	$190,542
(2 interior contract minus $6,000 in liquidated damages)	
A. Escalada - 11 units	$ 83,000
Toland & Sons - 2 units	$ 3,000
Total Interior Deleading Costs	$343,242

Exterior Contracts:

A. Escalada - 23 properties (2 exterior contracts)	$124,963
Tri-State Restorations - 22 properties (2 exterior contracts)	$136,315
Toland & Sons - 1 property	$ 1,000
Total Exterior Deleading Costs	$ 262,278
Dust Wipes: Dust wipe analysis necessary to allow occupants to re-enter their homes clear of lead dust hazard -738@$14.5	$10,701
Materials 738* $2	$ 1,476
Laboratory Start-up for Analysis - equipment	$ 997
Total Development, Deleading and Analysis Costs	$755,775

Moving and Storage:

41 moves and the storage of possessions $ 33,666
- this figure includes standard moves and storage at $720/move plus 5 cancellations which charged time and materials and extended storage when indicated by the deleading operations
-this also includes 391 extra days for storage at a cost of $2,346 in excess of the storage included in the move agreement
.- see Billing Record for Relocation Specialists for detail.

** Community Relations and Case Management staff oversaw every detail of moving and storage - monitor the packing, move, unpacking, scheduling details, collection of keys and distribution to deleaders and back to owners, etc.

Alternate Housing:

on 7 occasions families absolutely could not find suitable alternate housing and the Project arranged and paid for housing in local guest accommodations $ 11,612
- this represents 78 nights of alternate housing

** Community Relations staffhandled all details of alternate housing!!!!

LEAD FREE KIDS COMMUNITY RELATIONS PLAN

AND REVISIONS FOR 1989

Objective 1: To provide the public with information about the LFK Project, the effects of lead exposure, and the rate of lead poisoning.

TECHNIQUES:

-Publish generic brochure (brief) - English/Spanish.
-Publish generic brochure (brief) - French/Portuguese.
-Publish generic brochure - English.
-Publish Lead Poisoning pamphlet /fact sheet-
-English/Spanish.
-Publish Lead and the Law pamphlet/fact sheet -
-English/Spanish.

EXPLANATION:

-Based on discussions among project management staff, a decision was made to create a parents' brochure in English. This brochure was translated into Spanish, Portuguese Creole, and Haitian Creole. These translations have proven effective, as many Lead Free Kids participants do not speak English. (Attachment A)

TECHNIQUES:

-Conduct briefing meetings with community public officials.
-Conduct briefing meetings with community service agency heads.
-Conduct briefing meetings with CDC/neighborhood associations. (Attachment 1A)

EXPLANATION:

-In order to alert the broader Boston community about the Lead Free Kids Project, briefing meetings were held with community public officials, community service agency heads, and neighborhood associations. These organizations are located in the LFK target areas: Roxbury, Dorchester, Mattapan, and Jamaica Plain. During 1989, meetings were held with the following:

MAY 1989

-5/5/89 - Roxbury Police Dept.-Deputy Superintendent.
-5/7/89 - World Health Day - State House.
-5/23/89 -Cross Cultural Workshop - Boston City Hospital.
-5/31/89 -Phyllis Cater, Dir., Member Services, Neighborhood Health Plan.

JUNE 1989

-6/1/89 - Long School Health Fair.
-6/2/89 - Fields Corner Health Center.
-6/12/89 - Upham's Corner Health Center.
-6/15/89 - Roxbury Community College.
-6/22/89 - Bowdoin Street Health Center.
-6/24/89 - University of Massachusetts, Boston - "Future of our Urban Environment" conference.

JULY 1989

-7/12/89 - Dorchester House Community Health Center.
-7/14/89 - Dimock Street Health Center.
-7/29/89 - Charles Turner - Episcopal City Mission.

AUGUST 1989

-8/9/89 - Marcus Mitchell of Metropolitan Council for Educational Opportunities, Inc. (METCO)

OCTOBER 1989

-10/27/89 Frank O'Brien - Office of the Mayor.

NOVEMBER 1989

-11/10/89 - Al Plough.
-11/16/89 - Roslindale Councilman, Thomas Menino.
-11/20/89 - Roslindale Community Meeting.
-11/28/89 - Reginald Nunnally - Boston Housing Partnership.

DECEMBER 1989

-12/8/89 - Upham's Corner Health Center.
-12/13/89 - Boston Housing Partnership.
-12/21/89 - Boston School Department.

TECHNIQUES:

-Send introductory letter and project information to daycare centers and churches and follow-up with briefing meetings.

-Send follow-up letter to community individuals and organizations

EXPLANATION:

-The Community Relations Department contacted daycare centers in Dorchester and Roxbury but was unable to follow-up with any meetings or presentations about the project in 1989. Sign up meetings are incompatible with the current project design. Instead letter will be mailed out and follow up telephone calls made to schedule dates for presentations about the project during 1990. Churches were not contacted in 1989, but will be in 1990.(See CR Plan for 1990 Attachment C).

TECHNIQUES

-Conduct "LFK Sunday" at key churches in Roxbury, Dorchester, Mattapan, and Jamaica Plain.

EXPLANATIONS:

-The Community Relations Department was unable to conduct "LFK Sunday" at churches during 1989. A decision regarding "LFK Sunday" will be made in 1990, after consulting with Rev. Thomas of Charles St. AME, and Minister Don Muhammad of Mosque #11. These two clergymen are on the Community Advisory Committee of the LFK Project.

TECHNIQUES:

-Community Relations Department will develop a 20 - 30 minute slide presentation to disseminate information about lead poisoning. This slide show will be presented to health centers, community centers, day care centers and churches.

EXPLANATION:

-The CRD did not develop a slide show in 1989. This will be done in 1990. (See CRP 1990 p.1)

TECHNIQUES:

-Conduct/facilitate TV commentary/news spots and radio talk shows to discuss the LFK project.
Produce/facilitate newspaper/magazine articles.
-Publish/distribute 1st LFK Newsletter introducing project and providing background information.

EXPLANATION:

-Based on project needs and current project focus a decision was made not to conduct TV spots or to publish articles and newsletters.

TECHNIQUES:

-Develop fact sheets for project staff as needed to ensure consistent communication with public

Objective 2: To encourage name recognition and gain broad public exposure for LFK

TECHNIQUES:

-Purchase window decals (5000)
-Purchase LFK T shirts (325)
-Purchase buttons (10000)
-Purchase stickers (10000)
-Purchase balloons (10000)

EXPLANATION:

-These items were obtained and made available for distribution in early 1989. All participant family members received an item. (Attachment B)

TECHNIQUES:

-Produce/distribute radio PSA.

EXPLANATIONS:

-Because recruitment procedures for the LFK Project were different from those of the first LFK project, it was determined that extensive public exposure would not be necessary.

TECHNIQUES:

-Produce poster.

EXPLANATION:

-Posters were not made because:
(1) cost
(2) lack of need

TECHNIQUES:

-Utilize the media to augment name recognition.

EXPLANATION:

-It was decided that the project would not be enhanced in the Boston area by utilizing the media.

Objective 3: To encourage parents with children under 6 from the LFK areas to participate in the Project and to recruit project participants.

TECHNIQUES:

-Produce a parent brochure (English/Spanish).
-Produce a parent brochure (French/Portuguese).

EXPLANATION:

-A parent brochure was produced in May 1989 in Spanish/English. The same information in the brochure was produced in Haitian Creole and Cape Verdean Creole. (See Attachment A).

TECHNIQUES:

-Produce a lead poisoning pamphlet/fact sheet (French/Portuguese)

-Produce a lead poisoning pamphlet/fact sheet (English/Spanish)

EXPLANATION:

-Fact sheets were produced and distributed in English, Spanish, Haitian & Cape Verdean Creole about the project, its advantages to participants and benefits that are part of participating.

TECHNIQUES:

-Distribute PR materials to project participants (T shirts, buttons, etc).

EXPLANATION:

-As participants signed up they received T shirts, buttons, balloons and decals (See Attachment B).

TECHNIQUES:

-Conduct special events at key periods, such as blood drawing.

EXPLANATION:

-Due to the nature of the project and procedures for participation it was not necessary or appropriate to make sign-up, blood drawing, etc., special events.

TECHNIQUES:

-Solicit a special prize, such as a gift certificate for the LFK child - furniture, educational toy, etc to be used in a lottery for participants.

EXPLANATION:

-During the last week in July, a letter was mailed to: Star Market, Stop & Shop, Purity Supreme, Bradlee's, Filene's, Jordan Marsh, and Edward's Food Warehouse Follow-up calls were made on 8/2/89. The letter and telephone call requested gift certificates, discounts, and donations. These merchants, along with McDonald's responded positively. These incentives are designed to facilitate participant retention. Participant families began receiving monthly gift certificates in 1/90. (Attachment C)

TECHNIQUES:

-Conduct door to door recruitment through nursing
-Conduct door to door flyering
-Conduct briefing meetings and sign-up meetings in conjunction with community agencies such as day care/social service agencies

EXPLANATION:

-Not done - change in recruitment procedures/project needs.

TECHNIQUES:

-Participate in health fairs, community days and other opportunities to publicize project. (Attachment Ba)

EXPLANATION:

-LFK was publicized at: 5/7/89 World Health Day - State House, Boston; 6/2/89 King School Health Fair; 6/7/89 Black Agenda, Roxbury Community College; 6/24/89 U Mass Boston, "Future of our Urban Environment"; 10/14/89 Upham's Corner Fair.

OBJECTIVE 4: To retain participation of registered families in the LFK Project.

TECHNIQUES:

-Conduct special recognition events at key period, such as Parent sign-up.

EXPLANATION:

-Since participant sign-up was ongoing this was not applicable to current project protocols. Special events are projected for 1990 as incentives to project retention. For example, picnics and photo sessions with local politicians/dignitaries. (See CRD Plan for 1990 - Retention Activities Section)

TECHNIQUES:

-Blood Screening.
-Post Blood Screening recognition event.

EXPLANATION:

-Not applicable to current project procedures.

TECHNIQUES:

-Solicit special giveaways such as gift certificates to be used in a lottery for participants.

EXPLANATION:
-Planned for 1990 - not done in 1989 due to time constraints and Community Relations focus on recruitment of landlords. (See CRD plan for 1990 - Retention Activities Section)

TECHNIQUES:
-Initiate family project, such as LFK Cookbook

EXPLANATION:
-Will not be done as part of project.

TECHNIQUES:
-Maintain high profile for project stressing its importance through the use of the media, by maintaining support of community agencies/leaders, and by maintaining the CAC

EXPLANATION:
-This was accomplished in 1989 mainly through CAC meetings held in March, May, and September 1989. See list of CRD meetings under Objective 1 . (See also CRP 1990 -Education/Awareness Section),

OBJECTIVE 5: To encourage property owners on target streets to participate in the Project and to recruit Project participants.

TECHNIQUES:
-Produce a property owner brochure English/Spanish.
-Produce a property owner brochure French/Portuguese.
-Produce a lead and law pamphlet/fact sheet English/ Spanish.

EXPLANATION:
-A fact sheet was produced in English/Spanish and translated into Haitian and Cape Verdean Creole for property owners highlighting the benefits in the LFK project.

TECHNIQUES:
-Produce a lead and law pamphlet/fact sheet (French/Portuguese).

EXPLANATION:
-This was not done - too costly and not necessary for our participant population. Materials were available from OEA that had useful information on the lead law. These were distributed to participants.

TECHNIQUES:
-Conduct door to door recruitment
-Conduct door to door flyering

EXPLANATION:
-Not appropriate to current project protocols.

TECHNIQUES:
-Identify absentee property owners, mail project information with introductory letter, F/U with meeting or telephone call.

EXPLANATION:
-Landlord recruitment began in May and ended on December 8, 1989..

TECHNIQUES:
-Solicit a home improvement service/item as lottery prize for participants.

EXPLANATION:
-The CRD will attempt to secure a large item, such as vacuum cleaner, to be distributed to participants at the end of the project.

TECHNIQUES:
-Provide window decals for participants

EXPLANATION:
-Window decals were distributed to participants.

TECHNIQUES:
-Conduct special events at key periods of the project
-sign-up testing
-soil abatement
-post abatement
-soil abatement 2nd group

EXPLANATION:
-Due to the nature of the project and procedures for participation it was not necessary or appropriate to conduct special events.

TECHNIQUES:
-Sponsor/Facilitate some home/neighborhood beautification project/contest (create window boxes, clean lots and plant flowers, etc.).

EXPLANATION:
-Not done/may consider.

TECHNIQUES:
-Conduct briefing meeting and sign-up in conjunction with neighborhood groups and real estate groups, property owner groups, etc.

EXPLANATION:
-Not done/change in project protocols.

TECHNIQUES:
-Issue a press release and hold a press conference when project is announced.
-Issue press releases at program milestones.
-Distribute fact sheets, newsletters, updates to press

EXPLANATION:
-After extensive conversations with Trustees Public Relations Department, it was determined that it was in the best interest of the project not to publicize each milestone with extensive media coverage. Instead, a press release was released to announce that the project had signed a contract with AOHS. This was in New Hampshire newspapers - not in Boston area papers.

TECHNIQUES:
-Sponsor special events which encourage press coverage.
-Kick-off
-Parent sign-up
-Property owner sign-up
-Announcement of community project
-Soil abatement/blood drawings
-Sponsor special interviews with reporters for articles,TV spots etc.

EXPLANATION:
-Not done - project protocols and sign up procedures are different from those of the initial LFK project.

OBJECTIVE 7: To provide the public with ongoing project information and with information regarding outcomes of the project.

TECHNIQUES:
-Publish newsletter
-Publish/facilitate newspaper/magazine articles

EXPLANATION:
-Not done/may not be appropriate to our participant population.

TECHNIQUES:
-Conduct F/U briefing meetings with public officials, clergy, community service agency heads, health centers, CDC/neighborhood groups (some of these will be group meetings).

EXPLANATION:
-See list of meetings under Objective 1. (Also Attachment D).

TECHNIQUES:
-Sponsor conference to present outcome and discuss next steps.

EXPLANATION:
-Not done due to time constraints and project focus.

TECHNIQUES:
-Utilize media to provide updates to public.

EXPLANATION:
-Will consider utilizing media as project progresses.

TECHNIQUES:
-Sponsor special meetings with collaborating health centers to share information; target nurses and others directly working with LFK clients.

EXPLANATION:
-Meetings with Community Health Centers conducted on: 6/2/89,Fields Corner Health Center; 6/12/89 Upham's Corner Health Center; 6/22/89 Bowdoin Street Health Center; 7/12/89 Dorchester House Health Center; 7/14/89 Dimock St. Health Center; 12/8/89 Uphams Corner Health Center. More meetings are scheduled for 1990. See CRD Plan for 1990.

OBJECTIVE 8: To provide health centers and hospital primary care clinics with information about LFK and develop collaborative relationships.

TECHNIQUES:
-Produce targeted correspondence for key health care professionals (Ex Director, Pediatrics.)

-Conduct additional briefing meetings to discuss details of project implementation.

EXPLANATION:
-See last explanation under Objective 7.

OBJECTIVE 9: To involve the public in advising the project in implementing LFK and in supporting expanded lead poisoning services and prevention efforts.

TECHNIQUES:
-Convene CAC

EXPLANATION:
-CAC meetings were held on: 5/23/89, Planning Committee - meeting with Ron Jones, Wornie Reed, & Paul Bracy; 5/24/89 - CAC meeting; 9/18/89 - planning meeting; 9/29/89 - CAC meeting. (See CAC Advisory Board Membership List)

TECHNIQUES:
-Develop a lead poisoning agenda for the community.

EXPLANATION:
-The vehicle for developing a lead poisoning agenda is the CAC. (Attachment D).

TECHNIQUES:
-Convene LFK Community Relations Project meeting with EPA staff.

EXPLANATION:
-Not done/time constraints, will plan for 1990.

OBJECTIVE 10: To prepare LFK staff for interactions with the community.

TECHNIQUES:
-Conduct briefing meetings, trainings and role playing sessions with field staff prior to specific interactions with community (recruitment, presentations).

EXPLANATION:
-Began April 1989 - and as needed.(Attachment E)

OBJECTIVE 11: To be prepared to aggressively and effectively address any community relations concerns which may develop as the program progresses.

TECHNIQUES:
-Institute a referral protocol for office staff.

EXPLANATION:
-Done.

TECHNIQUES:
-Utilize the CAC to hold meetings as warranted to respond to concerns.

EXPLANATION:
-Under discussion among CAC (Meetings were held at: Roslindale Community Meeting 11/20 9-10pm)

TECHNIQUES:
-Develop a community relations concerns sub-plan.

EXPLANATION:
-Not done- will consider if appropriate.

OBJECTIVE 12: To provide updates on the progress of the community relations aspects of LFK to EPA and other interested parties.

TECHNIQUES:
-Convene LFK Community Relations Project Team meeting with EPA.

EXPLANATION:
-Not Done in 1989, but will plan for 1990.

TECHNIQUES:
-Provide CRP implementation updates at Lead Team meetings.

EXPLANATION:
-Updates given at weekly staff meetings.

TECHNIQUES:
-Publish revised plan as needed.

OBJECTIVE 13: To complete preparation activities necessary for the implementation of the CRP.

TECHNIQUES:
-Conduct interviews with key individuals who can offer suggestions on CRP.

EXPLANATION:
-As needed .

TECHNIQUES:
-Conduct interview with key individuals at BCLPPP and other agencies who are currently, have been or will be involved in lead services and prevention activities to ensure clear communications.

EXPLANATION:
-CRD took case managers to the lead clinic at BCH on June 12, 1989.

LEAD FREE KIDS COMMUNITY RELATIONS

AND RETENTION PLAN FOR 1990

The Community Relations Department will prepare slide presentations, (slide presentation courtesy of the Office of Environmental Affairs) for community organizations such as daycare centers, churches, neighborhood centers, and health centers. The presentations will explain the Lead Free Kids program and its impact on Roxbury, Dorchester, Mattapan, and Jamaica Plain and will be done as a slide show (see attachment A). The narrative for the slide show addresses the problem of lead in the Boston area and explains the sources of lead (paint, dust, soil, etc.) and its impact on the environment and people. Some data indicating the effects of exposure to lead in children and pregnant women is also provided. The accompanying slides show the Emergency Lead Poisoning areas, statistics indicating the disastrous effects of lead poisoning, lead paint chips and other photos.

The target community organizations are in Roxbury, Dorchester, Mattapan, and Jamaica Plain and are receiving the most attention, because they are the areas most adversely affected by lead contamination. The slide show, which will be shown two - three times a week for the next four - five months, is a valuable medium through which crucial, little- known information can be disseminated. Attached is a list of all the organizations contacted. Some presentations have already been made to (Upham's Corner Health Center on 12/8/89 and Bowdoin St. Health Center on 7/27/89.)

The first group of organizations to be contacted is community health centers. On January 3, 1990, a letter (Attachment B) requesting time for a slide show presentation was mailed out to nine centers in Roxbury, Dorchester, and Jamaica Plain. Follow-up calls were made by the CRD on January 12, 1990. Appointments have been scheduled for the month of February (beginning with the Codman Square Health Center on 1/6/90 at 1:00pm). Enclosed is the list of Community Health Centers and a copy of the letter that was sent. The goal is to make presentations at three centers per week. At this rate the Community Relations Department will complete presentations at CHC's by the third week in February.

The second round of presentations will be made to community daycare centers located in Roxbury, Dorchester, and Jamaica Plain. There are 32 daycare centers, all of which were contacted by telephone between January 16th and January 19th. These initial telephone calls were made to ascertain the name of the center director, and to briefly discuss the LFK project. Letters requesting time for presentations will be mailed out by the end of January. Presentations will be made 3 times per week over a ten-week period, commencing the first week in February and continuing through the first week in May. Attached is the list of daycare centers and the letter sent out by the C.R.D. (Attachment C).

The third round of presentations will be made to churches in Roxbury, Dorchester, Mattapan, and Jamaica Plain. As the primary institution serving the minority community in these areas, the church is in a good position to disseminate information on lead poisoning. Churches will be sent a letter and information about lead poisoning beginning mid-February. Like the health and daycare centers, these letters will be followed by telephone calls. Appointments will be scheduled for March, April, May, and June with the Thirty churches (See list, Attachment D). Presentations will be scheduled at the larger churches, since they have Monday-Friday business hours. The target churches will be: Resurrection Lutheran Church, Eliot Congregational Church, Charles Street AME Church, Mohammad's Mosque #11, Holy Tabernacle Church, Twelfth Baptist Church. St. Mark Congregational Church, St. Francis deSalles Catholic Church, Mission Church, and the Presbytarian Church of Roxbury. The Rev. Thomas of Charles St. AME Church and Minister Muhammed of the Mosque are members of the Community Advisory Committee. Their assistance in contacting churches and arranging presentations will facilitate the process.

In recognition of the cultural and linguistic diversity of LFK participant families, presentations will be made in March to ethnic community centers. These centers and directors are:

Luis Prado,
Executive Director
Alianza Hispana
409 Dudley Street
Roxbury, MA 02119
(617) 427-7175

James Talero
Executive Director
Oficina Hispana
de la Comunidad
125 Amory St.- Bldg. A
Roxbury, MA 02119
(617) 522-2222

Charles Victor
League of Haitian
Families
16a Mass. Ave.
Roxbury, MA 02119
(617) 266-3363

RETENTION ACTIVITIES/ALTERNATIVE HOUSING

In addition to landlord recruitment and education/ awareness activities, a primary focus of the Community Relations Department is participant retention. LFK is by nature a very intrusive project. As a result, it is critical that incentives be provided for participants to continue. Retention will be particularly important as the deleading phase begins. The plan to retain participants began in July 1989 when the CRD contacted local merchants in order to secure department store gift certificates, supermarket discounts and gift certificates, and donations of toys.

