



soilSHOP Tutorial Series

Part 4 of 5: Soil Screeners

Table of Contents

Soil Screeners

What is the role of the soil screener?	4
Why is this role needed?	5

Screener Action Items

Pre-event	7
During event	11
Post-event	18

Resources	19
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Expectations

By the end of Part 4, you should be able to:

- Explain the role of the soil screener and why is it important.
- Identify action items for screeners.
- Understand how a soilSHOP event works.
- Identify proper screener station set-up.
- List the resources available for screeners.

Soil Screeners

What is the role of the soil screener?

XRF operators screen each soil sample for lead, arsenic or other heavy metals using XRF equipment. Screeners record readings in data log books or other data tracking forms, and on sample result cards or sheets that will be given to the participants.

Soil Screeners

Why is this role needed?

The soil screening process impacts the following:

1. Overall flow of the event

- The time it takes to screen a sample relates directly to how long a resident has to wait.

2. Connecting a participant to the screening result

- The record keeping, data recording, and information transfer that occurs during the soil screening process is critical to tracking a soil sample through the screening process, and delivering the results to the appropriate participant.

Screeners Action Items

Pre-event

- Complete trainings in soilSHOP, XRF use, and safety.
- Assist with development of sample logging materials.
- Review materials needed for your station.
- Review Soil Screening Guidance and modify it to your event.
- Work with planning team to determine screener station set-up and procedures.

During event

- Ensure safety measures are implemented, including placement of screener station away from other stations and participant traffic.
- Ensure all materials are available (XRF equipment, log books, runner station).
- Screen soil samples and log results.
- Plan for the safe and responsible management of soil sample disposal.

Post-event

- Meet with team for follow-up actions (e.g., samples that were not screened during the event, results that were not picked up by participants, data logging/evaluation).
- Ensure XRF equipment is properly stored.
- Evaluate your station: what worked, lessons learned.

Pre-event

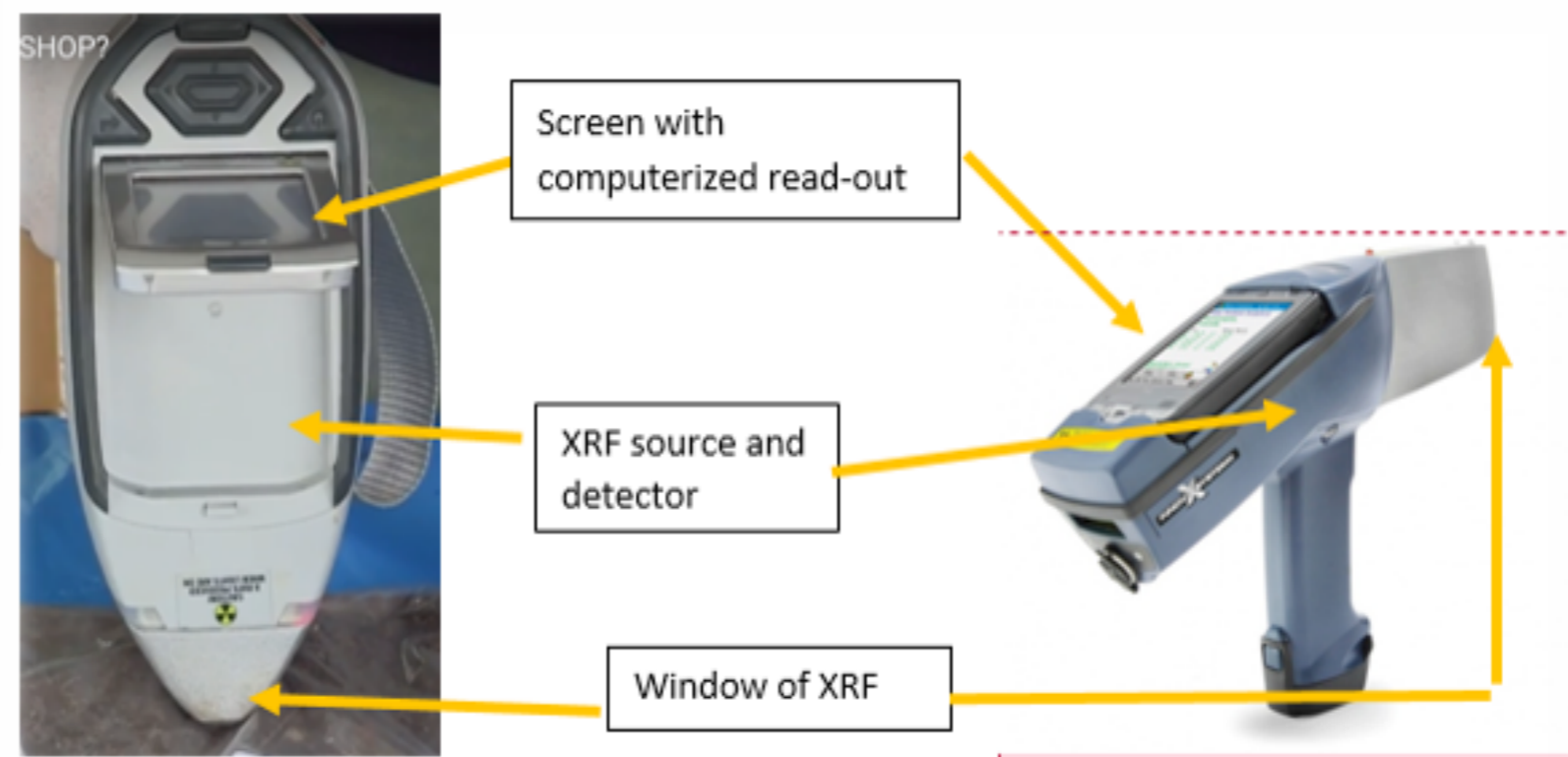
Soil Screening Material Examples:

Soil Screening	XRF Instrument(s)	
Soil Screening	Extension cord and power strips	
Soil Screening	Coolers for soil samples	
Soil Screening	Printed XRF Screening Process Factsheet (aka Soil Screening Procedure)	
Soil Screening	Logbooks (one for each XRF)	
Soil Screening	Calculators to assist with averaging	
Soil Screening	Disposable gloves (1 box small, med, large)	
Soil Screening	Aluminum pans (like the ones you would serve food in)	
Soil Screening	Decontamination equipment - paper towels - 1 gallon ziplock bags	
Soil Screening	Clipper	
Soil Screening	String/Green twine to hang clothespins – sample number card	
Soil Screening	Yellow Traffic Cones to clear parking area and delineate screening area	
Soil Screening	Caution tape to delineate screening area	

Example Material List

Review the materials and equipment needed for your station.

Complete necessary trainings on X-Ray Fluorescence (XRF) equipment.



XRF Instrument

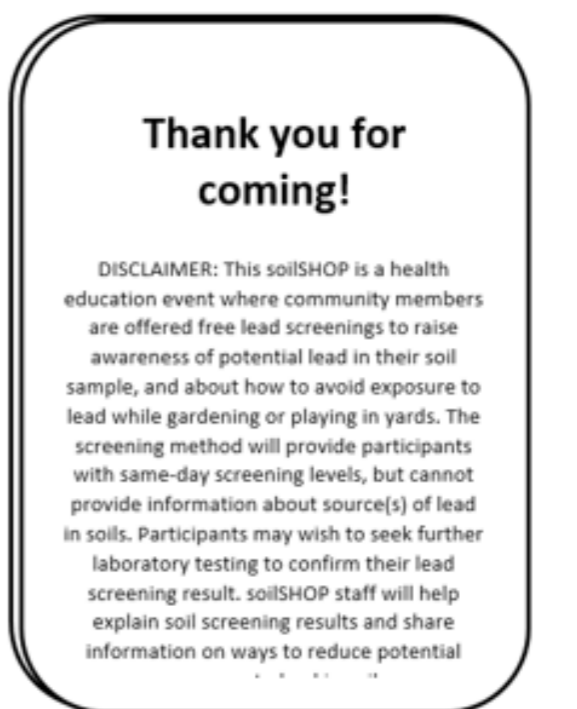
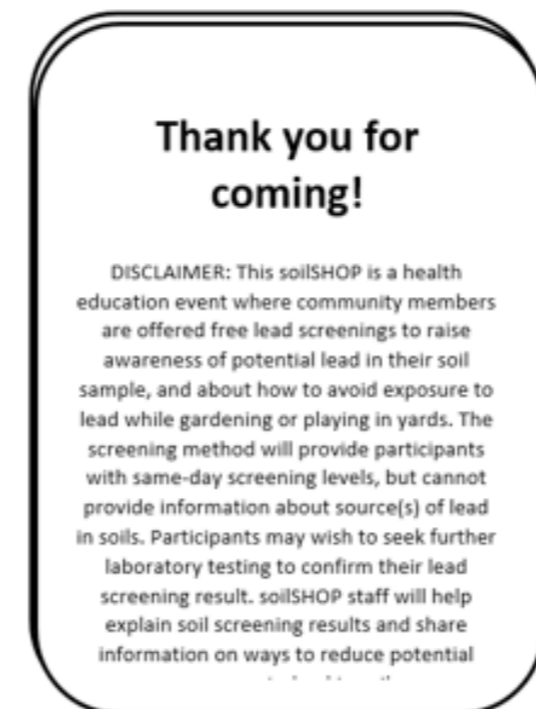
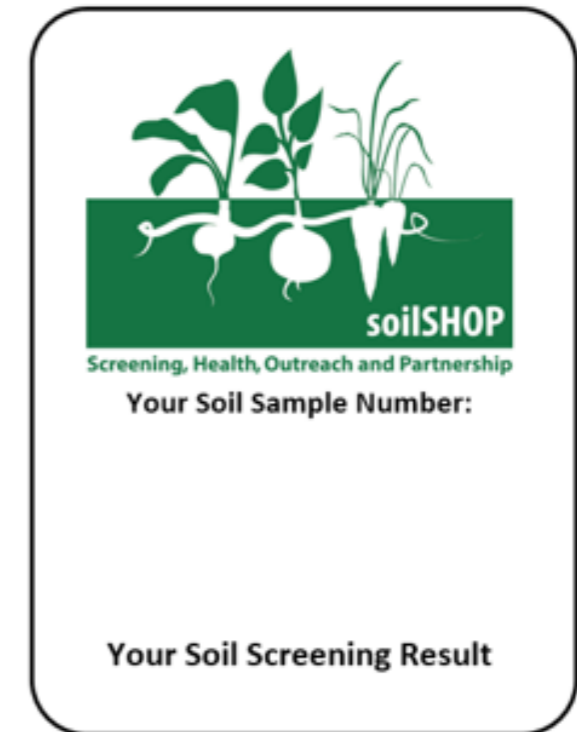
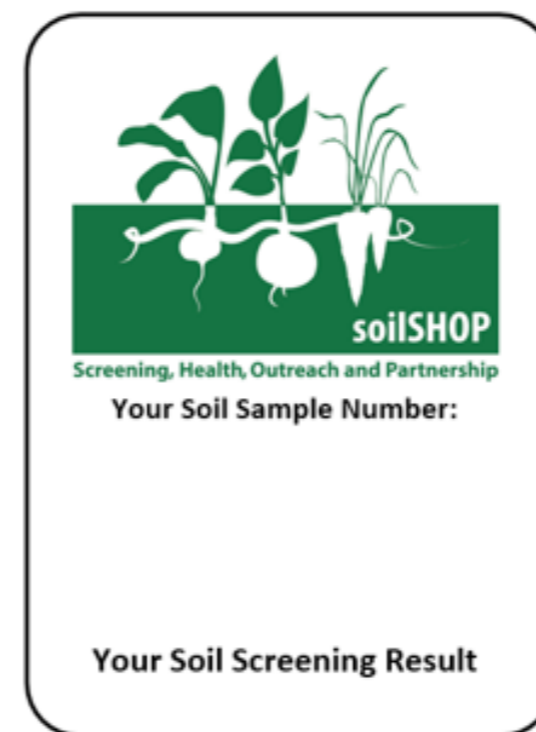
Pre-event

Log-In form provides details about the nature of the soil sample and helps soil screening team understand the results. Also helps health educator tailor health messages.

Participants take home records of their soil screening results. Remember to keep a data log for your records.

The image shows two side-by-side versions of the soilSHOP Log In Form. The left version is in English and the right version is in Spanish. Both forms contain the following sections:

- Log In Time:** Fields for Sample #1, #2, and #3 numbers and their respective Begin XRF Times.
- Collection Information:** A table for three samples (#1, #2, #3) with fields for:
 - Type of soil (Original, Amended, Raised Bed, Other)
 - Current or planned use (Garden, Play Area, Other)
 - Was this sample taken from more than one spot? (Yes/No)
 - Depth (inches)
 - Was sample location less than 5 feet away from house or building? (Yes/No/Not Sure)
 - Was sample location less than 5 feet away from street? (Yes/No/Not Sure)
- Age of the nearest structure:** Fields for Structure type (House, Fence, Shed, Other) and whether it was painted before 1978.
- Additional Comments:** A text area for extra notes.