The following stores were contacted during the months of July and August: Star Market, Stop & Shop, Purity Supreme , Robell's Department Store, Ames Dept. Store, Bradlee's, Filene's, Edward's Food House, McDonald's, and Jordan Marsh. All responded positively. Attached are copies of the letter that was mailed to area merchants and the gift certificate selection form. (Attachment E) Each month, participant families will receive a $25. coupon/gift certificate to the store of their choice. At the end of the project in December 1990, LFK will give each participant family a large gift such as a vacuum cleaner.

In addition to the monthly gift certificates, the CRD plans to hold monthly lotteries beginning in May and ending in November. At the beginning of each month, participant families will be notified of the "prize of the month." Prizes will include tickets to events in Boston (comedy acts, movies, plays, special museum exhibitions, concerts, and dinners to selected restaurants). Family names will be placed in a container, and a drawing will be held by LFK to choose the winning family.

During the months of June, July, August, and September CRD will plan events which focus exclusively on the 156 children in the project. Each week, a group of ten-fifteen children will be taken to the following places: Franklin Park Zoo, Jamaica Pond, Arnold Arboretum, Blue Hills, the Boston Harbor Islands (George's, Castle and Thompson), The Aquarium, the Museum of Fine Arts, the Museum of Science, Plumb Beach, etc. By the end of September, all 156 children will have gone on an LFK field trip.

In August 1990, an LFK picnic will be held at Franklin Park, and LFK participant families will be invited to attend. There will be food and games with prizes for the children, musical groups from Boston will be invited to perform, and public officials will attend. The event will be called "LFK Family Appreciation Day" and planning for the event will begin immediately.

From September, 1990 until the end of the project in December, 1990 (deleading phase), the CRD will combine participant retention activities with another project -- assisting participant families in leaving their houses during deleading. To ensure that the deleading phase begins and proceeds smoothly, the CRD will mail out letters reminding participant families when deleading will occur. These letters will be followed up with telephone calls and visits to allay any concerns families may have about leaving their houses.

The CRD will facilitate the moving process by providing boxes for belongings, masking tape, bags, etc. The LFK staff recognize that not all participant families have access to temporary housing. To respond to the needs of these families, the CRD is researching alternative housing. Groups and organizations which the CRD has contacted include: Urban Edge Housing, the Boston Housing Authority, Relocation Associates, John Cruz Construction Co., and other private organizations. The CRD is negotiating for reduced or free housing (20-30 units) in exchange for free deleading. To make the participants' stay as comfortable as possible the CRD is researching and pricing second hand furniture at places such as Morgan Memorial Goodwill and the MIT Furniture Exchange.

In December, 1990 LFK will hold a "Grand Prize" drawing for a 1- week free trip (LFK family will go) to Disney World in Orlando, Florida. The CRD is currently researching this trip and will approach: Pan Am, US Air, Piedmont, American Airlines, United Airlines, Holiday Inn, Viscount Hotel, etc. The trip will take several months of careful planning beginning at the end of January and continuing through early December. If the trip is found to be unfeasible, the CRD will hold a December Xmas drawing for a color TV, Stereo, or VCR.

EDUCATION/AWARENESS

The Community Advisory Committee (CAC) has been formed to facilitate the dissemination of information about LFK and lead poisoning to organizations accessible by the CAC.membership. The CAC is drawn from a broad range of public officials, academics, and agency heads. Among its members are: State Representative Nelson Merced, Boston City Councilman Charles Yancey, Paul Bracy, an official in the Department. of Public Health , and Wornic Reed, PhD, Director of the Trotter Institute at the University of Massachusetts. These community leaders have affiliations through their places of employment, social organizations, etc.

CAC members are currently involved in mobilizing their networks to establish a commitment to lead poisoning prevention. In addition, CAC members have been in the process of heightening sensitivity to the lead problem, by motivating their organizations to place lead on their agenda as a priority. The fruit of these efforts is becoming apparent as evidenced by the appearance of lead poisoning in Boston on the agenda of a statewide conference convened on 6/6/89. attended by several hundred community members and leaders.

The CAC is scheduled to meet every other month with the CRD to provide members with updated information on the LFK project and to be informed of their progress in executing the plan. Due to landlord recruitment and retention activities during the summer and fall of 1989, the CRD was unable to convene CAC meetings on a regular basis. In 1990, this will be a priority, and meetings will be scheduled on a monthly basis until the project ends in December 1990.

LEAD FREE KIDS STUDY FAMILY INVERVIEW

FAMID_____

LFK_NUM _____

LFK_NUM _____

LFK_NUM _____

1. RECORD INTERVIEWER'S (YOUR) FIRST AND LAST NAME

FIRST:_____ LAST:_____

2. RECORD INTERVIEWEE'S (PARENT, GUARDIAN, ETC.) FIRST AND LAST NAME

FIRST:_____ LAST:_____

3. RECORD DATE OF FAMILY INTERVIEW. __ __ / __ __ / __ __

Month Day Year

4. RECORD STARTING TIME OF FAMILY INTERVIEW. __ __ : __ __ AM / PM

THE LFK INTERVIEW CONSISTS OF TWO PARTS. THE FIRST PART IS THE FAMILY/HOUSEHOLD INTERVIEW. THE SECOND PART IS A CHILD SPECIFIC INTERVIEW. IF THERE IS MORE THAN ONE LFK CHILD IN A HOUSEHOLD, REPEAT THE CHILD INTERVIEW FOR EACH LFK CHILD. THERE IS NO NEED TO REPEAT THE FAMILY/HOUSEHOLD INTERVIEW.

FAMILY/HOUSEHOLD SECTION

First, I'm going to ask you some questions about your household and family and then I'll ask you about (CHILD'S NAME/CHILDREN'S NAME) who (is/are) participating in the Lead Free Kids study.

CENSUS

(NOTE: A PERSON "LIVES" IN THE HOME IF HE/SHE SPENDS THE NIGHT AT LEAST 50% OF THE TIME.)

100. Including yourself, how many people are living in your home?

__ __ persons

101. How many of the people living in your home are 18 years or older?

__ __ persons

102. How many are less than 18 years of age?

__ __ persons

(REMEMBER NUMBER OF PERSONS MENTIONNED IN Q'S 101 AND 102 SHOULD ADD UP TO THE NUMBER OF PERSONS MENTIONNED IN Q 100.)

103. How many children under 5 years of age live in your home?

__ __ children

SMOKING

200 A. How many people in your household currently smoke cigarettes?

__ __ persons

IF NONE, SKIP TO 250 A. IF ONE OR MORE PERSONS, ASK QUESTIONS 200 B.- 200 D. CONSECUTIVELY FOR ONE PERSON, THEN REPEAT FOR ANY OTHER.

	Smoker #1	Smoker #2	Smoker #3
200 B. What (is/are) the first name(s) of the (person/people) who smoke(s)?	_____	_____	_____
200 C. How many cigarettes (does SMOKER #1/#2,#3/do you) smoke a day? (FILL IN DK IF R DOESN'T KNOW)	_____	_____	_____
200 D. How many years total (has SMOKER #1,#2,#3/have you) smoked? (FILL IN DK IF R DOESN'T KNOW)	_____	_____	_____

PETS

Now, just a few questions about your household.

250 A. Do you have any dogs in your household?

1 No.....(Go to question 251 A)

2 Yes

9 Unknown.....(Go to question 251 A)

250 B. Does the dog go in and out of the house or does it never come inside?

1 Goes in and out

2 Never comes inside

9 Unknown

251 A. Do you have any cats in your household?

1 No.....(Go to question 261 A)

2 Yes

9 Unknown.....(Go to question 261 A)

251 B. Does the cat never go outside, never come inside, or does it go in and out of the house?

1 Never goes outside

2 Never comes inside

3 Goes in and out

9 Unknown

HOUSEKEEPING

261 A. Do you use an electric vacuum cleaner to clean the floors and carpets in your home?

1 Yes

2 No .....(Go to Question 300 A)

9 Unknown...(Go to Question 300 A)

261 B. About how often do you vacuum? Would you say more than once a week, about once a week, or less than once a week?

1 More than once a week

2 Once a week

3 Less than once a week

9 Unknown

261 C. About how often do you change or empty out the vacuum cleaner bag? Would you say often, sometimes or never?

1 Often

2 Sometimes

3 Never

9 Unknown

LEAD WORK

300 A. Now I'm going to ask you about jobs that you and other members of your household have held. I want you to tell me, as best you can, if any member of your household has worked in any of these jobs in the last year. These jobs may involve exposure to lead. I want you to include anyone who was living here this year even if they aren't here now. In the past year (FEBRUARY 1989 TO TODAY), has anyone in your household worked in a job that included.....(READ LIST)

(REMEMBER TO REPEAT "IN THE PAST YEAR.... " EVERY SO OFTEN)

a. Battery work

b. Metal work

c. Oil refining

d. Painting

e. Demolition

f. Welding

g. Chemical processing

h. Plumbing

i. Sandblasting

j. Glass Work

k. Window replacement

l. Autobody work

m. Road stripe painting

n. Metal recycling

o. Radiator repair

p. Shooting guns

q. Lead smelting

r. Foundry work

s. Mechanical work, that is a mechanic

t. Paint-pigment, zinc or copper work

u. Deleading

v. Any other lead handling work

RECORD "YES" IF R ANSWERS TO ANY ONE OF THESE JOBS, CIRCLE LETTER(S) THAT APPLIES AND CONTINUE WITH QUESTIONS 300 B.- 300 D. RECORD "NO" IF R ANSWERS TO NONE OF THESE CATEGORIES AND CONTINUE THE INTERVIEW WITH 350.

1 Yes

2 No (Go to Question 350)

ASK Q 300 B.- 300 D. CONSECUTIVELY FOR ONE ITEM, THEN REPEAT FOR ANY OTHER.

	#1	#2	#3	#4	#5
300 B. LIST SEPARATELY EACH OF THE ITEMS CIRCLED.	_____	_____	_____	_____	_____
300 C. Does the person doing _____ usually change out of his or her clothes and leave them at work?	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown
300 D. Does the person usually shower before coming home from work?	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown

HOBBIES

350. Now I'm going to ask you about hobbies or activities. I'm interested in hobbies and activities that any people may do in your house or right around your house whether or not they live with you. In the last year (FEBRUARY 1989 TO TODAY), has anyone around your house been involved in .....? (READ LIST BELOW.)

A. Remodeling or repairing your house or apartment	1 Yes	2 No	3 Unknown
B. Painting parts of your house or furniture in your house	1 Yes	2 No	3 Unknown
C. Painting pictures with artists' paints	1 Yes	2 No	3 Unknown
D. Painting bicycles or cars	1 Yes	2 No	3 Unknown
E. Working with stained glass	1 Yes	2 No	3 Unknown
F. Making fishing sinkers, bullets or anything else with lead	1 Yes	2 No	3 Unknown

350. HOBBIES (CONTINUED) In the last year (FEBRUARY 1989 TO TODAY), has anyone around your house been involved in .....? (READ LIST)

G. Soldering electronic parts	1 Yes	2 No	3 Unknown
H. Soldering pipes or doing plumbing	1 Yes	2 No	3 Unknown
I. Making lead-glazed pottery	1 Yes	2 No	3 Unknown
J. Making jewelry	1 Yes	2 No	3 Unknown

HOUSING CHARACTERISTICS

375 A. To the best of your knowledge, was your house or apartment building built before World War II, that is, before 1940?

1 Yes

2 No

9 Unknown (Go to question 376 A)

375 B. In what year was it built?

Year __ __ __ __ (FILL IN "9999" IF R DOESN'T KNOW)

376 A. Since you have been living here, have you or anyone else <u>ever</u> removed or sanded paint from the walls or woodwork <u>inside</u> your house?

1 Yes

2 No.....(Go to question 377 A)

9 Unknown..(Go to question 377 A)

376 B. What month and year was the last time this work was done?

Month __ __ Year 1 9 __ __ (FILL IN "99" IF R DOESN'T KNOW)

377 A. Since you have been living here, have you or anyone else ever removed or sanded paint from any part of the outside of your house?

1 Yes

2 No.....(Go to question 390)

9 Unknown..(Go to question 390)

377 B. What month and year was the last time this work was done?

Month __ __ Year 1 9 __ __ (FILL IN "99" IF R DOESN'T KNOW)

FOOD PREPARATION

390. Do you have any pottery or ceramics that might have come from a foreign country that you use for cooking or serving food?

1 Yes

2 No

9 Unknown

391. Do you have any pottery or ceramics that might be hand-made that you use for cooking or serving food?

1 Yes

2 No

9 Unknown

392. Is any of your family's food stored in the original cans after they are opened, for example, canned fruit juice?

1 Yes

2 No

9 Unknown

DEMOGRAPHICS

400. What is your relationship to (CHILD'S NAME)?

1 Mother (include stepmother).....(Go to Question 402)

2 Father (include stepfather).....(Go to Question 402)

3 Female Guardian (non relative)....(Go to Question 402)

4 Male Guardian (non relative).....(Go to Question 402)

5 Sister

6 Brother

7 Other Relative

8 Friend of the family or baby sitter

IF R IS A SISTER, BROTHER, OTHER RELATIVE, FRIEND OR BABY SITTER, ASK Q 401.

401. Do you consider yourself (CHILD'S NAME) guardian?

1 Yes

2 No

9 Unknown

NOTE: QUESTIONS 402 to 411 REFER TO THE PARENTS OR GUARDIANS OF THE LFK CHILD(REN).

402. Do (you/CHILD'S NAME parents or guardians) own or rent (your/their) (apartment/house)?

1 Rent

2 Own

9 Unknown

403. What is (your/CHILD'S NAME parent's/guardian's) current marital status? Are (you/they).....(READ ALL CHOICES LISTED BELOW.)

1 Married

2 Single but living together

3 Never Married

4 Divorced

5 Separated

6 Widowed

404. INTERVIEWER CHECK: IS R CHILD'S MOTHER OR FEMALE GUARDIAN?

1 ( ) YES.....Ask Questions 407A-409

2 ( ) NO.....Ask Questions 405-406

405. Does (CHILD'S NAME) mother or female guardian live with (him/her)?

1 Yes (Go to Question 407 A)

2 No

9 Unknown

406. About how often does (CHILD'S NAME) see his mother or female guardian?

1 Never (Go to Question 409)

2 Less than once a year (Go to Question 409)

3 A few times a year (Go to Question 409)

4 About once a month

5 At least once a week

407 A. Which of the following groups best describes (your/her) occupational status? (Are you/is she).....(READ ALL CHOICES LISTED BELOW.)

1 Unemployed..(Go to Question 408)

2 Homemaker...(Go to Question 408)

3 Employed part time, that is, less than 20 hours a week

4 Employed full time, that is, 20 or more hours a week

5 Something else such as disabled....(Go to Question 408)

407 B. What is (your/her) job title?

_____

407 C. What are (your/her) job duties?

_____

407 D. What sort of business or industry (do you/does she) work in? That is, what does the place where (you work/she works) make or do?

_____

408. What is the highest grade in school that (you/she) completed? (IF HIGH SCHOOL OR COLLEGE: Did (you/she) graduate?)

1 Less than 8th grade

2 Eighth grade

3 1-3 years high school

4 High school graduate

5 Vocational school or other non-college post

6 1-3 college

7 A college degree

8 Graduate work

9 Unknown

410. Does (your/CHILD'S NAME) family use the WIC (WOMEN, INFANTS AND CHILDREN) program?

1 Yes

2 No

9 Unknown

411 A. What kind of medical insurance or health care coverage does (your/CHILD'S NAME) family have? Do (you/they) have_____? (READ ALL CHOICES BELOW.)

a. Private insurance, for example, Blue Cross/Blue Shield	1 Yes	2 No	9 Unknown
b. Medicaid	1 Yes	2 No	9 Unknown
c. A health maintenance organization (HMO) plan, for example, Harvard Community Health	1 Yes	2 No	9 Unknown

411 B. Is there any other kind of medical or health insurance that I have not mentioned that either your family or (CHILD'S NAME) has?

1 Yes

2 No.....(Go to question 500)

9 Unknown..(Go to question 500)

411 C. What is it?

_____

BIRTH MOTHER'S CHARACTERISTICS

Now, I'm going to ask you some questions about (you/CHILD'S NAME birth mother).

500 A. Has a doctor ever told (you/CHILD'S NAME birth mother) that (you/she) (have/has) high blood pressure?

1 Yes

2 No...(Go to Question 501)

9 Unknown...(Go to Question 501)

500 B. Did the high blood pressure occur <u>only</u> during pregnancy?

1 Yes

2 No

9 Unknown

501. Has a doctor ever told (you/CHILD'S NAME birth mother) that (you/she) (have/has) asthma?

1 Yes

2 No

9 Unknown

502. How tall (are you/is CHILD'S NAME birth mother)?

_____feet _____inches (FILL IN DK IF R DOESN'T KNOW)

503. How much (do you/does CHILD'S NAME birth mother) weigh ?

_____Pounds (FILL IN DK IF R DOESN'T KNOW)

PLANS TO MOVE

And now just a few more questions about your household.

550. In what month and year did (your/CHILD'S NAME) family move to this address?

__ __ (MONTH) 1 9 __ __ (YEAR) (FILL IN "99" IF R DOESN'T KNOW)

551 A. Do (you/they) have definite plans to move within the next few months?

1 Yes

2 No.....(Go to Question 552 A)

9 Unknown....(Go to Question 552 A)

551 B. Where do (you/they) expect to be living? (GET STREET AND TOWN IF POSSIBLE)

_____

552 A. Whether or not (you/they) plan to move, it is important for us to be able to stay in touch with (you/them) over the next year. Will you give us the name of a friend or relative whom we can contact if we ever have trouble reaching (you/them)?

1 Yes... RECORD NAME, ADDRESS, AND TELEPHONE NUMBER OF CONTACT BELOW

2 No

B. What is the person's name? _____

C. What is (his/her) address? _____
(GET STREET AND TOWN)

D. What is (his/her) telephone number? (____) - _____

We've just completed the family interview. Now, I need to record the time and then we'll be ready to start the child interview(s).

553. RECORD THE ENDING TIME OF THE FAMILY INTERVIEW. __ __:__ __ AM / PM

LEAD FREE KIDS STUDY CHILD INVERVIEW

FAMID_____ LFK_NUM _____

1. RECORD INTERVIEWER'S (YOUR) FIRST AND LAST NAME

   FIRST:_____ LAST:_____

2. RECORD INTERVIEWEE'S (PARENT, GUARDIAN, ETC.) FIRST AND LAST NAME

   FIRST:_____ LAST:_____

3. RECORD LFK CHILD'S FIRST AND LAST NAME:

   FIRST _____ LAST:_____

4. RECORD DATE OF CHILD INTERVIEW. __ __ / __ __ / __ __
   Month Day Year

5. RECORD STARTING TIME OF CHILD INTERVIEW. __ __ : __ __ AM / PM

6. HEIGHT __ __ __.__ centimeters

7. Weight __ __.__ kilograms

8. Blood Pressure __ __ __ / __ __ __ mm Hg

CHILD'S ACTIVITIES DURING PAST SUMMER

Now, I am going to ask how (CHILD'S NAME) spent (his/her) time this past summer (JUNE, JULY, AUGUST 1989). I know that it's already winter but I want you to tell me, as best you can, about (CHILD'S NAME) activities this past summer. I am particularly interested in the amount of time (CHILD'S NAME) spent outdoors.

600 A. This past summer, did (CHILD'S NAME) regularly, that is at least once a week, spend time away from home at a .....(READ a).

	600 A.	600 B. Was the (READ a) in Roxbury, Dorchester, Mattapan, or Jamaica Plain?	600 C. This past summer, how many days a week did (he/she) usually go there?	600 D. This past summer, how many hours a day did (he/she) usually spend there?	600 E. This past summer when it was sunny, how many hours a day did (he/she) usually spend outdoors there?
				(FILL IN DK IF R DOESN'T KNOW)	
a. Day care center or family day care	1 Yes →	1 Yes	1 One day	_____	_____
	2 No	2 No	2 Two days		
	3 Unknown	3 Unknown	3 Three days		
			4 Four days		
			5 Five days		
			6 Six days		
			7 Everyday		
			9 Unknown		

600 A. This past summer, did (CHILD'S NAME) regularly, that is at least once a week, spend time away from home at a .....(READ b-c).

	600 A.	600 B. Was the (READ b,c) in Roxbury, Dorchester, Mattapan, or Jamaica Plain?	600 C. This past summer, how many days a week did (he/she) usually go there?	600 D. This past summer, how many hours a day did (he/she) usually spend there?	600 E. This past summer when it was sunny, how many hours a day did (he/she) usually spend outdoors there?
				(FILL IN DK IF R DOESN'T KNOW)	
b. Nursery or pre-school	1 Yes →	1 Yes	1 One day	_____	_____
	2 No	2 No	2 Two days		
	3 Unknown	3 Unknown	3 Three days		
			4 Four days		
			5 Five days		
			6 Six days		
			7 Everyday		
			9 Unknown		
c. Baby Sitters' Homes	1 Yes →	1 Yes	1 One day	_____	_____
	2 No	2 No	2 Two days		
	3 Unknown	3 Unknown	3 Three days		
			4 Four days		
			5 Five days		
			6 Six days		
			7 Everyday		
			9 Unknown		

600 A. This past summer, did (CHILD'S NAME), regularly that is at least once a week, spend time away from home at a .....(READ d-e).

	600 A.	600 B. Was the (READ d,e) in Roxbury, Dorchester, Mattapan, or Jamaica Plain?	600 C. This past summer, how many days a week did (he/she) usually go there?	600 D. This past summer, how many hours a day did (he/she) usually spend there?	600 E. This past summer when it was sunny, how many hours a day did (he/she) usually spend outdoors there?
				(FILL IN DK IF R DOESN'T KNOW)	
d. Relatives' Homes	1 Yes →	1 Yes	1 One day	_____	_____
	2 No	2 No	2 Two days		
	3 Unknown	3 Unknown	3 Three days		
			4 Four days		
			5 Five days		
			6 Six days		
			7 Everyday		
			9 Unknown		
e. Friends' Homes	1 Yes →	1 Yes	1 One day	_____	_____
	2 No	2 No	2 Two days		
	3 Unknown	3 Unknown	3 Three days		
			4 Four days		
			5 Five days		
			6 Six days		
			7 Everyday		
			9 Unknown		

600 A. This past summer, did (CHILD'S NAME) regularly, that is at least once a week, spend time away from home at a .....(READ f).

	600 A.	600 B. Was the (READ f) in Roxbury, Dorchester, Mattapan, or Jamaica Plain?	600 C. This past summer, how many days a week did (he/she) usually go there?	600 D. This past summer, how many hours a day did (he/she) usually spend there?	600 E. This past summer when it was sunny, how many hours a day did (he/she) usually spend outdoors there?
				(FILL IN DK IF R DOESN'T KNOW)	
f. Camp	1 Yes →	1 Yes	1 One day	_____	_____
	2 No	2 No	2 Two days		
	3 Unknown	3 Unknown	3 Three days		
			4 Four days		
			5 Five days		
			6 Six days		
			7 Everyday		
			9 Unknown		

601 A. Were there any other places like these that I have not mentioned where (CHILD'S NAME) regularly, that is at least once a week, spent time away from home this past summer?

1 Yes

2 No.....(Go to question 602 A)

9 Unknown..(Go to question 602 A)

601 B. What was the place? _____
(FILL IN DK IF R DOESN'T KNOW)

601 C. Was it in Roxbury, Dorchester, Mattapan, or Jamaica Plain?

1 Yes

2 No

9 Unknown

601 D. This past summer, how many days a week did (he/she) usually go there?

1 One day a week

2 Two days

3 Three days

4 Four days

5 Five days

6 Six days

7 Everyday

9 Unknown

601 E. This past summer, how many hours a day did (he/she) usually spend there?

_____
(FILL IN DK IF R DOESN'T KNOW)

601 F. This past summer when it was sunny, how many hours a day did (he/she) usually spend outdoors there?

_____
(FILL IN DK IF R DOESN'T KNOW)

602 A. This past summer, did (CHILD'S NAME) regularly, that is at least once a week, visit a park or playground with you or anyone else?

1 Yes

2 No.....(Go to question 603 A)

9 Unknown..(Go to question 603 A)

602 B. What is the name of the park or playground? (FILL IN DK IF R DOESN'T KNOW. IF THERE IS MORE THAN ONE PARK, GET INFORMATION ON EACH ONE.)

_____

602 C. What street and neighborhood is it in? (FILL IN DK IF R DOESN'T KNOW)

_____

602 D. This past summer, how many days a week did (he/she) usually go there?

1 Once a week

2 Two days

3 Three days

4 Four days

5 Five days

6 Six days

7 Everyday

9 Unknown

602 E. This past summer, how many hours a day did (he/she) usually spend there? (FILL IN DK IF R DOESN'T KNOW)

_____

603 A. This past summer, did (CHILD'S NAME) regularly play in any empty lots in your neighborhood?

1 Yes

2 No.....(Go to question 604 A)

9 Unknown.(Go to question 604 A)

603 B. What street is the lot on?
(FILL IN DK IF R DOESN'T KNOW)

_____

603 C. This past summer, how many days a week did (he/she) usually go there?

1 One day a week

2 Two days

3 Three days

4 Four days

5 Five days

6 Six days

7 Everyday

9 Unknown

603 D. This past summer, how many hours a day did (he/she) usually spend there?

_____
(FILL IN DK IF R DOESN'T KNOW)

Now, I am going to ask you some questions about how (CHILD'S NAME) spent (his/her) time in and around your home this past summer. (IF R IS IN THE STUDY GROUP ADD: I would like to know about (CHILD'S NAME) activities in and around your home before the soil was removed.)

604 A. In a typical sunny week this past summer, did (CHILD'S NAME) spend any time playing outdoors in your home's yard?

1 Yes

2 No.....(Go to question 605 A)

9 Unknown...(Go to question 605 A)

604 B. About how many days a week did (he/she) usually play there?

1 Once a week

2 Two days

3 Three days

4 Four days

5 Five days

6 Six days

7 Everyday

9 Unknown

604 C. On average, how many hours a day did (he/she) usually spend there? (FILL IN DK IF R DOESN'T KNOW)

_____

604 D. Where did (he/she) usually play in your home's yard? Did (he/she) play in your_____? (READ LIST. IF MORE THAN ONE, CIRCLE ALL THAT APPLY. USE SHOW CARD.)

1 Back yard

2 Left side of the yard when you face the house

3 Right side of the yard when you face the house

4 Front yard

7 Some other place in your yard (SPECIFY)_____

9 Unknown

604 E. (Was this area/Were these areas) where (he/she) played grassy? Concrete or asphalt? Plain dirt or soil? A sandbox? Or some other surface?
(IF MORE THAN ONE, CIRCLE ALL THAT APPLY. USE SHOW CARD.)

1 Grassy

2 Concrete or asphalt

3 Dirt or soil

4 Sandbox

7 Other (SPECIFY)_____

9 Unknown

605 A. In a typical sunny week this past summer, did (CHILD'S NAME) spend any time playing outside in other areas around the house such as the porch, sidewalk or street?

1 Yes

2 No.....(Go to question 606 A)

9 Unknown....(Go to question 606 A)

605 B. How many days a week did (he/she) usually play there?

1 Once a week

2 Two days

3 Three days

4 Four days

5 Five days

6 Six days

7 Everyday

9 Unknown

605 C. This past summer, how many hours a day did (he/she) usually spend on the porch, sidewalk, or street?

_____

(FILL IN DK IF R DOESN'T KNOW)

SKIP QUESTIONS 606 AND 607 IF CHILD NEVER PLAYED OUTSIDE THIS PAST SUMMER.

606 A. This past summer, did (CHILD'S NAME) ever take a baby bottle with (him/her) when (he/she) played outdoors?

1 Yes

2 No (Go to Question 607 A)

9 Unknown (Go to Question 607 A)

606 B. About how often did (he/she) do this? Would you say at least once a day, at least once a week but not everyday, a few times a month, or once a month or less? (USE SHOW CARD.)

1 At least once per day

2 At least once per week but not everyday

3 A few times a month

4 Once per month or less

9 Unknown

607 A. This past summer, did (CHILD'S NAME) ever eat food when (he/she) played outside?

1 Yes

2 No (Go to Question 608)

9 Unknown (Go to Question 608)

607 B. About how often did (he/she) do this? Would you say at least once a day, at least once a week but not everyday, a few times a month, or once a month or less?

1 At least once per day

2 At least once per week but not everyday

3 A few times a month

4 Once per month or less

9 Unknown

608. This past summer when (CHILD'S NAME) was inside at home, did (he/she) play or sit on the floor a lot of the time, some of the time or almost never?

1 A lot of the time

2 Some of the time

3 Almost never.....(Go to question 700)

9 Unknown.....(Go to question 700)

609. About how many hours on an average day do you think (CHILD'S NAME) usually sat or played on the floor at home?

_____Hours a day playing on floor at home (FILL IN DK IF R DOESN'T KNOW)

MOUTHING BEHAVIOR

Children often put things other than food in their mouths such as toys or fingers. Its very natural for them to do this and doesn't necessarily hurt them. Now, I'm going to ask you some questions about things that (CHILD'S NAME) may put in (his/her) mouth.

700. Does (CHILD'S NAME) use a pacifier?

1 Yes

2 No

9 Unknown

701. How often does (CHILD'S NAME) suck (his/her) thumb or fingers? Would you say often, sometimes, rarely, or never?

1 Often

2 Sometimes

3 Rarely

4 Never

9 Unknown

702. Children often explore with their mouths by tasting and touching things with their tongues. Have you ever seen (CHILD'S NAME) put (his/her) mouth or tongue on a windowsill when (he/she) is looking out?

1 Yes

2 No

9 Unknown

703. Have you ever seen (CHILD'S NAME) pick at a windowsill with (his/her) fingers while looking out?

1 Yes

2 No

9 Unknown

704 A. Have you ever seen (CHILD'S NAME) put paint chips in (his/her) mouth?

1 Yes

2 No....(Go to Question 705)

9 Unknown ...(Go to Question 705)

704 B. How often does (CHILD'S NAME) do this? Would you say usually, sometimes, or never?

1 Usually

2 Sometimes

3 Never

9 Unknown

705. Have you ever seen (CHILD'S NAME) eat dirt or sand?

1 Yes

2 No

9 Unknown

706 A. Does (CHILD'S NAME) have a favorite blanket or stuffed toy?

1 Yes

2 No.....(Go to Question 707 A)

9 Unknown..(Go to Question 707 A)

706 B. Does (he/she) carry this around during the day?

1 Yes

2 No

9 Unknown

706 C. How often does (he/she) put this in (his/her) mouth? Is it usually, sometimes, or never?

1 Usually

2 Sometimes

3 Never

9 Unknown

707 A. Are there any other things that I have not mentioned that you have seen (CHILD'S NAME) put in (his/her) mouth?

1 Yes

2 No.....(Go to Question 750)

9 Unknown...(Go to Question 750)

707 B. What are these? (LIST ALL MENTIONNED BELOW.)

_____

_____

HAND WASHING

Very few children like to wash their hands and it is often difficult for a parent to make them. Fortunately, there are no rules about how many times a day a child's hands should be washed. Now, I'm going to ask you some questions about washing (CHILD'S NAME) hands. (USE SHOW CARD.)

750. Are (CHILD'S NAME) hands almost always, sometimes or almost never washed before eating meals?

1 Almost always

2 Sometimes

3 Almost Never

9 Unknown

751. Are (his/her) hands almost always, sometimes or almost never washed after eating meals?

1 Almost always

2 Sometimes

3 Almost Never

9 Unknown

752. What about eating snacks? Are (CHILD'S NAME) hands almost always, sometimes or almost never washed before eating snacks?

1 Almost always

2 Sometimes

3 Almost Never

9 Unknown

753. Are (his/her) hands almost always, sometimes or almost never washed after eating snacks?

1 Almost always

2 Sometimes

3 Almost Never

754. What about playing outdoors? Are (his/her) hands almost always, sometimes or almost never washed after playing outdoors?

1 Almost always

2 Sometimes

3 Almost Never

9 Unknown

755. What about bedtime? Are (his/her) hands almost always, sometimes or almost never washed before bed?

1 Almost Always

2 Sometimes

3 Almost Never

9 Unknown

CHILD'S HEALTH

Now I am going to ask you a few questions about (CHILD'S NAME) medical care and health.

800 A. What is the name of the clinic or hospital where (CHILD'S NAME) usually gets (his/her) medical care?

_____

800 B. What is (his/her) doctor's name? _____

IF R DOESN'T KNOW USUAL PLACE OF MEDICAL CARE, ASK:

801. Where was the last place that (CHILD'S NAME) received medical care?

_____

802. Has a doctor ever told (you/CHILD'S NAME parent) that (CHILD'S NAME) has any of the following problems?

A. Asthma	1 Yes	2 No	9 Unknown
B. Seizures	1 Yes	2 No	9 Unknown
C. G6PD Deficiency	1 Yes	2 No	9 Unknown
D. Failure to thrive	1 Yes	2 No	9 Unknown

803 A. Has (CHILD'S NAME) been tested for sickle cell?

1 Yes

2 No .....(Go to question 804 A)

9 Unknown.(Go to question 804 A)

803 B. Was the result negative or positive?

1 Positive

2 Negative .....(Go to question 804 A)

9 Unknown.....(Go to question 804 A)

803 C. Was it positive for sickle cell trait?

1 Yes.....(Go to question 804 A)

2 No

9 Unknown

803 D. Was it positive for sickle cell disease?

1 Yes

2 No

9 Unknown

804 A. Has a doctor ever told (you/CHILD'S NAME parent) that (CHILD'S NAME) had anemia or low blood iron?

1 Yes

2 No .....(Go to question 805 A)

9 Unknown.(Go to question 805 A)

804 B. In what year (were you/was CHILD'S NAME parent or guardian) told that (CHILD'S NAME) had anemia or low blood iron?

1 9 __ __ (FILL IN "99" IF R DOESN'T KNOW)

804 C. Is (he/she) presently being treated for anemia or low blood iron?

1 Yes

2 No

9 Unknown

805 A. Has (CHILD'S NAME) ever received medical care for lead poisoning?

1 Yes

2 No .....(Go to Question 806 A)

9 Unknown...(Go to Question 806 A)

805 B. Did (CHILD'S NAME) stay in the hospital overnight for this care?

1 Yes

2 No

9 Unknown

806 A. Are there any other medical problems that (CHILD'S NAME) has that I have not mentionned?

1 Yes

2 No.....(Go to Question 850)

9 Unknown.....(Go to Question 850)

806 B. What are they?

_____

CHILD'S DIET

Now, I'm going to ask you about (CHILD'S NAME)'s diet and eating habits.

850. Does (CHILD'S NAME) eat any vegetables from your garden or any other garden in your neighborhood?

1 Yes

2 No

9 Unknown

851. About how often does (CHILD'S NAME) eat food with (his/her) fingers? Would you say a lot of the time, some of the time, or almost never?

1 A lot of the time

2 Some of the time

3 Almost never

9 Unknown

852. Is (CHILD'S NAME) currently being breast fed?

1 Yes

2 No

9 Unknown

have some things to show you that might help you answer the next set of
ns about foods that (CHILD'S NAME) may eat. (TAKE OUT SHOW CARDS, FOOD LISTS
ELS, CUPS, BOWLS AND EXPLAIN THEIR USE TO R.)
I'm going to ask you about some canned foods (CHILD'S NAME) may eat. Please
if, in the past six months, (he/she) has ever eaten any of these canned

	853 A. In the past six months, did (he/she) ever drink (READ a,b)?	853 B. How much did (he/she) usually drink at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	853 C. How often did (he/she) drink (READ a,b)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
ed Milk	1 Yes	1 < 1/2 cup	1 Everyday
	2 No	2 1/2 cup	2 5-6/week
	9 Unknown	3 1 cup	3 2-4/week
		4 >1 cup	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown
	(IF EVERYDAY) How many times a day? _____		
ed liquid ula	1 Yes	1 < 1/2 cup	1 Everyday
	2 No	2 1/2 cup	2 5-6/week
	9 Unknown	3 1 cup	3 2-4/week
		4 >1 cup	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	853 A. In the past six months did (he/she) ever eat (READ c,d)?	853 B. How much did (he/she) usually eat at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	853 C. How often did (he/she) eat (READ c,d)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
c. Canned meats and fish including tuna fish	1 Yes 2 No 9 Unknown	1 < 1/2 cup 2 1/2 cup 3 1 cup 4 >1 cup 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		
d. Canned fruits and vegetables	1 Yes 2 No 9 Unknown	1 < 1/2 cup 2 1/2 cup 3 1 cup 4 >1 cup 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	853 A. In the past six months did (he/she) ever (eat/drink) (READ e,f)?	853 B. How much did (he/she) usually (eat/drink) at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	853 C. How often did (he/she) (eat/drink) (READ e,f) Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
e. Canned juices	1 Yes 2 No 9 Unknown	1 < 1/2 cup 2 1/2 cup 3 1 cup 4 >1 cup 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		
f. Canned soups	1 Yes 2 No 9 Unknown	1 < 1/2 cup 2 1/2 cup 3 1 cup 4 >1 cup 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	853 A. In the past six months did (he/she) ever eat (READ g,h)?	853 B. How much did (he/she) usually eat at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	853 C. How often did (he/she) eat (READ g,h)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
g. Canned spaghetti	1 Yes 2 No 9 Unknown	1 < 1/2 cup 2 1/2 cup 3 1 cup 4 >1 cup 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		
h. Canned beans	1 Yes 2 No 9 Unknown	1 < 1/2 cup 2 1/2 cup 3 1 cup 4 >1 cup 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		

Now I'm going to ask you about other foods that (CHILD'S NAME) may eat that are not canned. Please tell me if in the past six months (he/she) has ever eaten any of these other non-canned foods.

	854 A. In the past six months did (he/she) ever drink (READ a,b)?	854 B. How much did (he/she) usually drink at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	854 C. How often did (he/she) drink (READ a,b)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
a. Milk	1 Yes 2 No 9 Unknown	1 < 1/2 cup (<4 oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (>8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		
b. Milk on cold or hot cereals	1 Yes 2 No 9 Unknown	1 < 1/2 cup (<4 oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (>8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		

LFK_NUM _____

	854 A. In the past six months did (he/she) ever (eat/drink) (READ c,d)?	854 B. How much did (he/she) usually (eat/drink) at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	854 C. How often did (he/she) (eat/drink) (READ c,d)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
c. Powdered Milk	1 Yes 2 No 9 Unknown	1 < 1/2 cup (<4oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (>8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		
d. Ice Cream, or Sherbet	1 Yes 2 No 9 Unknown	1 <1/2 cup (<4 oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (>8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	854 A. In the past six months did (he/she) ever eat (READ e,f)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	854 C. How often did (he/she) eat (READ e,f)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
e. Pudding or custard	1 Yes 2 No 9 Unknown	1 <1/2 cup (<4 oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (>8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		
f. Cottage cheese	1 Yes 2 No 9 Unknown	1 < 1/2 cup (<4 oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (>8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	854 A. In the past six months did (he/she) ever eat (READ g)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1 slice, 1 slice, 2 slices, or more than 2 slices?	854 C. How often did (he/she) eat (READ g)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
g. Any other cheeses	1 Yes	1 < slice (<1 oz)	1 Everyday
	2 No	2 1 slice (1 oz)	2 5-6/week
	9 Unknown	3 2 slices (2 oz)	3 2-4/week
		4 >2 slices (>2 oz)	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown

(IF EVERYDAY) How many times a day? _____

	854 A. In the past six months did (he/she) ever eat (READ h)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	854 C. How often did (he/she) eat (READ h)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
h. Beef liver	1 Yes	1 < 1/2 cup (<4 oz)	1 Everyday
	2 No	2 1/2 cup (4 oz)	2 5-6/week
	9 Unknown	3 1 cup (8 oz)	3 2-4/week
		4 >1 cup (>8 oz)	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown

(IF EVERYDAY) How many times a day?