Log-In form in English and Spanish

Soil Sample Cards

Pre-event

Material Examples


Review Soil Screening Guidance Guidance on the soilSHOP website and modify it for your XRF equipment, host organization protocols, and goals.

soilSHOP Toolkit Example Soil Screening Guidance

General Description of Soil Screening

This Example Soil Screening Procedure is intended for use by technicians and other soilSHOP soil screening staff, and provides an overall approach and some tips for successful soil screening. This Example Soil Screening Procedure should be reviewed, modified and applied by appropriately qualified scientists to meet the needs and operational guidelines/procedures of their representative agencies and organizations. This procedure outlines example steps that have been applied at soilSHOP events in the past.

General Description of Soil Screening
A soilSHOP provides an innovative approach to meet community-specific health education and outreach goals related to addressing potential soil contamination of lead and other heavy metals. Samples are collected by residents, who are instructed to collect dry, debris-free soil samples (about 2 cups) in plastic quart-size freezer bags and bring them to the soilSHOP for screening (see example directions in the Soil Sampling Comic Cartoon - Color). Each soil sample is then logged in and screened for lead and possibly other heavy metals by trained technicians using a XRF unit. Based on the screening level result, soil sample location (garden, play area, house gutter drip line, etc.), and other factors shared by the participant – a health educator will discuss the soil screening level, implications, best practices, and other resources for further information or soil testing.




Soil Screening Guidance
A soilSHOP unites the expertise of environmental scientists and health educators in a joint mission to reduce and prevent potential exposures to soil contamination of lead and other heavy metals, if screening for other heavy metals is appropriate for the community. In order to meet this mission, soilSHOPs provide rapid screening level analysis of lead in soil followed with targeted one-on-one education. General guidance for screening is provided in this document. This guidance assumes the data will only be used as a screening level sample result to provide a basis for health education (versus use to identify or delineate sources or evaluate contamination for a given area). U.S. Environmental Protection (EPA) Method 6200 referenced at the end of this document can be consulted for additional information regarding appropriate use of x-ray fluorescence (XRF) instrument units for soil screening.

Note: Information regarding Event Planning, Setup, and Sample Log In (implemented before Step 1) and Health Education (following Step 3) are provided in the soilSHOP Toolkit. The Soil Screening Team is

soilSHOP Toolkit Example Soil Screening Guidance

one group supporting the overall soilSHOP event. The various roles and responsibilities for a soilSHOP are provided on the *Example Staff Roles and Functions.docx*. This procedure describes three soilSHOP soil screening steps.



Step 1. Plan/Set Up

1. The Screening Team operates the XRF units and documents soil screening results. Members of this team should have appropriate education and training to implement soil screening using XRF units. Appropriate organizational and equipment health and safety requirements and procedures should be identified and followed. *Tip: As part of up-front planning for the event, the soilSHOP team should identify how soil samples will be managed during and after the event.*
2. Screening Team members should review this Example Soil Screening Procedure and modify it, as necessary, based on each event's XRF equipment, host organization protocols, and goals. *Tip: At least two XRF units should be available for each event.*
3. Screening Team members should ensure XRF batteries and any backup batteries are fully charged at the start of the event. *Tip: Try to have a backup power supply and extension cord available for each XRF unit.*
4. Screening Team members should meet with rest of the soilSHOP team to review sample log in, soil screening, and health education areas and sample flow procedures before the event. The team should also conduct a health and safety in-briefing and set up the sample screening area. *Tips: The soil screening area should be set aside from areas where the public can walk freely (to protect the equipment and prevent health and safety incidents). Post appropriate "Soil Screening In Progress" signage and equipment signage (for health and safety reasons). Sturdy tables, containers or trays to hold multiple soil sample bags, and any signage should be arranged before the event.*
5. Screening Team members should calibrate the units in line with equipment manufacturer instructions prior (e.g., 30 minutes) to the start of the event. *Tip: If multiple XRF units are available, the Screening Team should consider whether and how to calibrate these units to each other before and after soil screening using the manufacturer's blanks. Some screening teams have even run lab samples on 10% of the screened soils for quality assurance and quality control of screening values.*
6. Screening Team members will operate the XRF units, and each member will be equipped with a log book, pen, watch or phone (to monitor screening time), and calculator. A camera will be available for photos of samples (if desired). Screeners should use protective gloves for screening and avoid eating or drinking in the soil screening area. Wipes, paper towels, and trash cans will be handy in the soil screening area.
7. Identify one Screening Team Member as the Lead Screener, this person will address any questions or issues that arise from the XRF Screening Team members or others about the screening process and results.