	854 A. In the past six months did (he/she) ever eat (READ i,j)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	854 C. How often did (he/she) eat (READ i,j)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
i. Pork or ham	1 Yes	1 < 1/2 cup (< 4oz)	1 Everyday
	2 No	2 1/2 cup (4 oz)	2 5-6/week
	9 Unknown	3 1 cup (8 oz)	3 2-4/week
		4 >1 cup (> 8oz)	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown

(IF EVERYDAY) How many times a day? _____

j. Lunch meats like bologna or salami	1 Yes	1 < 1/2 cup (<4 oz)	1 Everyday
	2 No	2 1/2 cup (4 oz)	2 5-6/week
	9 Unknown	3 1 cup (8 oz)	3 2-4/week
		4 >1 cup (>8 oz)	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown

(IF EVERYDAY) How many times a day? _____

	854 A. In the past six months did (he/she) ever eat (READ k,l)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	854 C. How often did (he/she) eat (READ k,l)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
k. Any other red meat (including hamburgers, meatloaf, steak, roast beef)	1 Yes 2 No 9 Unknown	1 < 1/2 cup (<4 oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (>8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		
l. Beans (such as kidney, navy, soy, or pinto beans)	1 Yes 2 No 9 Unknown	1 < 1/2 cup (< 4oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (>8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	854 A. In the past six months did (he/she) ever eat (READ m,n)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	854 C. How often did (he/she) eat (READ m,n)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
m. Shellfish	1 Yes	1 <1/2 cup (<4 oz)	1 Everyday
	2 No	2 1/2 cup (4 oz)	2 5-6/week
	9 Unknown	3 1 cup (8 oz)	3 2-4/week
		4 >1 cup (>8 oz)	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown
	(IF EVERYDAY) How many times a day? _____		
n. Any other fish	1 Yes	1 < 1/2 cup (<4 oz)	1 Everyday
	2 No	2 1/2 cup (4 oz)	2 5-6/week
	9 Unknown	3 1 cup (8 oz)	3 2-4/week
		4 >1 cup (>8 oz)	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	854 A. In the past six months did (he/she) ever eat (READ o,p)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	854 C. How often did (he/she) eat (READ o,p)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
o. Leafy green vegetables (such as spinach, lettuce, broccoli, mustard and collard greens, kale (NOT GREEN BEANS OR PEAS)	1 Yes 2 No 9 Unknown	1 < 1/2 cup(<4 oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (>8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		
p. Nuts	1 Yes 2 No 9 Unknown	1 < 1/2 cup (<4 oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (> 8oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	854 A. In the past six months did (he/she) ever eat (READ q,r)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	854 C. How often did (he/she) eat (READ q,r)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
q. Cold cereals	1 Yes	1 < 1/2 cup (<4 oz)	1 Everyday
	2 No	2 1/2 cup (4 oz)	2 5-6/week
	9 Unknown	3 1 cup (8 oz)	3 2-4/week
		4 >1 cup (>8 oz)	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown
	(IF EVERYDAY) How many times a day? _____		
r. Spaghetti or macaroni	1 Yes	1 <1/2 cup (<4 oz)	1 Everyday
	2 No	2 1/2 cup (4 oz)	2 5-6/week
	9 Unknown	3 1 cup (8 oz)	3 2-4/week
		4 >1 cup (>8 oz)	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	854 A. In the past six months did (he/she) ever eat (READ s)?	854 B. How much did (he/she) usually eat at a time? Was it less than one tablespoon, one tablespoon, two tablespoons, or more than two tablespoons?	854 C. How often did (he/she) eat (READ s)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
s. Peanut butter	1 Yes	1 < 1 tablespoon	1 Everyday
	2 No	2 1 tablespoon	2 5-6/week
	9 Unknown	3 2 tablespoons	3 2-4/week
		4 >2 tablespoons	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown

(IF EVERYDAY) How many times a day? _____

	854 A. In the past six months did (he/she) ever eat (READ t)?	854 B. How much did (he/she) usually eat at a time? Was it less than one hot dog, one hot dog, or more than one hot dog?	854 C. How often did (he/she) eat (READ t)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
t. Hot dogs	1 Yes	1 <1 hot dog (<3 oz)	1 Everyday
	2 No	2 1 hot dog (3 oz)	2 5-6/week
	9 Unknown	3 >1 hot dog (>3 oz)	3 2-4/week
		9 Unknown	4 1/week
			5 1-3/month
			6 <1/month
			9 Unknown

(IF EVERYDAY) How many times a day? _____

	854 A. In the past six months did (he/she) ever eat (READ u,v)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1 slice, 1 slice, 2 slices, or more than 2 slices?	854 C. How often did (he/she) eat (READ u,v)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
u. White bread	1 Yes	1 <1 Slice	1 Everyday
	2 No	2 1 Slice	2 5-6/week
	9 Unknown	3 2 Slices	3 2-4/week
		4 >2 slices	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown
	(IF EVERYDAY) How many times a day? _____		
v. Whole wheat, rye, other dark bread	1 Yes	1 <1 slice	1 Everyday
	2 No	2 1 slice	2 5-6/week
	9 Unknown	3 2 slices	3 2-4/week
		4 >2 slices	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	854 A. In the past six months, did (he/she) ever eat (READ w)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1 roll, 1 roll, 2 rolls, or more than 2 rolls?	854 C. How often did (he/she) eat (READ w)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
w. White rolls	1 Yes	1 < 1 Roll	1 Everyday
	2 No	2 1 Roll	2 5-6/week
	9 Unknown	3 2 Rolls	3 2-4/week
		4 >2 Rolls	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown

(IF EVERYDAY) How many times a day? _____

	854 A. In the past six months, did (he/she) ever eat (READ x,y)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1 cracker, 1 cracker, 2 crackers, 3 crackers, or more than three crackers?	854 C. How often did (he/she) eat (READ x,y)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
x. White crackers like Saltines	1 Yes 2 No 9 Unknown	1 < 1 cracker 2 1 cracker 3 2 crackers 4 3 crackers 5 >3 crackers 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		
y. Whole wheat, rye, other dark crackers (like Wheat Thins)	1 Yes 2 No 9 Unknown	1 < 1 cracker 2 1 cracker 3 2 crackers 4 3 crackers 5 >3 crackers 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	854 A. In the past six months, did (he/she) ever eat (READ z)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1 slice, 1 slice, or more than 1 slice?	854 C. How often did (he/she) eat (READ z)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
z. Cakes	1 Yes	1 <1 Slice (<3 oz)	1 Everyday
	2 No	2 1 slice (3 oz)	2 5-6/week
	9 Unknown	3 >1 Slice (>3 oz)	3 2-4/week
		9 Unknown	4 1/week
			5 1-3/month
			6 <1/month
			9 Unknown

(IF EVERYDAY) How many times a day? _____

	854 A. In the past six months, did (he/she) ever eat (READ aa)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1 cookie, 1 cookie, 2 cookies, 3 cookies, or more than 3 cookies?	854 C. How often did (he/she) eat (READ aa)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
aa. Cookies	1 Yes	1 <1 Cookie	1 Everyday
	2 No	2 1 Cookie	2 5-6/week
	9 Unknown	3 2 Cookies	3 2-4/week
		4 3 Cookies	4 1/week
		5 >3 Cookies	5 1-3/month
		9 Unknown	6 <1/month
			9 Unknown

(IF EVERYDAY) How many times a day? _____

	854 A. In the past six months, did (he/she) ever eat (READ bb)?	854 B. How much did (he/she) usually eat) at a time? Was it less than 1 donut, 1 donut, or more than 1 donut?	854 C. How often did (he/she) eat (READ bb)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
bb. Donuts	1 Yes	1 < 1 Donut	1 Everyday
	2 No	2 1 Donut	2 5-6/week
	9 Unknown	3 > 1 Donut	3 2-4/week
		9 Unknown	4 1/week
			5 1-3/month
			6 <1/month
			9 Unknown

(IF EVERYDAY) How many times a day? _____

	854 A. In the past six months, did (he/she) ever eat (READ cc)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1 egg, 1 egg, 2 eggs, or more than 2 eggs?	854 C. How often did (he/she) eat (READ cc)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
cc. Eggs	1 Yes	1 Less than 1 Egg	1 Everyday
	2 No	2 1 Egg	2 5-6/week
	9 Unknown	3 2 Eggs	3 2-4/week
		4 More than 2 Eggs	4 1/week
		9 Unknown	5 1-3/month
			6 <1/month
			9 Unknown

(IF EVERYDAY) How many times a day? _____

	854 A. In the past six months did (he/she) ever eat (READ dd,ee)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	854 C. How often did (he/she) eat (READ dd,ee)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
dd. Baby fruits or vegetables (like Beech Nuts or Gerbers)	1 Yes 2 No 9 Unknown	1 < 1/2 cup (< 4 oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (>8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		
ee. Baby Meats (like Beech Nuts or Gerbers)	1 Yes 2 No 9 Unknown	1 <1/2 cup (< 4 oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (> 8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown
	(IF EVERYDAY) How many times a day? _____		

	854 A. In the past six months did (he/she) ever eat (READ ff)?	854 B. How much did (he/she) usually eat at a time? Was it less than 1/2 cup, 1/2 cup, 1 cup, or more than 1 cup?	854 C. How often did (he/she) eat (READ ff)? Was it everyday, 5-6 times a week, 2-4 times a week, once a week, 1-3 times a month, or less than once a month?
ff. Baby Cereals (like Beech Nuts or Gerbers)	1 Yes 2 No 9 Unknown	1 < 1/2 cup (<4 oz) 2 1/2 cup (4 oz) 3 1 cup (8 oz) 4 >1 cup (>8 oz) 9 Unknown	1 Everyday 2 5-6/week 3 2-4/week 4 1/week 5 1-3/month 6 <1/month 9 Unknown

(IF EVERYDAY) How many times a day? _____

855 A. Do you buy any canned foods that you think have been imported from another country?

1 Yes

2 No.....(Go to Question 856 A)

9 Unknown..(Go to Question 856 A)

855 B. Does (CHILD'S NAME) eat any of these imported foods?

1 Yes

2 No

9 Unknown

856 A. Does (CHILD'S NAME) drink plain tap water?

1 Yes

2 No.....(Go to Question 857)

9 Unknown..(Go to Question 857)

856 B. On an average day, about how many 8 ounce glasses of tap water does (he/she) drink? (SHOW 8 OZ CUP.)

_____8 oz. glasses per day (FILL IN DK IF R DOESN'T KNOW)

857. Do you put ice cubes made from tap water into any of (CHILD'S NAME) drinks?

1 Yes

2 No

9 Unknown

858. Do you use tap water to mix with powdered foods that (he/she) might eat?

1 Yes

2 No

9 Unknown

859. Do you use tap water to mix into powdered or frozen drinks like Kool-Aid or orange juice that (he/she) might drink?

1 Yes

2 No

9 Unknown

860. Do you ever mix tap water with any other juices that (CHILD'S NAME) drinks?

1 Yes

2 No

9 Unknown

861. Do you use tap water when you cook (CHILD'S NAME) foods?

1 Yes

2 No

9 Unknown

862 A. Does (CHILD'S NAME) take any vitamins?

1 Yes

2 No.....(Go to Question 863)

9 Unknown..(Go to Question 863)

862 B. What is the name of the vitamin?
(FILL IN DK IF R DOESN'T KNOW)

_____

862 C. How often does (he/she) take the vitamins? Would you say every day, almost every day, about once a week, or less than once a week?

1 Every day

2 Almost every day

3 Once a week

4 Less than once a week

9 Unknown

863. Does (CHILD'S NAME) take an iron supplement? (OR: Do the vitamins contain iron?)

1 Yes

2 No

9 Unknown

ASK TO SEE BOTTLE IF RESPONDENT IS UNCLEAR ABOUT IRON OR VITAMIN DOSE OR SAYS THAT THE CHILD TAKES A MULTIVITAMIN.

FATHER OR MALE GUARDIAN CHARACTERISTICS

Now I have a few questions about (CHILD'S NAME) father or male guardian.

900. INTERVIEWER CHECK: IS R CHILD'S FATHER OR MALE GUARDIAN?

1 ( ) YES....(Ask Questions 903A-905)

2 ( ) No.....(Ask Questions 901-902)

901. Does (CHILD'S NAME) father or male guardian live here with (him/her)?

1 Yes.....(Go to Question 903)

2 No

9 Unknown

902. How often does (CHILD'S NAME) see his father or male guardian?

1 Never.....(Go to Question 905)

2 Less than once a year...(Go to Question 905)

3 A few times a year.....(Go to Question 905)

4 About once a week

5 At least once a week

903 A. Which of the following best describes (your/his) occupational status? (READ ALL CHOICES BELOW.)

1 Unemployed.....(Go to Question 904)

3 Employed part-time, that is, less than 20 hours a week

4 Employed full-time, that is, 20 or more hours a week

5 Something else such as disabled ...(Go to Question 904)

903 B. What is (your/his) job title?

_____

903 C. What are (your/his) job duties?

_____

903 D. What sort of business or industry is the place where (you/he) works? That is, what does the place where (you/he) works make or do?

_____

904. What is the highest grade in school that (you/he) completed? (IF HIGH SCHOOL OR COLLEGE: Did (you/he) graduate?)

1 Less than 8th grade

2 Eighth grade

3 1-3 years high school

4 High school graduate

5 Vocational school or other non-college post

6 1-3 college

7 A college degree

8 Graduate work

9 Unknown

905. What is (your/his) age? _____

906. Has a doctor ever told (you/CHILD'S NAME birth father) that (you/he) (have/has) high blood pressure?

1 Yes

2 No

9 Unknown

907. Has a doctor ever told (you/CHILD'S NAME birth father) that (you/he) (have/has) asthma?

1 Yes

2 No

9 Unknown

908. How tall (are you/is CHILD'S NAME birth father)?

_____feet _____inches (FILL IN DK IF R DOESN'T KNOW)

909. How much (do you/does CHILD'S NAME birth father) weigh?

_____Pounds (FILL IN DK IF R DOESN'T KNOW)

CHILD'S BACKGROUND

950. Which of the following best describes (CHILD'S NAME) background -- Black not of Hispanic origin, White not of Hispanic origin, Hispanic, Asian, Native American, or something else?

1 Black not of Hispanic origin

2 White not of Hispanic origin

3 Hispanic

4 Asian

5 Native American

8 Other

9 Unknown

951. From what country did (your/CHILD'S NAME mother's) family come before coming to the U.S.? (FILL IN DK IF R DOESN'T KNOW)

_____

952. From what country did (your/CHILD'S NAME father's) family come before coming to the U.S.? (FILL IN DK IF R DOESN'T KNOW)

_____

953 A. Are there any languages besides English that are regularly spoken in (your/CHILD'S NAME) household?

1 Yes

2 No.....(Go to Question 1000)

9 Unknown..(Go to Question 1000)

953 B. What are they?

1 Spanish

2 Portugese

3 Creole/French

4 Other (Specify)_____

9 Unknown

IF NO MORE LFK CHILDREN, SAY: This completes the interview. Thank you very much for cooperation and time. We really appreciate your help.

IF THERE ARE MORE LFK CHILDREN IN THE HOUSEHOLD, SAY: Now, I'm going to ask you the same questions about (OTHER LFK CHILD'S NAME).

1000. RECORD THE ENDING TIME OF THE CHILD INTERVIEW. __ __:__ __ AM / PM

1001. PLEASE SIGN BELOW.

_____
Interviewer's Signature

FILL IN 1002 AFTER YOU LEAVE.

1002. The quality of this interview is:

1 Reliable

2 Some doubt

3 Unreliable Explain:_____

_____

LEAD FREE KIDS STUDY FOLLOW-UP FAMILY INVERVIEW

FAMID_____ LFK_NUM _____

LFK_NUM _____

LFK_NUM _____

1. RECORD INTERVIEWER'S (YOUR) FIRST AND LAST NAME

FIRST:_____ LAST:_____

2. RECORD INTERVIEWEE'S (PARENT, GUARDIAN, ETC.) FIRST AND LAST NAME

FIRST:_____ LAST:_____

3. RECORD DATE OF FOLLOW-UP FAMILY INTERVIEW. __ __ / __ __ / __ __

Month Day Year

4. RECORD STARTING TIME OF FOLLOW-UP FAMILY INTERVIEW. __ __ : __ __ AM/PM

THE LFK FOLLOW-UP INTERVIEW CONSISTS OF TWO PARTS. THE FIRST PART IS THE FAMILY/HOUSEHOLD INTERVIEW. THE SECOND PART IS A CHILD SPECIFIC INTERVIEW. IF THERE IS MORE THAN ONE LFK CHILD IN A HOUSEHOLD, REPEAT THE CHILD INTERVIEW FOR EACH LFK CHILD. THERE IS NO NEED TO REPEAT THE FAMILY/HOUSEHOLD INTERVIEW.

FAMILY/HOUSEHOLD SECTION

First, I'm going to ask you some questions about your household and family and then I'll ask you about (CHILD'S NAME/CHILDREN'S NAME) who (is/are) participating in the Lead Free Kids study.

SMOKING

200 A. How many people in your household currently smoke cigarettes?

__ __ persons

IF NONE, SKIP TO 250 A. IF ONE OR MORE PERSONS, ASK QUESTIONS 200 B.- 200 D. CONSECUTIVELY FOR ONE PERSON, THEN REPEAT FOR ANY OTHER.

	Smoker #1	Smoker #2	Smoker #3
200 B. What (is/are) the first name(s) of the (person/people) who smoke(s)?	_____	_____	_____
200 C. How many cigarettes (does SMOKER #1/#2,#3/do you) smoke a day? (FILL IN DK IF R DOESN'T KNOW)	_____	_____	_____
200 D. How many years total (has SMOKER #1,#2,#3/have you) smoked? (FILL IN DK IF R DOESN'T KNOW)	_____	_____	_____

PETS

250 A. Do you have any dogs in your household?

1 No.....(Go to question 251 A)

2 Yes

9 Unknown.....(Go to question 251 A)

250 B. Does the dog go in and out of the house or does it never come inside?

1 Goes in and out

2 Never comes inside

9 Unknown

251 A. Do you have any cats in your household?

1 No.....(Go to question 261 A)

2 Yes

9 Unknown.....(Go to question 261 A)

251 B. Does the cat never go outside, never come inside, or does it go in and out of the house?

1 Never goes outside

2 Never comes inside

3 Goes in and out

9 Unknown

HOUSEKEEPING

261 A. Do you use an electric vacuum cleaner to clean the floors and carpets in your home?

1 Yes

2 No .....(Go to Question 262)

9 Unknown...(Go to Question 262)

261 B. About how often do you vacuum? Would you say more than once a week, about once a week, or less than once a week?

1 More than once a week

2 Once a week

3 Less than once a week

9 Unknown

261 C. About how often do you change or empty out the vacuum cleaner bag? Would you say often, sometimes or never?

1 Often

2 Sometimes

3 Never

9 Unknown

262. Compared to when (CHILD'S NAME) first joined the Lead Free Kids Study, would you say that (CHILD'S NAME/your) house is now cleaned more often, less often, or about the same amount?

1 More often

2 Less often

3 About the same

9 Unknown

LEAD WORK

300 A. Now I'm going to ask you about jobs that you and other members of your household have held. I want you to tell me, as best you can, if any member of your household has worked in any of these jobs in the last year. These jobs may involve exposure to lead. I want you to include anyone who was living here this year even if they aren't here now. In the past year (AUGUST 1989 TO TODAY), has anyone in your household worked in a job that included.....(READ LIST)

(REMEMBER TO REPEAT "IN THE PAST YEAR.... " EVERY SO OFTEN)

a. Battery work
b. Metal work
c. Oil refining
d. Painting
e. Demolition
f. Welding
g. Chemical processing
h. Plumbing
i. Sandblasting
j. Glass Work
k. Window replacement
l. Autobody work
m. Road stripe painting
n. Metal recycling
o. Radiator repair
p. Shooting guns
q. Lead smelting
r. Foundry work
s. Mechanical work, that is a mechanic
t. Paint-pigment, zinc or copper work
u. Deleading
v. Any other lead handling work

RECORD "YES" IF R ANSWERS TO ANY ONE OF THESE JOBS, CIRCLE LETTER(S) THAT APPLIES AND CONTINUE WITH QUESTIONS 300 B.- 300 D. RECORD "NO" IF R ANSWERS TO NONE OF THESE CATEGORIES AND CONTINUE THE INTERVIEW WITH 350.

1 Yes
2 No (Go to Question 350)

ASK Q 300 B.- 300 D. CONSECUTIVELY FOR ONE ITEM, THEN REPEAT FOR ANY OTHER.

	#1	#2	#3	#4	#5
300 B. LIST SEPARATELY EACH OF THE ITEMS CIRCLED.	_____	_____	_____	_____	_____
300 C. Does the person doing _____ usually change out of his or her clothes and leave them at work?	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown
300 D. Does the person usually shower before coming home from work?	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown	1 Yes 2 No 9 Unknown

HOBBIES

350. Now I'm going to ask you about hobbies or activities. I'm interested in hobbies and activities that any people may do in your house or right around your house whether or not they live with you. In the last year (AUGUST 1989 TO TODAY), has anyone around your house been involved in .....? (READ LIST BELOW.)

A. Remodeling or repairing your house or apartment	1 Yes	2 No	3 Unknown
B. Painting parts of your house or furniture in your house	1 Yes	2 No	3 Unknown
C. Painting pictures with artists' paints	1 Yes	2 No	3 Unknown
D. Painting bicycles or cars	1 Yes	2 No	3 Unknown
E. Working with stained glass	1 Yes	2 No	3 Unknown
F. Making fishing sinkers, bullets or anything else with lead	1 Yes	2 No	3 Unknown

350. HOBBIES (CONTINUED) In the last year (AUGUST 1989 TO TODAY), has anyone around your house been involved in .....? (READ LIST)

G. Soldering electronic parts	1 Yes	2 No	3 Unknown
H. Soldering pipes or doing plumbing	1 Yes	2 No	3 Unknown
I. Making lead-glazed pottery	1 Yes	2 No	3 Unknown
J. Making jewelry	1 Yes	2 No	3 Unknown

MOVED

360 A. (Have/Has) (you/CHILD'S NAME family) moved from the original apartment or house where (your/CHILD'S NAME) family lived when (you/they) first joined the Lead Free Kids Project? (MOST FAMILIES FIRST JOINED THE PROJECT LAST SUMMER AND FALL.)

1 Yes

2 No.....(Go to question 376 A)

9 Unknown..(Go to question 376 A)

360 B. What is the exact month, day and year that (you/they) moved?

_____ / _____ / _____ (FILL IN 99 IF R DOESN'T KNOW)
Month / Day / Year

RENOVATIONS, DELEADING

Now, I have a few questions about renovations and deleading that might have been done in your (apartment/house).
IF MOVED, SAY: These questions apply to the original premises, house or apartment where (your/CHILD'S NAME) family lived at the start of the project.

376 A. In the past year (AUGUST 1989 TO TODAY), have you or anyone else removed or sanded paint from the walls or woodwork <u>inside</u> your house?

1 Yes

2 No.....(Go to question 377 A)

9 Unknown..(Go to question 377 A)

376 B. What month was the last time this work was done?

Month __ __ (FILL IN "99" IF R DOESN'T KNOW)

377 A. In the past year (AUGUST 1989 TO TODAY), have you or anyone else removed or sanded paint from any part of the outside of your house?

1 Yes

2 No.....(Go to question 378 A)

9 Unknown..(Go to question 378 A)

377 B. What month was the last time this work was done?

Month __ __ (FILL IN "99" IF R DOESN'T KNOW)

378 A. In the past year (AUGUST 1989 TO TODAY), was the outside of your house deleaded?

1 Yes

2 No.....(Go to question 379 A)

9 Unknown..(Go to question 379 A)

378 B. What month was the last time this work was done?

Month __ __ (FILL IN "99" IF R DOESN'T KNOW)

379 A. In the past year (AUGUST 1989 TO TODAY), was the inside of your house deleaded?

1 Yes

2 No.....(Go to question 380 A)

9 Unknown..(Go to question 380 A)

379 B. What month was the last time this work was done?

Month __ __ (FILL IN "99" IF R DOESN'T KNOW)

379 C. Did (your/CHILD'S NAME'S) family move off the premises while the interior deleading was being done?

1 Yes

2 No

9 Unknown

379 D. Who did the deleading? Was it done by yourselves or a contractor?

1 Yourselves....(Go to question 380 A)

2 Contractor

3 Don't Know

379 E. What was the name of the contractor?

_____

379 F. Was the contractor a certified deleader?

1 Yes

2 No

9 Unknown

380 A. In the past year (AUGUST 1989 TO TODAY), have you or anyone else renovated or remodeled the inside of your house?
(RENOVATIONS MIGHT INCLUDE REMODELLING THE KITCHEN, BATHROOM, PLASTERING, KNOCKING DOWN WALLS, ETC. PAINTING OR WALLPAPERING ALONE WOULD NOT COUNT.)

1 Yes

2 No.....(Go to question 381 A)

9 Unknown..(Go to question 381 A)

380 B. Please describe, as best you can, what renovations were done on the inside of the house.

_____

_____

380 C. What month was the last time this work was done?

Month __ __ (FILL IN "99" IF R DOESN'T KNOW)

381 A. In the past year (AUGUST 1989 TO TODAY), have you or anyone else renovated or remodeled the outside of your house?
(RENOVATIONS MIGHT INCLUDE CHANGES IN STRUCTURE, ADDITIONS, ETC.)

1 Yes

2 No.....(Go to question 382 A)

9 Unknown..(Go to question 382 A)

381 B. Please describe, as best you can, what renovations were done on the outside of the house.

_____

_____

_____

381 C. What month was the last time this work was done?

Month __ __ (FILL IN "99" IF R DOESN'T KNOW)

382 A. (IF PARTICIPANT HAS MOVED SAY: The next few questions are also about the house/apartment (you/CHILD'S NAME family) lived in at the start of the study.)
In the past year (AUGUST 1989 TO TODAY) did any of your next door neighbors remove or sand paint from any part of the outside of their house?

1 Yes

2 No.....(Go to question 383)

9 Unknown.....(Go to question 383)

382 B. Which neighbor was it? When facing the front of your house, was it the neighbor to the left of your house, to the right of your house, in back of your house, or somewhere else? (DIRECTIONS SHOULD BE DETERMINED WHEN FACING THE FRONT OF THE PARTICIPANT'S HOME)

1 To the left

2 To the right

3 In back

4 Somewhere else SPECIFY: _____

9 Unknown

383. THIS QUESTION IS ONLY FOR FAMILIES THAT HAVE MOVED. GO TO QUESTION 390 IF THE FAMILY HAS NOT MOVED.

Since you have moved to your new (house/apartment), have you or anyone else sanded paint on the inside or outside of your new place? Renovated the inside or outside? Deleaded the inside or outside?

A. Sanded Paint	1	Yes	2	No	3	Unknown
B. Renovated	1	Yes	2	No	3	Unknown
C. Deleaded	1	Yes	2	No	3	Unknown

LEAD KNOWLEDGE

Now, just a few questions about your thoughts on lead.

390. Compared to when (CHILD'S NAME) first joined the Lead Free Kids Study, would you say that your knowledge about the places where lead is found in and around the home has increased or stayed about the same?

1 Increased

2 Stayed about the same

9 Unknown

391. Compared to when (CHILD'S NAME) first joined the Lead Free Kids Study, would you say that your knowledge about the child health problems associated with lead has increased or stayed about the same?

1 Increased

2 Stayed about the same

9 Unknown

392. Compared to when (CHILD'S NAME) first joined the Lead Free Kids Study, would you say that your opinion about how dangerous lead is to health has increased, decreased, or stayed about the same?

1 Increased

2 Decreased

3 Stayed about the same

9 Unknown

We've just completed the family interview. Now, I need to record the time and then we'll be ready to start the child interview(s).

400. RECORD THE ENDING TIME OF THE FOLLOW-UP FAMILY INTERVIEW.

__ __:__ __ AM / PM

LEAD FREE KIDS STUDY CHILD FOLLOW-UP INTERVIEW

FAMID_____ LFK_NUM _____

1. RECORD INTERVIEWER'S (YOUR) FIRST AND LAST NAME

   FIRST:_____ LAST:_____

2. RECORD INTERVIEWEE'S (PARENT, GUARDIAN, ETC.) FIRST AND LAST NAME

   FIRST:_____ LAST:_____

3. RECORD LFK CHILD'S FIRST AND LAST NAME:

   FIRST _____ LAST:_____

4. RECORD DATE OF FOLLOW-UP CHILD INTERVIEW. __ __ / __ __ / __ __
   Month Day Year

5. RECORD STARTING TIME OF FOLLOW-UP CHILD INTERVIEW. __ __ : __ __ AM/PM

CHILD'S ACTIVITIES DURING THIS SUMMER

Now, I am going to ask how (CHILD'S NAME) spent (his/her) time this summer (JUNE, JULY, AUGUST 1990). I am particularly interested in the amount of time (CHILD'S NAME) spent outdoors.

600 A. This summer, did (CHILD'S NAME) regularly, that is at least once a week, spend time away from home at a .....(READ a).

	600 A.	600 B. Was the (READ a) in Roxbury, Dorchester, Mattapan, or Jamaica Plain?	600 C. This past summer, how many days a week did (he/she) usually go there?	600 D. This past summer, how many hours a day did (he/she) usually spend there?	600 E. This past summer when it was sunny, how many hours a day did (he/she) usually spend outdoors there?
				(FILL IN DK IF R DOESN'T KNOW)	
a. Day care center or family day care	1 Yes 2 No 3 Unknown	1 Yes 2 No 3 Unknown	1 One day 2 Two days 3 Three days 4 Four days 5 Five days 6 Six days 7 Everyday 9 Unknown	_____	_____

LFK_NUM _____

600 A. This summer, did (CHILD'S NAME) regularly, that is at least once a week, spend time away from home at a .....(READ b-c).

	600 A.	600 B. Was the (READ b,c) in Roxbury, Dorchester, Mattapan, or Jamaica Plain?	600 C. This past summer, how many days a week did (he/she) usually go there?	600 D. This past summer, how many hours a day did (he/she) usually spend there?	600 E. This past summer when it was sunny, how many hours a day did (he/she) usually spend outdoors there?
				(FILL IN DK IF R DOESN'T KNOW)	
b. Nursery or pre-school	1 Yes 2 No 3 Unknown	1 Yes 2 No 3 Unknown	1 One day 2 Two days 3 Three days 4 Four days 5 Five days 6 Six days 7 Everyday 9 Unknown	_____	_____
c. Baby Sitters' Homes	1 Yes 2 No 3 Unknown	1 Yes 2 No 3 Unknown	1 One day 2 Two days 3 Three days 4 Four days 5 Five days 6 Six days 7 Everyday 9 Unknown	_____	_____

600 A. This summer, did (CHILD'S NAME), regularly that is at least once a week, spend time away from home at a .....(READ d-e).

	600 A.	600 B. Was the (READ d,e) in Roxbury, Dorchester, Mattapan, or Jamaica Plain?	600 C. This past summer, how many days a week did (he/she) usually go there?	600 D. This past summer, how many hours a day did (he/she) usually spend there?	600 E. This past summer when it was sunny, how many hours a day did (he/she) usually spend outdoors there?
				(FILL IN DK IF R DOESN'T KNOW)	
d. Relatives' Homes	1 Yes 2 No 3 Unknown	1 Yes 2 No 3 Unknown	1 One day 2 Two days 3 Three days 4 Four days 5 Five days 6 Six days 7 Everyday 9 Unknown	_____	_____
e. Friends' Homes	1 Yes 2 No 3 Unknown	1 Yes 2 No 3 Unknown	1 One day 2 Two days 3 Three days 4 Four days 5 Five days 6 Six days 7 Everyday 9 Unknown	_____	_____

600 A. This summer, did (CHILD'S NAME) regularly, that is at least once a week, spend time away from home at a .....(READ f).

	600 A.	600 B. Was the (READ f) in Roxbury, Dorchester, Mattapan, or Jamaica Plain?	600 C. This past summer, how many days a week did (he/she) usually go there?	600 D. This past summer, how many hours a day did (he/she) usually spend there?	600 E. This past summer when it was sunny, how many hours a day did (he/she) usually spend outdoors there?
				(FILL IN DK IF R DOESN'T KNOW)	
f. Camp	1 Yes	1 Yes	1 One day	_____	_____
	2 No	2 No	2 Two days		
	3 Unknown	3 Unknown	3 Three days		
			4 Four days		
			5 Five days		
			6 Six days		
			7 Everyday		
			9 Unknown		

601 A. Were there any other places like these that I have not mentioned where (CHILD'S NAME) regularly, that is at least once a week, spent time away from home this summer?

1 Yes

2 No.....(Go to question 602 A)

9 Unknown..(Go to question 602 A)

601 B. What was the place? _____
(FILL IN DK IF R DOESN'T KNOW)

601 C. Was it in Roxbury, Dorchester, Mattapan, or Jamaica Plain?

1 Yes

2 No

9 Unknown

601 D. This summer, how many days a week did (he/she) usually go there?

1 One day a week

2 Two days

3 Three days

4 Four days

5 Five days

6 Six days

7 Everyday

9 Unknown

601 E. This summer, how many hours a day did (he/she) usually spend there?

_____
(FILL IN DK IF R DOESN'T KNOW)

601 F. This summer when it was sunny, how many hours a day did (he/she) usually spend outdoors there?

_____
(FILL IN DK IF R DOESN'T KNOW)

602 A. This summer, did (CHILD'S NAME) regularly, that is at least once a week, visit a park or playground with you or anyone else?

1 Yes

2 No.....(Go to question 603 A)

9 Unknown..(Go to question 603 A)

602 B. What is the name of the park or playground? (FILL IN DK IF R DOESN'T KNOW. IF THERE IS MORE THAN ONE PARK, GET INFORMATION ON EACH ONE.)

_____

602 C. What street and neighborhood is it in? (FILL IN DK IF R DOESN'T KNOW)

_____

602 D. This summer, how many days a week did (he/she) usually go there?

1 Once a week

2 Two days

3 Three days

4 Four days

5 Five days

6 Six days

7 Everyday

9 Unknown

602 E. This summer, how many hours a day did (he/she) usually spend there? (FILL IN DK IF R DOESN'T KNOW)

_____

603 A. This summer, did (CHILD'S NAME) regularly play in any empty lots in your neighborhood?

1 Yes

2 No.....(Go to question 604 A)

9 Unknown.(Go to question 604 A)

603 B. What street is the lot on?
(FILL IN DK IF R DOESN'T KNOW)

_____

603 C. This summer, how many days a week did (he/she) usually go there?

1 One day a week

2 Two days

3 Three days

4 Four days

5 Five days

6 Six days

7 Everyday

9 Unknown

603 D. This summer, how many hours a day did (he/she) usually spend there?

_____
(FILL IN DK IF R DOESN'T KNOW)

Now, I am going to ask you some questions about how (CHILD'S NAME) spent (his/her) time in and around your home this summer.

604 A. In a typical sunny week this summer, did (CHILD'S NAME) spend any time playing outdoors in your home's yard? (DO NOT INCLUDE THE PORCH, STREET OR SIDEWALK HERE. THOSE AREAS ARE ASKED ABOUT IN QUESTION 605.)

1 Yes

2 No.....(Go to question 605 A)

9 Unknown...(Go to question 605 A)

604 B. About how many days a week did (he/she) usually play there?

1 Once a week

2 Two days

3 Three days

4 Four days

5 Five days

6 Six days

7 Everyday

9 Unknown

604 C. On average, how many hours a day did (he/she) usually spend there? (FILL IN DK IF R DOESN'T KNOW)

_____

604 D. Where did (he/she) usually play in your home's yard? Did (he/she) play in your_____? (READ LIST AND USE SHOW CARD.)

1	Back yard	1	Yes	2	No	9 Unknown
2	Left side of the yard when you face the house	1	Yes	2	No	9 Unknown
3	Right side of the yard when you face the house	1	Yes	2	No	9 Unknown
4	Front yard	1	Yes	2	No	9 Unknown
7	Some other place in your yard (SPECIFY)_____	1	Yes	2	No	9 Unknown

604 E. (Was this area/Were these areas) where (he/she) played grassy? Concrete or asphalt? Plain dirt or soil? A sandbox? Or some other surface? (USE SHOW CARD.)

1	Grassy	1	Yes	2	No	9 Unknown
2	Concrete or asphalt	1	Yes	2	No	9 Unknown
3	Dirt or soil	1	Yes	2	No	9 Unknown
4	Sandbox	1	Yes	2	No	9 Unknown
7	Other (SPECIFY)_____	1	Yes	2	No	9 Unknown

605 A. In a typical sunny week this summer, did (CHILD'S NAME) spend any time playing outside in other areas around the house such as the porch, sidewalk or street?

1 Yes

2 No.....(Go to question 606 A)

9 Unknown....(Go to question 606 A)

605 B. How many days a week did (he/she) usually play there?

1 Once a week

2 Two days

3 Three days

4 Four days

5 Five days

6 Six days

7 Everyday

9 Unknown

605 C. This summer, how many hours a day did (he/she) usually spend on the porch, sidewalk, or street?

_____

(FILL IN DK IF R DOESN'T KNOW)

606 A. IF PARTICIPANT HAS MOVED FROM ORIGINAL PREMISES, SKIP QUESTIONS 606 A-C. Compared to when (CHILD'S NAME) first joined the Lead Free Kids Study, have there been any changes in the places outdoors around your home where (he/she) is allowed to play or go? That is, are there any places outdoors around your home where (he/she) is no longer allowed to play or go?

1 Yes

2 No.....(Go to question 607 A)

9 Unknown...(Go to quesiton 607 A)

606 B. Exactly where is (he/she) no longer allowed to play or go?

_____

606 C. Why is (he/she) no longer allowed to go or play there?

SKIP QUESTIONS 607 AND 608 IF CHILD NEVER PLAYED OUTSIDE THIS SUMMER.

607 A. This summer, did (CHILD'S NAME) ever take a baby bottle with (him/her) when (he/she) played outdoors?

1 Yes

2 No (Go to Question 608 A)

9 Unknown (Go to Question 608 A)

607 B. About how often did (he/she) do this? Would you say at least once a day, at least once a week but not everyday, a few times a month, or once a month or less? (USE SHOW CARD.)

1 At least once per day

2 At least once per week but not everyday

3 A few times a month

4 Once per month or less

9 Unknown

608 A. This summer, did (CHILD'S NAME) ever eat food when (he/she) played outside?

1 Yes

2 No (Go to Question 609)

9 Unknown (Go to Question 609)

608 B. About how often did (he/she) do this? Would you say at least once a day, at least once a week but not everyday, a few times a month, or once a month or less?

1 At least once per day

2 At least once per week but not everyday

3 A few times a month

4 Once per month or less

9 Unknown

609. This summer when (CHILD'S NAME) was inside at home, did (he/she) play or sit on the floor a lot of the time, some of the time or almost never?

1 A lot of the time

2 Some of the time

3 Almost never.....(Go to question 611 A)

9 Unknown.....(Go to question 611 A)

610. About how many hours on an average day do you think (CHILD'S NAME) usually sat or played on the floor at home?

_____Hours a day playing on floor at home (FILL IN DK IF R DOESN'T KNOW)

611 A. IF PARTICIPANT HAS MOVED FROM ORIGINAL PREMISES, SKIP QUESTIONS 611 A-C. Compared to when (CHILD'S NAME) first joined the Lead Free Kids Study, have there been any changes in the places inside your home where (he/she) is allowed to play or go? That is, are there any places inside your home where (he/she) is no longer allowed to play or go?

1 Yes

2 No.....(Go to question 612)

9 Unknown....(Go to question 612)

611 B. Exactly where is (he/she) no longer allowed to play or go?

_____

611 C. Why is (he/she) no longer allowed to play or go there?

_____

612. In the past year, that is, since AUGUST 1989 has (CHILD'S NAME) slept away from home for more than one consecutive month? (TIME AWAY FROM HOME MIGHT INCLUDE VACATIONS, VISITS TO RELATIVES, OVERNIGHT CAMP, ETC. IT HAS TO BE FOR ONE CONSECUTIVE MONTH TO COUNT.)

1 Yes

2 No

9 Unknown

LFK_NUM _____ PREMID _____ CHILD'S NAME _____

613 A. In the past year, that is, since August 1989 did (CHILD'S NAME) ever spend time away from home at a place that was being renovated?

(PLACES MIGHT INCLUDE DAYCARE CENTER, BABYSITTER'S, FRIEND'S OR RELATIVE'S HOMES. RENOVATIONS WOULD INCLUDE REMODELLING, PLASTERING, KNOCKING DOWN WALLS. PAINTING OR WALLPAPERING ALONE WOULD NOT COUNT.)

1 Yes

2 No

9 Unknown

613 B. Exactly what place was this?

_____

613 C. About how often would (he/she) go there? Would you say often or sometimes?

1 Often

2 Sometimes

9 Unknown

614. In the past year, that is, since August 1989 did (CHILD'S NAME) ever spend time away from home at a place that was being deleaded?

(SAME PLACES AS QUESTION 613 A WOULD BE APPLICABLE.)

1 Yes

2 No

9 Unknown

MOUTHING BEHAVIOR

Children often put things other than food in their mouths such as toys or fingers. Its very natural for them to do this and doesn't necessarily hurt them. Now, I'm going to ask you some questions about things that (CHILD'S NAME) may put in (his/her) mouth.

700. Does (CHILD'S NAME) use a pacifier?

1 Yes

2 No

9 Unknown

701. How often does (CHILD'S NAME) suck (his/her) thumb or fingers? Would you say often, sometimes, rarely, or never?

1 Often

2 Sometimes

3 Rarely

4 Never

9 Unknown

702. Children often explore with their mouths by tasting and touching things with their tongues. Have you ever seen (CHILD'S NAME) put (his/her) mouth or tongue on a windowsill when (he/she) is looking out?

1 Yes

2 No

9 Unknown

703. Have you ever seen (CHILD'S NAME) pick at a windowsill with (his/her) fingers while looking out?

1 Yes

2 No

9 Unknown

704 A. Have you ever seen (CHILD'S NAME) put paint chips in (his/her) mouth?

1 Yes

2 No....(Go to Question 705)

9 Unknown ...(Go to Question 705)

704 B. How often does (CHILD'S NAME) do this? Would you say usually, sometimes, or never?

1 Usually

2 Sometimes

3 Never

9 Unknown

705. Have you ever seen (CHILD'S NAME) eat dirt or sand?

1 Yes

2 No

9 Unknown

706 A. Does (CHILD'S NAME) have a favorite blanket or stuffed toy?

1 Yes

2 No.....(Go to Question 707 A)

9 Unknown..(Go to Question 707 A)

706 B. Does (he/she) carry this around during the day?

1 Yes

2 No

9 Unknown

706 C. How often does (he/she) put this in (his/her) mouth? Is it usually, sometimes, or never?

1 Usually

2 Sometimes

3 Never

9 Unknown

707 A. Are there any other things that I have not mentioned that you have seen (CHILD'S NAME) put in (his/her) mouth?

1 Yes

2 No.....(Go to Question 750)

9 Unknown...(Go to Question 750)

707 B. What are these? (LIST ALL MENTIONNED BELOW.)

_____

_____

HAND WASHING

Very few children like to wash their hands and it is often difficult for a parent to make them. Fortunately, there are no rules about how many times a day a child's hands should be washed. Now, I'm going to ask you some questions about washing (CHILD'S NAME) hands. (USE SHOW CARD.)

750. Are (CHILD'S NAME) hands almost always, sometimes or almost never washed before eating meals?

1 Almost always

2 Sometimes

3 Almost Never

9 Unknown

751. Are (his/her) hands almost always, sometimes or almost never washed after eating meals?

1 Almost always

2 Sometimes

3 Almost Never

9 Unknown

752. What about eating snacks? Are (CHILD'S NAME) hands almost always, sometimes or almost never washed before eating snacks?

1 Almost always

2 Sometimes

3 Almost Never

9 Unknown

753. Are (his/her) hands almost always, sometimes or almost never washed after eating snacks?

1 Almost always

2 Sometimes

3 Almost Never

9 Unknown

754. What about playing outdoors? Are (his/her) hands almost always, sometimes or almost never washed after playing outdoors?

1 Almost always

2 Sometimes

3 Almost Never

4 Never plays outdoors

9 Unknown

755. What about bedtime? Are (his/her) hands almost always, sometimes or almost never washed before bed?

1 Almost Always

2 Sometimes

3 Almost Never

9 Unknown

756. Compared to when (CHILD'S NAME) first joined the Lead Free Kids Study, would you say that (CHILD'S NAME) hands are washed more often, less often, or about the same?

1 More often

2 Less often

3 About the same

9 Unknown

WATER CONSUMPTION

Now, a few questions about tap water use.

856 A. Does (CHILD'S NAME) drink plain tap water?

1 Yes

2 No.....(Go to Question 857)

9 Unknown..(Go to Question 857)

856 B. On an average day, about how many 8 ounce glasses of tap water does (he/she) drink? (SHOW 8 OZ CUP.)

_____8 oz. glasses per day (FILL IN DK IF R DOESN'T KNOW)

857. Do you put ice cubes made from tap water into any of (CHILD'S NAME) drinks?

1 Yes

2 No

9 Unknown

858. Do you use tap water to mix with powdered foods that (he/she) might eat?

1 Yes

2 No

9 Unknown

859. Do you use tap water to mix into powdered or frozen drinks like Kool-Aid or orange juice that (he/she) might drink?

1 Yes

2 No

9 Unknown

860. Do you ever mix tap water with any other juices that (CHILD'S NAME) drinks?

1 Yes

2 No

9 Unknown

861. Do you use tap water when you cook (CHILD'S NAME) foods?

1 Yes

2 No

9 Unknown

862. Before using tap water for drinking or cooking, do you let the water run to flush out the system?

1 Yes

2 No

9 Unknown

Now, we have reached the last part of the interview. This section concerns your view of (CHILD'S NAME) behavior. We want to ask about (CHILD'S NAME) behavior because exposure to lead may influence it.

We want you to tell us what you think about (his/her) behavior even if other people might not agree. We are going to read a list of items that describe normal children. We want you to think about (CHILD'S NAME) behavior now or within the last two months and tell us, as best you can, if the item is not true of the child, somewhat or sometimes true of the child, or very true or often true of the child. If there are any items that you do not feel comfortable answering, just tell us and we will skip to the next one.

TAKE OUT SHOW CARD WITH THE ABOVE RESPONSES. GO TO THE CHILD BEHAVIOR CHECK LIST AND ASK ABOUT ALL ITEMS LISTED. CIRCLE THE APPROPRIATE RESPONSES ON THE CHECK LIST. BE SURE TO FILL IN CHILD'S NAME AND LFK NUMBER ON EACH PAGE OF THE CHECK LIST.

CHILD BEHAVIOR CHECKLIST FOR AGES 2-3

For office use only
ID #

CHILD'S NAME

SEX ☐ Boy ☐ Girl

AGE

ETHNIC GROUP OR RACE

TODAY'S DATE Mo ____ Day ____ Yr. ____

CHILD'S BIRTHDATE Mo. ____ Day ____ Yr. ____

Please fill out this form to reflect *your* view of the child's behavior even if other people might not agree about the behavior.

PARENT'S TYPE OF WORK *(Please be specific – for example, auto mechanic, high school teacher, homemaker, laborer, skine operator, shoe salesman, army sergeant, even if parent does not live with child)*

FATHER'S TYPE OF WORK: ____

MOTHER'S TYPE OF WORK: ____

THIS FORM FILLED OUT BY:

☐ Mother (name): ____

☐ Father (name): ____

☐ Other – name & relationship to child: ____

Below is a list of items that describe children. For each item that describes the child now or within the past 2 months, please circle the 2 if the item is very true or often true of the child. Circle the 1 if the item is somewhat or sometimes true of the child. If the item is not true of the child, circle the 0. Please answer all items as well as you can, even if some do not seem to apply to the child.

0 = Not True (as far as you know) 1 = Somewhat or Sometimes True 2 = Very True or Often True

0 1 2 1. Aches or pains (without medical cause)
0 1 2 2. Acts too young for age
0 1 2 3. Afraid to try new things
0 1 2 4. Avoids looking others in the eye
0 1 2 5. Can't concentrate, can't pay attention for long
0 1 2 6. Can't sit still or restless
0 1 2 7. Can't stand having things out of place
0 1 2 8. Can't stand waiting; wants everything now
0 1 2 9. Chews on things that aren't edible
0 1 2 10. Clings to adults or too dependent
0 1 2 11. Constantly seeks help
0 1 2 12. Constipated, doesn't move bowels
0 1 2 13. Cries a lot
0 1 2 14. Cruel to animals
0 1 2 15. Defiant
0 1 2 16. Demands must be met immediately
0 1 2 17. Destroys his/her own things
0 1 2 18. Destroys things belonging to his/her family or other children
0 1 2 19. Diarrhea or loose bowels when not sick
0 1 2 20. Disobedient
0 1 2 21. Disturbed by any change in routine
0 1 2 22. Doesn't want to sleep alone
0 1 2 23. Doesn't answer when people talk to him/her
0 1 2 24. Doesn't eat well (describe): ____
0 1 2 25. Doesn't get along with other children
0 1 2 26. Doesn't know how to have fun, acts like a little adult
0 1 2 27. Doesn't seem to feel guilty after misbehaving
0 1 2 28. Doesn't want to go out of home
0 1 2 29. Easily frustrated
0 1 2 30. Easily jealous
0 1 2 31. Eats or drinks things that are not food (describe): ____
0 1 2 32. Fears certain animals, situations, or places (describe): ____
0 1 2 33. Feelings are easily hurt
0 1 2 34. Gets hurt a lot, accident-prone
0 1 2 35. Gets in many fights
0 1 2 36. Gets into everything
0 1 2 37. Gets too upset when separated from parents
0 1 2 38. Has trouble getting to sleep
0 1 2 39. Headaches (without medical cause)
0 1 2 40. Hits others
0 1 2 41. Holds his/her breath
0 1 2 42. Hurts animals or people without meaning to
0 1 2 43. Looks unhappy without good reason
0 1 2 44. Angry moods
0 1 2 45. Nausea, feels sick (without medical cause)
0 1 2 46. Nervous movements or twitching (describe): ____
0 1 2 47. Nervous, highstrung, or tense
0 1 2 48. Nightmares
0 1 2 49. Overeating
0 1 2 50. Overtired
0 1 2 51. Overweight
0 1 2 52. Painful bowel movements
0 1 2 53. Physically attacks people
0 1 2 54. Picks nose, skin, or other parts of body (describe): ____
0 1 2 55. Plays with own sex parts too much
0 1 2 56. Poorly coordinated or clumsy
0 1 2 57. Problems with eyes without medical cause (describe): ____
0 1 2 58. Punishment doesn't change his/her behavior
0 1 2 59. Quickly shifts from one activity to another
0 1 2 60. Rashes or other skin problems (without medical cause)
0 1 2 61. Refuses to eat
0 1 2 62. Refuses to play active games
0 1 2 63. Repeatedly rocks head or body
0 1 2 64. Resists going to bed at night

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0 = Not True (as far as you know) 1 = Somewhat or Sometimes True 2 = Very True or Often True

0	1	2	65.	Resists toilet training (describe): _____
0	1	2	66.	Screams a lot
0	1	2	67.	Seems unresponsive to affection
0	1	2	68.	Self-conscious or easily embarrassed
0	1	2	69.	Selfish or won't share
0	1	2	70.	Shows little affection toward people
0	1	2	71.	Shows little interest in things around him/her
0	1	2	72.	Shows too little fear of getting hurt
0	1	2	73.	Shy or timid
0	1	2	74.	Sleeps less than most children during day and/or night (describe): _____
0	1	2	75.	Smears or plays with bowel movements
0	1	2	76.	Speech problem (describe): _____
0	1	2	77.	Stares into space or seems preoccupied
0	1	2	78.	Stomachaches or cramps (without medical cause)
0	1	2	79.	Stores up things he/she doesn't need (describe): _____
0	1	2	80.	Strange behavior (describe): _____
0	1	2	81.	Stubborn, sullen, or irritable
0	1	2	82.	Sudden changes in mood or feelings
0	1	2	83.	Sulks a lot
0	1	2	84.	Talks or cries out in sleep
0	1	2	85.	Temper tantrums or hot temper
0	1	2	86.	Too concerned with neatness or cleanliness
0	1	2	87.	Too fearful or anxious
0	1	2	88.	Uncooperative
0	1	2	89.	Underactive, slow moving, or lacks energy
0	1	2	90.	Unhappy, sad, or depressed
0	1	2	91.	Unusually loud
0	1	2	92.	Upset by new people or situations (describe): _____
0	1	2	93.	Vomiting, throwing up (without medical cause)
0	1	2	94.	Wakes up often at night
0	1	2	95.	Wanders away from home
0	1	2	96.	Wants a lot of attention
0	1	2	97.	Whining
0	1	2	98.	Withdrawn, doesn't get involved with others
0	1	2	99.	Worrying
			100.	Please write in any problems your child has that were not listed above.
0	1	2		_____
0	1	2		_____
0	1	2		_____

PLEASE BE SURE YOU HAVE ANSWERED ALL ITEMS.

UNDERLINE ANY YOU ARE CONCERNED ABOUT

WHEN YOU FINISH THE CHILD BEHAVIOR CHECK LIST AND IF NO MORE LFK CHILDREN, SAY: This completes the interview. Thank you very much for cooperation and time. We really appreciate your help.

IF THERE ARE MORE LFK CHILDREN IN THE HOUSEHOLD, SAY: Now, I'm going to ask you the same questions about (OTHER LFK CHILD'S NAME).

1000. RECORD THE ENDING TIME OF THE FOLLOW-UP CHILD INTERVIEW.

__ __:__ __ AM / PM

1001. PLEASE SIGN BELOW.

_____
Interviewer's Signature

FILL IN 1002 AFTER YOU LEAVE.

1002. The quality of this interview is:

1 Reliable

2 Some doubt

3 Unreliable Explain:_____

_____

LEAD FREE KIDS STUDY

LEAD IN SOIL DEMONSTRATION PROJECT, BOSTON

DATA MANAGEMENT PLAN

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DATA MANAGEMENT PLAN OVERVIEW

1. Introduction

The Lead Free Kids (LFK) database consists of about 21 data files, which are either created by data entry using the Paradox database management system, received from the EPA as Lotus files, or received from the Boston Childhood Lead Poisoning Prevention Program (BCLPPP) as Dbase III+ files. All received files are imported into Paradox for data correction. All Paradox files are converted into Statistical Analysis System (SAS) files for data management and analysis.

2. Organization of Project

The Lead Free Kids project has two distinct data collection phases, the "eligibility" phase and the "study" phase, and each phase requires its own set of data files. During the eligibility phase, information pertaining to criteria for study enrollment were collected in order to identify subjects who were willing and eligible to participate in the study. Computer files generated during the subject recruitment period were used for project management and for a descriptive analysis of the non-participants were transferred from the eligibility data files to the study files. The eligibility data files were archived.

3. Organization of Data

Data collected about four separate units of observation: child, family, unit (premises and apartment concatenated), and premises. Some data files contain repeated measures type data, i.e., the same set of data items for the same unit of observation collected at different times. For instance, blood test results will be collected three times for each child. The goal of the organization of the database is to make it possible to (1) easily match a child to the data that apply to his or her premises or apartment, and to (2) easily match information pertaining to a stage of the study (e.g., pre-abatement, post-abatement, etc.) across all files with repeated measures data (e.g. soil lead measures, dust lead measures, blood lead measures).

The central data file is the KID file which provides the means by which data from different files can be combined to form composite case records. The unit of observation for the KID file is a child, and each observation will contain all the identifiers for that child (child id, family id, premises id, unit id). Any files that do not have identifiers in common can be merged through the KID file.

The repeated measure data contains variables that designate the phase of the study when the test was done. By selecting test results based on values of PHASE, data from different stages of the study can be compared.

DATABASE CONFIGURATION

FILE	DESCRIPTION	OTHER IDENTIFIERS
Files pertaining to children (Identifier is LFK_NUM):		
KID	Data about child, KEY file	
BLOODPB	Blood lead and FEP blood test results	PHASE
KIDINT	First portion of initial child interview	
DIET1-2	Diet portions of initial child interview	
KIDINT_B	Final portion of initial child interview	
FERRITIN	Ferritin blood test results	
HANDWIPE	Handwipe lead results	PHASE
SOURCE	Health care center or provider	
STATUS	Change of status (moved, quit)	STATDATE
FUKID	First follow-up child interview	
HEIGHT	Child's height, weight and blood pressure at first follow-up interview	
PARKID	Assignment of id numbers to parks where children played	
FU2KID	Second follow-up child interview	
Files pertaining to premises (Identifier is PREMID):		
PREMISES	Location of premises, landlord info	
DETAILED	Soil lead results from detailed sampling	SAMPNUM, POSITION
SAMPNUMS	Location of detailed soil samples by soil sample number	SAMPNUM

DATABASE CONFIGURATION

FILE	DESCRIPTION	OTHER IDENTIFIERS
Files pertaining to families (Identifier is FAMID):		
FAMILY	Data that applies to all children in the family	
DATES	Dates of LFK interventions, by FAMID PREMID	
FAMINT	Initial family interview	
FUFAM	First follow-up family interview	
FU2FAM	Second follow-up family interview	
WATER	Water lead results	HK_DATE
CHIPPEEL	Chipping and peeling paint assessment	
PAINT	Interior paint lead measurement	PREMID-APT_NO
Files pertaining to a living unit (Identifier is PREMID-APT_NO):		
DUST	Dust lead results	ROOM, PLACE, PHASE

FILE DESCRIPTIONS OVERVIEW

The following items are described for each data file in the database. An explanation of these items and general information that applies to all data files are given here.

(1) FILE NAME:

The file name listed is the SAS dataset name. In almost all cases, the corresponding PARADOX file has the same name. The exceptions are: (1) FAMILY.SSD, which is called FAMILIES.DB in PARADOX (because FAMILY is not a valid PARADOX dataset name), and (2) DETAILED.SSD, which is created by a SAS program (DETAILED.SAS) that concatenates the data received in batches from the EPA. The batches are named by the EPA report number (SOIL12, SOIL13, SOIL14, etc.) in both PARADOX and SAS.

(2) FILE DESCRIPTION:

General description of the data in the dataset.

(3) UNIT OF OBSERVATION:

Description of unit that one record represents. (One record per child, one record for each phase of study for each child, etc.)

(4) IDENTIFIER:

The KEY identifying variable for merging datasets through file KID. (PREMID, LFK_NUM, FAMID, or PREMID-APT_NO).

(5) ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:

If there are multiple observations in the data set by the principal identifier, the additional identifiers necessary to identify an observation uniquely are listed here.

(6) ORIGIN OF DATA:

The origin of the data is either data entry through PARADOX or, in the case of data files received from the EPA, file conversion from LOTUS.

(7) LOCATING ORIGINAL SOURCE FOR DATA ITEMS:

In order to expedite data verifications, each dataset contains all the data items necessary to locate the original paper source (data collection instrument, lab report, etc.) for an observation.

(8) [illegible] ASSURANCE:

The standard data entry validation tools (range checks, picture formats, etc.) were used for all datasets created through data entry. In addition, double entry and hand-checking were used, as specified. The quality of identifiers was assured through table-lookup at data entry. The principal identifiers were validated against a table of valid values, and invalid values were rejected. Valid values called up additional identifying information (name, address, etc.) to verify a correct match.

If the datasets were received from EPA as LOTUS files, SAS programs were used to match the identifiers to the table of valid values, and the validity of the matches was checked by hand.

LEAD FREE KIDS STUDY

ORIGINAL ENROLLED CHILDREN

PREMISES

Group	Frequency	Percent	Cumulative Frequency	Cumulative Percent
---				
A	36	35.6	36	35.6
B	30	29.7	66	65.3
S	35	34.7	101	100.0

FAMILIES

Group	Frequency	Percent	Cumulative Frequency	Cumulative Percent
---				
A	43	34.1	43	34.1
B	39	31.0	82	65.1
S	44	34.9	126	100.0

UNITS

Group	Frequency	Percent	Cumulative Frequency	Cumulative Percent
---				
A	42	34.1	42	34.1
B	38	30.9	80	65.0
S	43	35.0	123	100.0

KIDS

Group	Frequency	Percent	Cumulative Frequency	Cumulative Percent
---				
A	51	33.6	51	33.6
B	47	30.9	98	64.5
S	54	35.5	152	100.0

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

KID

(2) **FILE DESCRIPTION:**

Key file containing identifiers for merging data files between levels of relational database structure. Also contains demographical data about child.

(3) **UNIT OF OBSERVATION:**

One observation per child.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data were transferred from data files created during eligibility phase. These data came originally from OEA data files, and were corrected by LFK staff during the preliminary interview.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

See preliminary interview cover sheet, filed by PREMID.

(8) **QUALITY ASSURANCE:**

Data were verified by families during preliminary interview and again during administration of initial family questionnaire. Changes were made from data correction sheets completed by Assistant Epidemiologist.

LEAD FREE KIDS

FILE DESCRIPTION

(1) FILE NAME:

BLOODPB

(2) FILE DESCRIPTION:

Blood lead and FEP from all phases of study. (Includes baselines results for children who were not enrolled.)

(3) UNIT OF OBSERVATION:

One observation per child and phase of study.

(4) IDENTIFIER:

LFK_NUM

(5) ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:

PHASE (Values are PRE, POST1, POST2)

(6) ORIGIN OF DATA:

Results from ESA blood test reporting slips were copied to data entry sheets. Data entry done from data entry sheets.

(7) LOCATING ORIGINAL SOURCE FOR DATA ITEMS:

ESA lab results and data entry sheet on file by ESA receive date (ESADATE). Use LINENUM to reference line on data entry sheet with child's result.

(8) QUALITY ASSURANCE:

Computer listing of data file checked against original ESA report slip by hand.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

KIDINT

(2) **FILE DESCRIPTION:**

Initial interview questionnaire data pertaining to a child. KIDINT contains pages 1 through 18 of questionnaire (items 600-806). Other portions of the child interview are in DIET1 & DIET2 (pp. 19-40, items 850-854) and KIDINT_B (pp. 41-48, items 855-1002).

(3) **UNIT OF OBSERVATION:**

One observation per child.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from interview form.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Interview forms filed by PREMID.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) FILE NAME:

DIET1 and DIET2

(2) FILE DESCRIPTION:

Initial interview questionnaire data pertaining to the child's diet. DIET1-2 contains pages 19-40 (items 850-854) of the questionnaire. Other portions of the initial child interview are in KIDINT (pp. 1-18, items 600-804) and KIDINT_B (pp. 41-48, items 855-1002).

(3) UNIT OF OBSERVATION:

One observation per child.

(4) IDENTIFIER:

LFK_NUM

(5) ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:

(6) ORIGIN OF DATA:

Data entry from interview form.

(7) LOCATING ORIGINAL SOURCE FOR DATA ITEMS:

Interview forms filed by PREMID.

(8) QUALITY ASSURANCE:

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

KIDINT_B

(2) **FILE DESCRIPTION:**

Initial interview questionnaire data pertaining to a child's father, tap water use, and demographic information. KIDINT_B contains pages 41 to 48 (items 855-1002) of the questionnaire. Other portions of the initial child interview are in KIDINT (pp. 1-18, items 600-804) and DIET1 & DIET2 (pp. 19-40, items 850-854).

(3) **UNIT OF OBSERVATION:**

One observation per child.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Dáta entry from interview form.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Interview forms filed by PREMID.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

FERRITIN

(2) **FILE DESCRIPTION:**

Ferritin test results from Bioran.

(3) **UNIT OF OBSERVATION:**

One observation per child (only baseline obtained).

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from Bioran blood test report slips.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Filed by LFK_NUM, each result on an individual slip.

(8) **QUALITY ASSURANCE:**

Double entry.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

HANDWIPE

(2) **FILE DESCRIPTION:**

Handwipe test results.

(3) **UNIT OF OBSERVATION:**

One observation per child and phase of study.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

PHASE (Values are PRE, POST1, POST2)

(6) **ORIGIN OF DATA:**

Lab reports from Dennison Laboratories.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Handwipe Analysis Reports filed by form sequence (analysis date).

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

SOURCE

(2) **FILE DESCRIPTION:**

Contains health care provider code for each child for reporting blood lead and FEP to provider. (Health care provider information is also collected during the child interview).

(3) **UNIT OF OBSERVATION:**

One observation per child.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data were transferred from data files created during eligibility phase. These data items came originally from OEA data files, and were corrected by LFK staff during the preliminary interview.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

See preliminary interview cover sheets, which are filed by PREMID.

(8) **QUALITY ASSURANCE:**

Validated by LFK staff with parents and health care providers.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

STATUS

(2) **FILE DESCRIPTION:**

Any change of status involving participation in the study is registered in STATUS. If a child moves out of his/her original unit, the move is noted here, as well as the new address, if known.

(3) **UNIT OF OBSERVATION:**

An observation for each change of status for each child. A child could have more than one change of status by moving more than once, or moving and later dropping out of the study.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

Date of change of status report (STATDATE).

(6) **ORIGIN OF DATA:**

Data entry done from "Change of Status" form.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Forms filed by LFK_NUM.

(8) **QUALITY ASSURANCE:**

Computer sheet generated at data entry and validated by Assistant Epidemiologist.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

PREMISES

(2) **FILE DESCRIPTION:**

Contains data that apply to the premises occupied by the children (address, neighborhood, etc.) and to the owner of the property. Also contains randomization group assignment.

(3) **UNIT OF OBSERVATION:**

One observation for each premises.

(4) **IDENTIFIER:**

PREMID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data were transferred from data files created during the eligibility phase. The address information originated at OEA, and the landlord information was entered from the LANDLORD RECRUITING FINAL SHEET.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

See premises folders, filed by PREMID.

(8) **QUALITY ASSURANCE:**

Address and landlord information is continually updated and corrected by the LFK staff through home visits and landlord contacts.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

DETAILED

(2) **FILE DESCRIPTION:**

Contains baseline detailed soil sample results. Each sample is identified by the premises from which it came (PREMID), the assigned sequence number of the sample as noted on the sampling map of the year (SAMPNUM) and by the variable POSITION (TOP or BOTTOM)

(3) **UNIT OF OBSERVATION:**

One observation for each sample result reported. (Usually, a top and a bottom sample for each location)

(4) **IDENTIFIER:**

PREMID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

SAMPNUM, POSITION

(6) **ORIGIN OF DATA:**

Data received in LOTUS files from the EPA and converted into SAS files.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

The variable FILE denotes the EPA report file (and diskette) from which the observation originated. LFK has retained both the diskettes and the hard copies of the file reports as received from the EPA for reference and verification. An observation can be located within a file by the lab ID (LABID), which is a sequential sample number assigned by the EPA. The same method can be used to locate the original result at the EPA labs, which also keeps a record of the results.

(8) **QUALITY ASSURANCE:**

Values can be verified against EPA records using method described above.

WATER CONSUMPTION

Now, a few questions about tap water use.

856 A. Does (CHILD'S NAME) drink plain tap water?

1 Yes

2 No.....(Go to Question 857)

9 Unknown..(Go to Question 857)

856 B. On an average day, about how many 8 ounce glasses of tap water does (he/she) drink? (SHOW 8 OZ CUP.)

_____8 oz. glasses per day (FILL IN DK IF R DOESN'T KNOW)

857. Do you put ice cubes made from tap water into any of (CHILD'S NAME) drinks?

1 Yes

2 No

9 Unknown

858. Do you use tap water to mix with powdered foods that (he/she) might eat?

1 Yes

2 No

9 Unknown

859. Do you use tap water to mix into powdered or frozen drinks like Kool-Aid or orange juice that (he/she) might drink?

1 Yes

2 No

9 Unknown

860. Do you ever mix tap water with any other juices that (CHILD'S NAME) drinks?

1 Yes

2 No

9 Unknown

861. Do you use tap water when you cook (CHILD'S NAME) foods?

1 Yes

2 No

9 Unknown

862. Before using tap water for drinking or cooking, do you let the water run to flush out the system?

1 Yes

2 No

9 Unknown

Now, we have reached the last part of the interview. This section concerns your view of (CHILD'S NAME) behavior. We want to ask about (CHILD'S NAME) behavior because exposure to lead may influence it.

We want you to tell us what you think about (his/her) behavior even if other people might not agree. We are going to read a list of items that describe normal children. We want you to think about (CHILD'S NAME) behavior now or within the last two months and tell us, as best you can, if the item is not true of the child, somewhat or sometimes true of the child, or very true or often true of the child. If there are any items that you do not feel comfortable answering, just tell us and we will skip to the next one.

TAKE OUT SHOW CARD WITH THE ABOVE RESPONSES. GO TO THE CHILD BEHAVIOR CHECK LIST AND ASK ABOUT ALL ITEMS LISTED. CIRCLE THE APPROPRIATE RESPONSES ON THE CHECK LIST. BE SURE TO FILL IN CHILD'S NAME AND LFK NUMBER ON EACH PAGE OF THE CHECK LIST.

CHILD BEHAVIOR CHECKLIST FOR AGES 2-3

For office use only
ID #

CHILD'S NAME

SEX ☐ Boy ☐ Girl

AGE

ETHNIC GROUP OR RACE

TODAY'S DATE Mo _____ Day _____ Yr. _____

CHILD'S BIRTHDATE Mo. _____ Day _____ Yr. _____

Please fill out this form to reflect *your* view of the child's behavior even if other people might not agree about the behavior.

PARENT'S TYPE OF WORK *(Please be specific – for example, auto mechanic, high school teacher, homemaker, laborer, spine operator, shoe salesman, army sergeant, even if parent does not live with child)*

FATHER'S TYPE OF WORK: _____

MOTHER'S TYPE OF WORK: _____

THIS FORM FILLED OUT BY:

☐ Mother (name). _____

☐ Father (name): _____

☐ Other – name & relationship to child: _____

Below is a list of items that describe children. For each item that describes the child now or within the past 2 months, please circle the 2 if the item is very true or often true of the child. Circle the 1 if the item is somewhat or sometimes true of the child. If the item is not true of the child, circle the 0. Please answer all items as well as you can, even if some do not seem to apply to the child.

0 = Not True (as far as you know) 1 = Somewhat or Sometimes True 2 = Very True or Often True

0 1 2 1. Aches or pains (without medical cause)
0 1 2 2. Acts too young for age
0 1 2 3. Afraid to try new things
0 1 2 4. Avoids looking others in the eye
0 1 2 5. Can't concentrate, can't pay attention for long
0 1 2 6. Can't sit still or restless
0 1 2 7. Can't stand having things out of place
0 1 2 8. Can't stand waiting; wants everything now
0 1 2 9. Chews on things that aren't edible
0 1 2 10. Clings to adults or too dependent
0 1 2 11. Constantly seeks help
0 1 2 12. Constipated, doesn't move bowels
0 1 2 13. Cries a lot
0 1 2 14. Cruel to animals
0 1 2 15. Defiant
0 1 2 16. Demands must be met immediately
0 1 2 17. Destroys his/her own things
0 1 2 18. Destroys things belonging to his/her family or other children
0 1 2 19. Diarrhea or loose bowels when not sick
0 1 2 20. Disobedient
0 1 2 21. Disturbed by any change in routine
0 1 2 22. Doesn't want to sleep alone
0 1 2 23. Doesn't answer when people talk to him/her
0 1 2 24. Doesn't eat well (describe): _____
0 1 2 25. Doesn't get along with other children
0 1 2 26. Doesn't know how to have fun, acts like a little adult
0 1 2 27. Doesn't seem to feel guilty after misbehaving
0 1 2 28. Doesn't want to go out of home
0 1 2 29. Easily frustrated
0 1 2 30. Easily jealous
0 1 2 31. Eats or drinks things that are not food (describe): _____
0 1 2 32. Fears certain animals, situations, or places (describe): _____
0 1 2 33. Feelings are easily hurt
0 1 2 34. Gets hurt a lot, accident-prone
0 1 2 35. Gets in many fights
0 1 2 36. Gets into everything
0 1 2 37. Gets too upset when separated from parents
0 1 2 38. Has trouble getting to sleep
0 1 2 39. Headaches (without medical cause)
0 1 2 40. Hits others
0 1 2 41. Holds his/her breath
0 1 2 42. Hurts animals or people without meaning to
0 1 2 43. Looks unhappy without good reason
0 1 2 44. Angry moods
0 1 2 45. Nausea, feels sick (without medical cause)
0 1 2 46. Nervous movements or twitching (describe): _____
0 1 2 47. Nervous, highstrung, or tense
0 1 2 48. Nightmares
0 1 2 49. Overeating
0 1 2 50. Overtired
0 1 2 51. Overweight
0 1 2 52. Painful bowel movements
0 1 2 53. Physically attacks people
0 1 2 54. Picks nose, skin, or other parts of body (describe): _____
0 1 2 55. Plays with own sex parts too much
0 1 2 56. Poorly coordinated or clumsy
0 1 2 57. Problems with eyes without medical cause (describe): _____
0 1 2 58. Punishment doesn't change his/her behavior
0 1 2 59. Quickly shifts from one activity to another
0 1 2 60. Rashes or other skin problems (without medical cause)
0 1 2 61. Refuses to eat
0 1 2 62. Refuses to play active games
0 1 2 63. Repeatedly rocks head or body
0 1 2 64. Resists going to bed at night

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0 = Not True (as far as you know) 1 = Somewhat or Sometimes True 2 = Very True or Often True

0 1 2 65. Resists toilet training (describe): _____

0 1 2 66. Screams a lot
0 1 2 67. Seems unresponsive to affection
0 1 2 68. Self-conscious or easily embarrassed
0 1 2 69. Selfish or won't share
0 1 2 70. Shows little affection toward people
0 1 2 71. Shows little interest in things around him/her
0 1 2 72. Shows too little fear of getting hurt
0 1 2 73. Shy or timid
0 1 2 74. Sleeps less than most children during day and/or night (describe): _____

0 1 2 75. Smears or plays with bowel movements
0 1 2 76. Speech problem (describe): _____

0 1 2 77. Stares into space or seems preoccupied
0 1 2 78. Stomachaches or cramps (without medical cause)
0 1 2 79. Stores up things he/she doesn't need (describe): _____

0 1 2 80. Strange behavior (describe): _____

0 1 2 81. Stubborn, sullen, or irritable

0 1 2 82. Sudden changes in mood or feelings
0 1 2 83. Sulks a lot
0 1 2 84. Talks or cries out in sleep
0 1 2 85. Temper tantrums or hot temper
0 1 2 86. Too concerned with neatness or cleanliness
0 1 2 87. Too fearful or anxious
0 1 2 88. Uncooperative
0 1 2 89. Underactive, slow moving, or lacks energy
0 1 2 90. Unhappy, sad, or depressed
0 1 2 91. Unusually loud
0 1 2 92. Upset by new people or situations (describe): _____

0 1 2 93. Vomiting, throwing up (without medical cause)
0 1 2 94. Wakes up often at night
0 1 2 95. Wanders away from home
0 1 2 96. Wants a lot of attention
0 1 2 97. Whining
0 1 2 98. Withdrawn, doesn't get involved with others
0 1 2 99. Worrying
100. Please write in any problems your child has that were not listed above.

0 1 2 _____
0 1 2 _____
0 1 2 _____

PLEASE BE SURE YOU HAVE ANSWERED ALL ITEMS.

UNDERLINE ANY YOU ARE CONCERNED ABOUT

WHEN YOU FINISH THE CHILD BEHAVIOR CHECK LIST AND IF NO MORE LFK CHILDREN, SAY: This completes the interview. Thank you very much for cooperation and time. We really appreciate your help.

IF THERE ARE MORE LFK CHILDREN IN THE HOUSEHOLD, SAY: Now, I'm going to ask you the same questions about (OTHER LFK CHILD'S NAME).

1000. RECORD THE ENDING TIME OF THE FOLLOW-UP CHILD INTERVIEW.

__ __:__ __ AM / PM

1001. PLEASE SIGN BELOW.

_____
Interviewer's Signature

FILL IN 1002 AFTER YOU LEAVE.

1002. The quality of this interview is:

1 Reliable

2 Some doubt

3 Unreliable Explain:_____

_____

LEAD FREE KIDS STUDY

LEAD IN SOIL DEMONSTRATION PROJECT, BOSTON

DATA MANAGEMENT PLAN

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DATA MANAGEMENT PLAN OVERVIEW

1. Introduction

The Lead Free Kids (LFK) database consists of about 21 data files, which are either created by data entry using the Paradox database management system, received from the EPA as Lotus files, or received from the Boston Childhood Lead Poisoning Prevention Program (BCLPPP) as Dbase III+ files. All received files are imported into Paradox for data correction. All Paradox files are converted into Statistical Analysis System (SAS) files for data management and analysis.

2. Organization of Project

The Lead Free Kids project has two distinct data collection phases, the "eligibility" phase and the "study" phase, and each phase requires its own set of data files. During the eligibility phase, information pertaining to criteria for study enrollment were collected in order to identify subjects who were willing and eligible to participate in the study. Computer files generated during the subject recruitment period were used for project management and for a descriptive analysis of the non-participants were transferred from the eligibility data files to the study files. The eligibility data files were archived.

3. Organization of Data

Data collected about four separate units of observation: child, family, unit (premises and apartment concatenated), and premises. Some data files contain repeated measures type data, i.e., the same set of data items for the same unit of observation collected at different times. For instance, blood test results will be collected three times for each child. The goal of the organization of the database is to make it possible to (1) easily match a child to the data that apply to his or her premises or apartment, and to (2) easily match information pertaining to a stage of the study (e.g., pre-abatement, post-abatement, etc.) across all files with repeated measures data (e.g. soil lead measures, dust lead measures, blood lead measures).

The central data file is the KID file which provides the means by which data from different files can be combined to form composite case records. The unit of observation for the KID file is a child, and each observation will contain all the identifiers for that child (child id, family id, premises id, unit id). Any files that do not have identifiers in common can be merged through the KID file.

The repeated measure data contains variables that designate the phase of the study when the test was done. By selecting test results based on values of PHASE, data from different stages of the study can be compared.

DATABASE CONFIGURATION

FILE	DESCRIPTION	OTHER IDENTIFIERS
Files pertaining to children (Identifier is LFK_NUM):		
KID	Data about child, KEY file	
BLOODPB	Blood lead and FEP blood test results	PHASE
KIDINT	First portion of initial child interview	
DIET1-2	Diet portions of initial child interview	
KIDINT_B	Final portion of initial child interview	
FERRITIN	Ferritin blood test results	
HANDWIPE	Handwipe lead results	PHASE
SOURCE	Health care center or provider	
STATUS	Change of status (moved, quit)	STATDATE
FUKID	First follow-up child interview	
HEIGHT	Child's height, weight and blood pressure at first follow-up interview	
PARKID	Assignment of id numbers to parks where children played	
FU2KID	Second follow-up child interview	
Files pertaining to premises (Identifier is PREMID):		
PREMISES	Location of premises, landlord info	
DETAILED	Soil lead results from detailed sampling	SAMPNUM, POSITION
SAMPNUMS	Location of detailed soil samples by soil sample number	SAMPNUM

DATABASE CONFIGURATION

FILE	DESCRIPTION	OTHER IDENTIFIERS
Files pertaining to families (Identifier is FAMID):		
FAMILY	Data that applies to all children in the family	
DATES	Dates of LFK interventions, by FAMID	PREMID
FAMINT	Initial family interview	
FUFAM	First follow-up family interview	
FU2FAM	Second follow-up family interview	
WATER	Water lead results	HK_DATE
CHIPPEEL	Chipping and peeling paint assessment	
PAINT	Interior paint lead measurement	PREMID-APT_NO
Files pertaining to a living unit (Identifier is PREMID-APT_NO):		
DUST	Dust lead results	ROOM, PLACE, PHASE

FILE DESCRIPTIONS OVERVIEW

The following items are described for each data file in the database. An explanation of these items and general information that applies to all data files are given here.

(1) FILE NAME:

The file name listed is the SAS dataset name. In almost all cases, the corresponding PARADOX file has the same name. The exceptions are: (1) FAMILY.SSD, which is called FAMILIES.DB in PARADOX (because FAMILY is not a valid PARADOX dataset name), and (2) DETAILED.SSD, which is created by a SAS program (DETAILED.SAS) that concatenates the data received in batches from the EPA. The batches are named by the EPA report number (SOIL12, SOIL13, SOIL14, etc.) in both PARADOX and SAS.

(2) FILE DESCRIPTION:

General description of the data in the dataset.

(3) UNIT OF OBSERVATION:

Description of unit that one record represents. (One record per child, one record for each phase of study for each child, etc.)

(4) IDENTIFIER:

The KEY identifying variable for merging datasets through file KID. (PREMID, LFK_NUM, FAMID, or PREMID-APT_NO).

(5) ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:

If there are multiple observations in the data set by the principal identifier, the additional identifiers necessary to identify an observation uniquely are listed here.

(6) ORIGIN OF DATA:

The origin of the data is either data entry through PARADOX or, in the case of data files received from the EPA, file conversion from LOTUS.

(7) LOCATING ORIGINAL SOURCE FOR DATA ITEMS:

In order to expedite data verifications, each dataset contains all the data items necessary to locate the original paper source (data collection instrument, lab report, etc.) for an observation.

(8) QUALITY ASSURANCE:

The standard data entry validation tools (range checks, picture formats, etc.) were used for all datasets created through data entry. In addition, double entry and hand-checking were used, as specified. The quality of identifiers was assured through table-lookup at data entry. The principal identifiers were validated against a table of valid values, and invalid values were rejected. Valid values called up additional identifying information (name, address, etc.) to verify a correct match.

If the datasets were received from EPA as LOTUS files, SAS programs were used to match the identifiers to the table of valid values, and the validity of the matches was checked by hand.

LEAD FREE KIDS STUDY

ORIGINAL ENROLLED CHILDREN

PREMISES

Group	Frequency	Percent	Cumulative Frequency	Cumulative Percent
A	36	35.6	36	35.6
B	30	29.7	66	65.3
S	35	34.7	101	100.0

FAMILIES

Group	Frequency	Percent	Cumulative Frequency	Cumulative Percent
A	43	34.1	43	34.1
B	39	31.0	82	65.1
S	44	34.9	126	100.0

UNITS

Group	Frequency	Percent	Cumulative Frequency	Cumulative Percent
A	42	34.1	42	34.1
B	38	30.9	80	65.0
S	43	35.0	123	100.0

KIDS

Group	Frequency	Percent	Cumulative Frequency	Cumulative Percent
A	51	33.6	51	33.6
B	47	30.9	98	64.5
S	54	35.5	152	100.0

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

KID

(2) **FILE DESCRIPTION:**

Key file containing identifiers for merging data files between levels of relational database structure. Also contains demographical data about child.

(3) **UNIT OF OBSERVATION:**

One observation per child.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data were transferred from data files created during eligibility phase. These data came originally from OEA data files, and were corrected by LFK staff during the preliminary interview.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

See preliminary interview cover sheet, filed by PREMID.

(8) **QUALITY ASSURANCE:**

Data were verified by families during preliminary interview and again during administration of initial family questionnaire. Changes were made from data correction sheets completed by Assistant Epidemiologist.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

BLOODPB

(2) **FILE DESCRIPTION:**

Blood lead and FEP from all phases of study. (Includes baselines results for children who were not enrolled.)

(3) **UNIT OF OBSERVATION:**

One observation per child and phase of study.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

PHASE (Values are PRE, POST1, POST2)

(6) **ORIGIN OF DATA:**

Results from ESA blood test reporting slips were copied to data entry sheets. Data entry done from data entry sheets.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

ESA lab results and data entry sheet on file by ESA receive date (ESADATE). Use LINENUM to reference line on data entry sheet with child's result.

(8) **QUALITY ASSURANCE:**

Computer listing of data file checked against original ESA report slip by hand.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

KIDINT

(2) **FILE DESCRIPTION:**

Initial interview questionnaire data pertaining to a child. KIDINT contains pages 1 through 18 of questionnaire (items 600-806). Other portions of the child interview are in DIET1 & DIET2 (pp. 19-40, items 850-854) and KIDINT_B (pp. 41-48, items 855-1002).

(3) **UNIT OF OBSERVATION:**

One observation per child.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from interview form.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Interview forms filed by PREMID.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) FILE NAME:

DIET1 and DIET2

(2) FILE DESCRIPTION:

Initial interview questionnaire data pertaining to the child's diet. DIET1-2 contains pages 19-40 (items 850-854) of the questionnaire. Other portions of the initial child interview are in KIDINT (pp. 1-18, items 600-804) and KIDINT_B (pp. 41-48, items 855-1002).

(3) UNIT OF OBSERVATION:

One observation per child.

(4) IDENTIFIER:

LFK_NUM

(5) ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:

(6) ORIGIN OF DATA:

Data entry from interview form.

(7) LOCATING ORIGINAL SOURCE FOR DATA ITEMS:

Interview forms filed by PREMID.

(8) QUALITY ASSURANCE:

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

KIDINT_B

(2) **FILE DESCRIPTION:**

Initial interview questionnaire data pertaining to a child's father, tap water use, and demographic information. KIDINT_B contains pages 41 to 48 (items 855-1002) of the questionnaire. Other portions of the initial child interview are in KIDINT (pp. 1-18, items 600-804) and DIET1 & DIET2 (pp. 19-40, items 850-854).

(3) **UNIT OF OBSERVATION:**

One observation per child.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from interview form.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Interview forms filed by PREMID.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) FILE NAME:

FERRITIN

(2) FILE DESCRIPTION:

Ferritin test results from Bioran.

(3) UNIT OF OBSERVATION:

One observation per child (only baseline obtained).

(4) IDENTIFIER:

LFK_NUM

(5) ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:

(6) ORIGIN OF DATA:

Data entry from Bioran blood test report slips.

(7) LOCATING ORIGINAL SOURCE FOR DATA ITEMS:

Filed by LFK_NUM, each result on an individual slip.

(8) QUALITY ASSURANCE:

Double entry.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

HANDWIPE

(2) **FILE DESCRIPTION:**

Handwipe test results.

(3) **UNIT OF OBSERVATION:**

One observation per child and phase of study.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

PHASE (Values are PRE, POST1, POST2)

(6) **ORIGIN OF DATA:**

Lab reports from Dennison Laboratories.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Handwipe Analysis Reports filed by form sequence (analysis date).

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

SOURCE

(2) **FILE DESCRIPTION:**

Contains health care provider code for each child for reporting blood lead and FEP to provider. (Health care provider information is also collected during the child interview).

(3) **UNIT OF OBSERVATION:**

One observation per child.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data were transferred from data files created during eligibility phase. These data items came originally from OEA data files, and were corrected by LFK staff during the preliminary interview.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

See preliminary interview cover sheets, which are filed by PREMID.

(8) **QUALITY ASSURANCE:**

Validated by LFK staff with parents and health care providers.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

STATUS

(2) **FILE DESCRIPTION:**

Any change of status involving participation in the study is registered in STATUS. If a child moves out of his/her original unit, the move is noted here, as well as the new address, if known.

(3) **UNIT OF OBSERVATION:**

An observation for each change of status for each child. A child could have more than one change of status by moving more than once, or moving and later dropping out of the study.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

Date of change of status report (STATDATE).

(6) **ORIGIN OF DATA:**

Data entry done from "Change of Status" form.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Forms filed by LFK_NUM.

(8) **QUALITY ASSURANCE:**

Computer sheet generated at data entry and validated by Assistant Epidemiologist.

LEAD FREE KIDS

FILE DESCRIPTION

(1) FILE NAME:

PREMISES

(2) FILE DESCRIPTION:

Contains data that apply to the premises occupied by the children (address, neighborhood, etc.) and to the owner of the property. Also contains randomization group assignment.

(3) UNIT OF OBSERVATION:

One observation for each premises.

(4) IDENTIFIER:

PREMID

(5) ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:

(6) ORIGIN OF DATA:

Data were transferred from data files created during the eligibility phase. The address information originated at OEA, and the landlord information was entered from the LANDLORD RECRUITING FINAL SHEET.

(7) LOCATING ORIGINAL SOURCE FOR DATA ITEMS:

See premises folders, filed by PREMID.

(8) QUALITY ASSURANCE:

Address and landlord information is continually updated and corrected by the LFK staff through home visits and landlord contacts.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

DETAILED

(2) **FILE DESCRIPTION:**

Contains baseline detailed soil sample results. Each sample is identified by the premises from which it came (PREMID), the assigned sequence number of the sample as noted on the sampling map of the year (SAMPNUM) and by the variable POSITION (TOP or BOTTOM)

(3) **UNIT OF OBSERVATION:**

One observation for each sample result reported. (Usually, a top and a bottom sample for each location)

(4) **IDENTIFIER:**

PREMID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

SAMPNUM, POSITION

(6) **ORIGIN OF DATA:**

Data received in LOTUS files from the EPA and converted into SAS files.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

The variable FILE denotes the EPA report file (and diskette) from which the observation originated. LFK has retained both the diskettes and the hard copies of the file reports as received from the EPA for reference and verification. An observation can be located within a file by the lab ID (LABID), which is a sequential sample number assigned by the EPA. The same method can be used to locate the original result at the EPA labs, which also keeps a record of the results.

(8) **QUALITY ASSURANCE:**

Values can be verified against EPA records using method described above.

LEAD FREE KIDS

FILE DESCRIPTION

(1) FILE NAME:

RECONTAM

(2) FILE DESCRIPTION:

Contains recontamination (surface) soil sample results. Each sample is identified by the premises from which it came (PREMID), the assigned sequence number of the sample as noted on the sampling map of the yard (SAMPNUM).

(3) UNIT OF OBSERVATION:

One observation for each sample result reported.

(4) IDENTIFIER:

PREMID

(5) ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:

SAMPNUM, POSITION

(6) ORIGIN OF DATA:

Data received in LOTUS files from the EPA and converted into SAS files.

(7) LOCATING ORIGINAL SOURCE FOR DATA ITEMS:

The variable FILE denotes the EPA report file (and diskette) from which the observation originated. LFK has retained both the diskette and the hard copies of the file reports as received from the EPA for reference and verification. An observation can be located within a file by the lab ID (LABID), which is a sequential sample number assigned by the EPA. The same method can be used to locate the original result at the EPA labs, which also keeps a record of the results.

(8) QUALITY ASSURANCE:

Values can be verified against EPA records using method described above.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

POSTSOIL

(2) **FILE DESCRIPTION:**

Contains immediate post-abatement (surface) soil sample results. Each sample is identified by the premises from which it came (PREMID), the assigned sequence number of the sample as noted on the sampling map of the yard (SAMPNUM).

(3) **UNIT OF OBSERVATION:**

One observation for each sample result reported.

(4) **IDENTIFIER:**

PREMID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

SAMPNUM, POSITION

(6) **ORIGIN OF DATA:**

Data received in LOTUS files from the EPA and converted into SAS files.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

The variable FILE denotes the EPA report file (and diskette) from which the observation originated. LFK has retained both the diskette and the hard copies of the file reports as received from the EPA for reference and verification. An observation can be located within a file by the lab ID (LABID), which is a sequential sample number assigned by the EPA. The same method can be used to locate the original result at the EPA labs, which also keeps a record of the results.

(8) **QUALITY ASSURANCE:**

Values can be verified against EPA records using method described above.

LEAD FREE KIDS

FILE DESCRIPTION

(1) FILE NAME:

SAMPNUMS

(2) FILE DESCRIPTION:

Contains data about location from which each detailed soil sample was taken within the yard. The location is specified by the side of the house (Left, Right, Front, Back) and the distance in meters between the sample location and that side of the house (M_AWAY). The distance in meters is calculated by the computer from a map measurement (noted in mm.) and from the scale used for that map.

(3) UNIT OF OBSERVATION:

One observation for each sampling location. (NB: Each location will match 2 samples, a TOP and a BOTTOM)

(4) IDENTIFIER:

PREMID

(5) ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:

SAMPNUM

(6) ORIGIN OF DATA:

Data entry from transcription form. A data transcription form was completed for each premises map. The distances were measured by ruler in mm and noted for each sample taken. The scale of the map was also noted (mm/m).

(7) LOCATING ORIGINAL SOURCE FOR DATA ITEMS:

Maps and data transcription forms filed by PREMID.

(8) QUALITY ASSURANCE:

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

PARKID

(2) **FILE DESCRIPTION:**

Parks and playgrounds frequented by LFK children were identified by an ID number and linked to each child.

(3) **UNIT OF OBSERVATION:**

One observation for each park or playground.

(4) **IDENTIFIER:**

PARKID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

LFK_NUM

(6) **ORIGIN OF DATA:**

Data entry from "PARKID LIST."

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Forms filed in PARKID folder in results file drawer.

(8) **QUALITY ASSURANCE:**

Computer sheet generated at data entry and validated by Data Analyst.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

FAMILY

(2) **FILE DESCRIPTION:**

Contains data collected during eligibility phase that pertains to all children in a family (telephone numbers, apartment number, parent information).

(3) **UNIT OF OBSERVATION:**

One observation per family.

(4) **IDENTIFIER:**

FAMID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data were transferred from data files created during eligibility phase. These data came originally from OEA data files, and were corrected by LFK staff during the preliminary interview.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

See preliminary interview cover sheet, filed by PREMID.

(8) **QUALITY ASSURANCE:**

Data were verified by families during preliminary interview and again during administration of initial family questionnaire. Changes were made from data correction sheets completed by Assistant Epidemiologist.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

FAMINT

(2) **FILE DESCRIPTION:**

Initial interview questionnaire data pertaining to a family.

(3) **UNIT OF OBSERVATION:**

One observation per family.

(4) **IDENTIFIER:**

FAMID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from interview form.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Interview forms filed by FAMID.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) FILE NAME:

WATER

(2) FILE DESCRIPTION:

Contains tap water sample test results.

(3) UNIT OF OBSERVATION:

Two observations for each family.
NB: The actual unit of observation should have been UNIT (The concatenation of PREMID and APT_NO), because it is possible for more than one family to occupy the same unit. If necessary, the file FAMILY can be merged with the WATER file to attach the unit numbers, and the WATER results duplicated for multiple families in the same unit.

(4) IDENTIFIER:

FAMID

(5) ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:

HK_DATE

(6) ORIGIN OF DATA:

Data entry from Hall-Kimbrell test report slip.

(7) LOCATING ORIGINAL SOURCE FOR DATA ITEMS:

Use the date received at Hall-Kimbrell (HK_DATE) to locate the original report. Use the Hall-Kimbrell lab ID (HKES_NUM) to locate a result within a report.

(8) QUALITY ASSURANCE:

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

DUST

(2) **FILE DESCRIPTION:**

Contains dust sample lead level, sample weight, and area samples for each sample reported. NB: The variable LESSTHAN has a value of '<' if the sample weight is less than .005.

(3) **UNIT OF OBSERVATION:**

One observation for each dust sample reported.

(4) **IDENTIFIER:**

UNIT (Concatenated from PREMID and APT_NO)

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

ROOM (Bedroom, Kitchen, etc.)
PLACE (Window, Floor)
PHASE (PRE, POST1, POST2)

(6) **ORIGIN OF DATA:**

Data entry from DUST SAMPLES DATA FORM. The identifying data and sample description data are filled in by the LFK staff member who obtained the samples. The weight, PbD, and LABID are filled in by the EPA.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Each page of results received by LFK from the EPA is assigned a sequential page number (FORM_SEQ). A page contains all the sample data about one unit for one phase of the study. The DUST SAMPLE DATA FORMS are filed by FORM_SEQ.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

FUFAM

(2) **FILE DESCRIPTION:**

First follow-up interview questionnaire data pertaining to a family.

(3) **UNIT OF OBSERVATION:**

One observation per family.

(4) **IDENTIFIER:**

FAMID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from interview form

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Interview forms filed by PREMID.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

FUKID

(2) **FILE DESCRIPTION:**

First follow-up interview questionnaire data pertaining to a child.

(3) **UNIT OF OBSERVATION:**

One observation per child.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from interview form.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Interview forms filed by PREMID.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) FILE NAME:

HEIGHT

(2) FILE DESCRIPTION:

Height, weight, and blood pressure from the first follow-up period were recorded by the nurse/case manager at a time different from the first follow-up interview. Results are found in HEIGHT and can be merged with the interview by LFK_NUM.

(3) UNIT OF OBSERVATION:

One observation per child.

(4) IDENTIFIER:

LFK_NUM

(5) ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:

(6) ORIGIN OF DATA:

Data entry done from "2nd Height, Weight, and Blood Pressure" form.

(7) LOCATING ORIGINAL SOURCE FOR DATA ITEMS:

Forms filed by LFK_NUM within family (FAMID) within premises (PREMID)

(8) QUALITY ASSURANCE:

Computer sheet generated at data entry and validated by Data Analyst.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

FU2FAM

(2) **FILE DESCRIPTION:**

Second follow-up interview questionnaire data pertaining to a family.

(3) **UNIT OF OBSERVATION:**

One observation per family.

(4) **IDENTIFIER:**

FAMID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from interview form

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Interview forms filed by PREMID.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

FU2KID

(2) **FILE DESCRIPTION:**

Second follow-up interview questionnaire data pertaining to a child.

(3) **UNIT OF OBSERVATION:**

One observation per child.

(4) **IDENTIFIER:**

LFK_NUM

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from interview form.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Interview forms filed by PREMID.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

CHIPPEEL

(2) **FILE DESCRIPTION:**

Contains interior chipping and peeling paint assessments by room.

(3) **UNIT OF OBSERVATION:**

One observation for each family.

(4) **IDENTIFIER:**

FAMID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from INTERIOR PAINT ASSESSMENT FORM. The identifying data and sample description data are filled in by the LFK staff member who made the assessments. The codes for NOT APPLICABLE and other codes are filled in by the assistant epidemiologist or the data analyst.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Each page of results received by the data analyst from the LFK staff is assigned a sequential page number (FORM_SEQ). A page contains all the chipping and peeling paint data about one unit. The INTERIOR PAINT ASSESSMENT FORMS are filed by FORM_SEQ.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

PAINT

(2) **FILE DESCRIPTION:**

Contains interior paint lead measurements (with PGT) by room and location (wall or woodwork).

(3) **UNIT OF OBSERVATION:**

One observation for each unit or family.

(4) **IDENTIFIER:**

FAMID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from XRF LEAD PAINT MEASUREMENT FORM. The identifying data and sample description data are filled in by the LFK staff member who obtained the samples or, in some cases, by the staff member who abstracted the data from inspection reports. The codes for NOT APPLICABLE and other codes are filled in by the data analyst.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Each page of results received by the data analyst from the LFK staff is assigned a sequential page number (FORM_SEQ). A page contains all the interior paint lead data about one unit. The XRF LEAD PAINT MEASUREMENT FORMS are filed by FORM_SEQ.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS

FILE DESCRIPTION

(1) **FILE NAME:**

DATES

(2) **FILE DESCRIPTION:**

Contains dates of all LFK interventions, i.e. dust, loose paint, soil abatements, and exterior and interior deleading, for each family.

(3) **UNIT OF OBSERVATION:**

One observation for each family.

(4) **IDENTIFIER:**

FAMID

(5) **ADDITIONAL IDENTIFIERS NEEDED TO UNIQUELY IDENTIFY AN OBSERVATION:**

(6) **ORIGIN OF DATA:**

Data entry from DATES OF INTERVENTIONS FOR LFK UNITS form. Dates of LFK interventions were filled in by LFK staff members responsible for monitoring the interventions.

(7) **LOCATING ORIGINAL SOURCE FOR DATA ITEMS:**

Form organized by FAMID and filed.

(8) **QUALITY ASSURANCE:**

100% visual comparison/correction.

LEAD FREE KIDS STUDY

INSTRUCTIONS TO PARTICIPANTS

The copy of the consent form should be kept in a secure place for future reference. It is also important that you have the telephone number of the "Lead Free Kids Program" easily available, so that you can get in touch with us whenever you want to.

LEAD FREE KIDS STUDY

PARTICIPANT CONSENT FORM

I understand that the Department of Health and Hospitals of the City of Boston's Childhood Lead Poisoning Prevention Program, with the assistance of the United States Environmental Protection Agency, is conducting the Lead Free Kids Project to determine the possible effectiveness of the removal of lead contaminated soil on reducing blood lead levels of pre-school children in certain areas of Boston.

I understand that I have been asked to participate in this project because I live in Roxbury, Dorchester, Mattapan, or Jamaica Plain and have a child/children up to four years of age with a blood lead level in the upper end of the normal range (between 12 and 24 ug/dl). Blood lead levels refer to the amount of lead in a child's blood. All children between the ages of 9 months and 6 years should have their blood lead levels checked at least twice a year to make sure they are not too high.

I understand that the project will take place from January 1989 to January 1991 and will involve several visits to my residence for blood samples, an interview, soil, dust, water and paint samples, and soil and dust removal.

_____

Subject's Initials

I understand that I will be assigned to one of three study groups. The first group will receive loose paint and contaminated soil and dust removal starting in the fall of 1989. The second group will receive loose paint and dust removal starting in the fall of 1989 and soil removal starting in the fall of 1990. The third group will receive loose paint removal starting in the fall of 1989 and soil and dust removal starting in the fall of 1990. I understand that my assignment to any one of these groups will be by chance (like flipping a coin) and that I have an equal chance of being assigned to any one group.

I understand that if I move, I and my child/children may continue to be part of the project. In addition, I understand that I will be asked for the names of several people (friends, neighbors, or relatives) whom the staff may contact to obtain my new address if I do not notify the staff that I have moved. If I do not wish to give out these names, I and my child/children may still participate in the study.

I understand there will be three parts to the project:

A. Interview -- Collection of information concerning:

(1) Health history and activities of participating children in my home that may be related to lead poisoning;

(2) Occupations of adults in my home that may involve lead;

(3) Types of cooking utensils used in my home (cooking utensils may contain lead);

(4) Hobbies of any family member involving lead.

_____
Subject's Initials

B. Environmental Testing and Cleanup

(1) Collection of dust samples in my home;

(2) Collection of soil samples in the yard of my home;

(3) Collection of tap water samples in my home;

(4) Collection of paint samples in my home;

(5) Removal of the top several inches of soil from my yard, if that soil has a lead content greater than 500 parts per million, and

(6) Replacement of all excavated soil with clean soil and grass seed or sod.

(7) Vacuuming of the interior of my home to remove dust;

C. Taking of blood samples and hand lead measurements

(1) A blood sample, approximately 2-3 ml. or less than the amount of fluid on a teaspoon will be taken from a vein in the arm of each participating child to be tested for indicators of lead toxicity. Lead toxicity is a lead level that is high enough to cause changes in certain aspects of a child's body function. There will be at least three with the possibility of five blood samples taken. There should be no problems associated with collecting the blood sample, other than slight, temporary discomfort and the possibility of a small bruise where the needle enters the skin, which will disappear in a few days. Needles used for this purpose are pre-sterilized and disposed of after each sampling.

(2) Lead on the hands of each participating child will also be measured. This measurement involves thoroughly wiping both hands of each child with commercial wet-wipes. There should be no discomfort associated with this procedure.

(3) Project teams will take blood samples and conduct hand lead measurements in each participating child three times over the next one and one-half years.

I understand that all of the information from the interview and test results will be held in the strictest confidence.

_____

Subject's Initials

I understand that participation in this study will involve a certain level of intrusion into my family's routine. Project staff will need to come into my home on several occasions to obtain the samples described above and carry out loose paint and interior dust removal. I also understand that I may need to close certain windows and doors when the soil is being removed.

I also understand that I will receive compensation from the study for my participation. This compensation will consist of monthly food packages for as long as I participate and an appliance when I complete my participation in the study. I understand that I will receive this compensation even if I move away from my current home provided that I stay in touch with the study staff.

I also understand that this study may benefit my children because it may reduce their chances of lead poisoning. The study may also benefit scientific knowledge since it may provide information on the amount and sources of lead in and around homes and may help determine the best ways to prevent lead poisoning, a very serious child health problem.

I, as the legal guardian of the child/children participating in the study voluntarily agree to take part in the study and consent to having my child/children participate. I understand that my and my child's (or childrens') participation may involve:

_____
Subject's Initials

(1) being interviewed regarding the topics described above;

(2) contributing samples of blood and hand lead measurements;

(3) allowing soil, dust and water samples to be taken at my residence, and allowing soil removal/replacement activities and interior vacuuming to occur;

(4) allowing the examination of paint at my residence.

I have been assured that personal information will be kept in confidence by the Lead Free Kids Project. Any data from the project that are given to the Environmental Protection Agency (EPA) will not contain identifying information. I also understand that neither I, nor any member of my family, will be identified by name in any reports of the results of the Lead Free Kids Project.

I understand that I may decline to answer specific questions as I see fit and that I am free to withdraw my child's participation in the project at any time. I also understand that my withdrawl will not jeopardize receipt of medical care for myself or my child/children.

I understand that I will be informed, in writing, of the results of all of the blood, soil, dust, water and paint tests described above by the project staff in a timely fashion and that these results will be explained to me.

_____

Subject's Initials

I understand that if any blood test results indicate that my child/children should receive medical follow up, the project staff will provide a referral to my regular health care provider or will assist me in finding an appropriate health care provider.

I understand that if the test indicates a need for medical follow-up, I will be notified immediately. I can obtain additional information about this study, medical follow-up, and questions I may have about the results of the study by writing or calling my Lead Free Kids staff team (names) at:

Lead Free Kids Project
818 Harrison Avenue
Boston, MA 02118
534-5965

I understand that if I am not happy with any part of the study and don't want to talk to my study staff team about it, I can call or write to the project administrator (Natalie Zarimba) or director (Mr. Ronald R. Jones) at the above address and phone number.

In addition, you may wish to discuss this study and/or your participation in it with your regular doctor or nurse. You may also request the person who is in charge of the study to speak with your doctor.

_____
Subject's Initials

Statement of subject's approval of consent

_____ _____

Subject Date

I have witnessed that the elements of the above informed consent have been adequately and appropriately explained to the subject.

_____ _____

Witness Date

I attest the I have fully and appropriately informed the subject of the nature of the above study and have offered to answer any questions that he/she may have.

_____ _____

Principal Investigator Date

Furthermore, if you have any questions concerning the study and/or your consent to be a participant, you may also contact the Human Studies Committee of the Trustees of Health and Hospitals of The City of Boston, Inc. (Chairperson, 424-5842) created for the protection of the human subjects involved in proposed studies. Although the Human Studies Committee has approved this study as protocol #___-_____, on _____(date), your participation is entirely voluntary.

LEAD FREE KIDS STUDY

PARTICIPANT LANDLORD CONSENT FORM

I understand that the Department of Health and Hospitals of the City of Boston's Childhood Lead Poisoning Prevention Program, with the assistance of the United States Environmental Protection Agency, is conducting the Lead Free Kids Project to determine the possible effectiveness of the removal of lead contaminated soil on reducing blood lead levels of non-poisoned children in certain areas of Boston.

I understand that my tenant ____(NAME)_____ who lives at __(ADDRESS)____ has been asked to participate in this project.

I also understand that the project will take place from January 1989 to January 1991 and will involve several visits to my tenant's residence for activities including testing for lead in paint, soil, dust and loose paint removal.

I understand that my tenant will be assigned to one of three study groups. The first group will receive interior loose paint and contaminated soil and interior dust removal starting in the fall of 1989. The second group will receive loose paint and dust removal starting in the fall of 1989 and soil removal starting in the fall of 1990. The third group will receive loose paint removal starting in the fall of 1989 and soil and dust removal starting in

_____
Landlord's Initials

the fall of 1990. I understand that my tenant's assignment to any one of these groups will be by chance (like flipping a coin) and that they have an equal chance of being assigned to any one group. I also understand that I will be informed of which group my tenant has been assigned.

I also understand that at the end of the study (fall 1990), the project will test the interior of my tenant's apartment, common hallways and the exterior of my property for lead paint. I also understand that if violations of the Massachusetts Lead Law are found, the project will help me by identifying or providing financial assistance, if applicable, for bringing my property into compliance with the law.

I understand that, as initial part of this assistance, I will receive $500 (actual amount not yet determined) compensation from the study for my participation when all of the activities described above are completed. I also understand that I will receive this compensation even if my tenant moves before he/she completes participation in the study.

I understand the project will need to gain access to my property for the following activities:

_____

Landlord's Initials

(1) Removal of the top several inches of soil from my property's yard if that soil has a lead content greater than 500 parts per million,

(2) Replacement of all excavated soil with clean soil and grass seed or sod.

I understand that the project will be responsible for replacing any landscaping, flowers, fences or other structures on my property that are damaged as a result of the project's activities.

I, as owner of the property at _____(ADDRESS)_____, voluntarily agree to take part in the study. I understand that my participation will involve allowing soil removal and replacement activities to occur.

I have been assured that personal information will be kept in confidence by the Lead Free Kids Project. Any data from the project that are given to the Environmental Protection Agency (EPA) will not contain identifying information. I also understand that I will not be identified by name in any reports of the results of the Lead Free Kids Project.

_____

Landlord's Initials

I can obtain additional information about this study and questions I may have about the results of the study by writing or calling my Lead Free Kids staff team (names) at:

Lead Free Kids Project
818 Harrison Avenue
Boston, MA 02118
424-5965

I understand that if I am not happy with any part of the study and don't want to talk to my study staff team about it, I can call or write to the project administrator (Natalie Zaremba) or director (Mr. Ronald R. Jones) at the above address and phone number.

Statement of landlord's approval of consent

_____ _____
Landlord Date

I have witnessed that the elements of the above informed consent have been adequately and appropriately explained to the landlord.

_____ _____
Witness Date

I attest the I have fully and appropriately informed the landlord of the nature of the above study and have offered to answer any questions that he/she may have.

_____ _____
Principal Investigator Date

Furthermore, if you have any questions concerning the study and/or your consent to be a participant, you may also contact the Human Studies Committee of the Trustees of Health and Hospitals of The City of Boston, Inc. (Chairperson, 424-5842) created for the protection of the human subjects involved in proposed studies. Although the Human Studies Committee has approved this study as protocol #_____, on _____(date), your participation is entirely voluntary.

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