Step 2. Screen Soil

1. The Log In Team will provide each soil sample with a completed Sample Log In Form, and blank Screening Result Card to the Soil Screening Team. These materials should be kept together.

Soil Screening Guidance Manual

Pre-event

Tips:

- Plan ahead.
- Identify appropriate ways to dispose of soil.
- Identify follow-up procedures for samples that may not have been addressed (e.g., samples not screened due to time limits or because they need to dry).

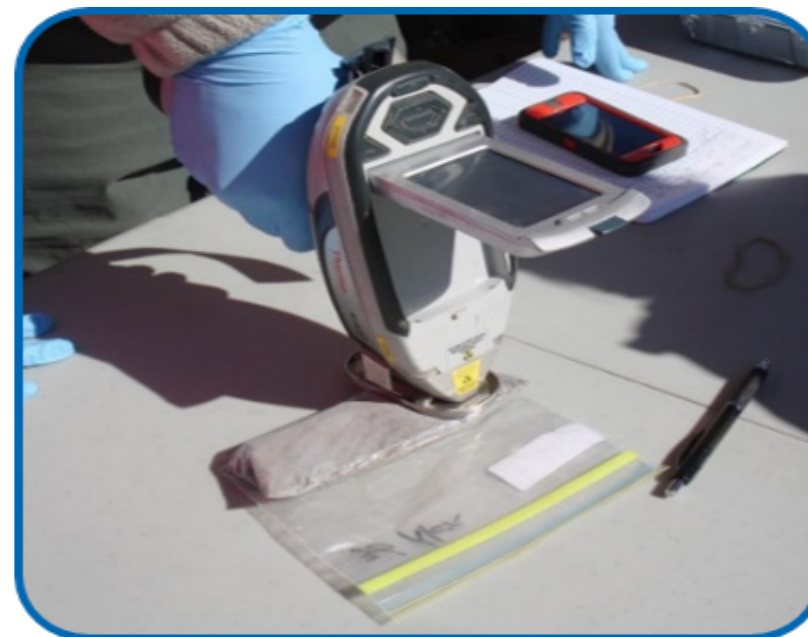
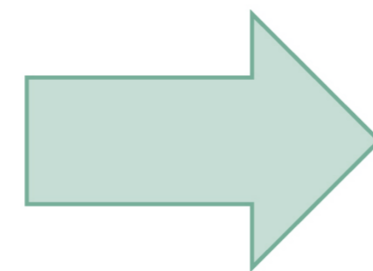


During event

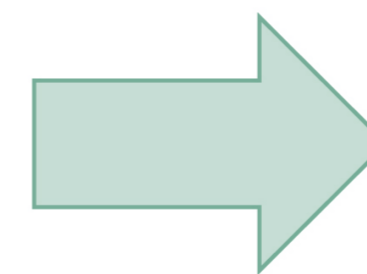
Maintain all sample package materials together throughout the process.



Check soil sample for bag tears and large debris (rocks or twigs). Soil should be dry.



Place sample on a stable, flat surface (e.g., table). Place XRF equipment directly on sample for 30 seconds.



Document screening results in log book or form, and on soil sample results card for health educator.

During event

Screeener Station Set-Up:

- Keep the screening station away from participants, food, and other staff members.
- Provide trash cans, wipes, and paper towels at the station.



Screeener station is identified with caution labels and items.

During event

XRF Equipment Use During soilSHOP

The XRF equipment is powerful, cost effective, and provides a rapid method for analyzing soil samples (as little as 30 seconds), while producing reliable results suitable for soilSHOP goals.

During event

Safety Precautions When Using XRF Equipment:

- Never point the XRF at yourself or others when the primary beam lights are illuminated (x-ray on).
 - **XRFs are a source of radiation.**
- Advise women of child-bearing age of the potential damage to a developing fetus from radiation exposure.
- Follow all manufacturers' training and instructions when handling the equipment.
- Conduct a health and safety briefing to ensure the screening area is set up properly and caution signage is visible before the event.

During event

Tips:

Use Safety Precautions

- Provide gloves and disinfecting wipes to staff
- Rope off XRF area for traffic control and safety

Stay Organized

- Use aluminum trays at the XRF station to separate pending and completed samples-and label them accordingly.

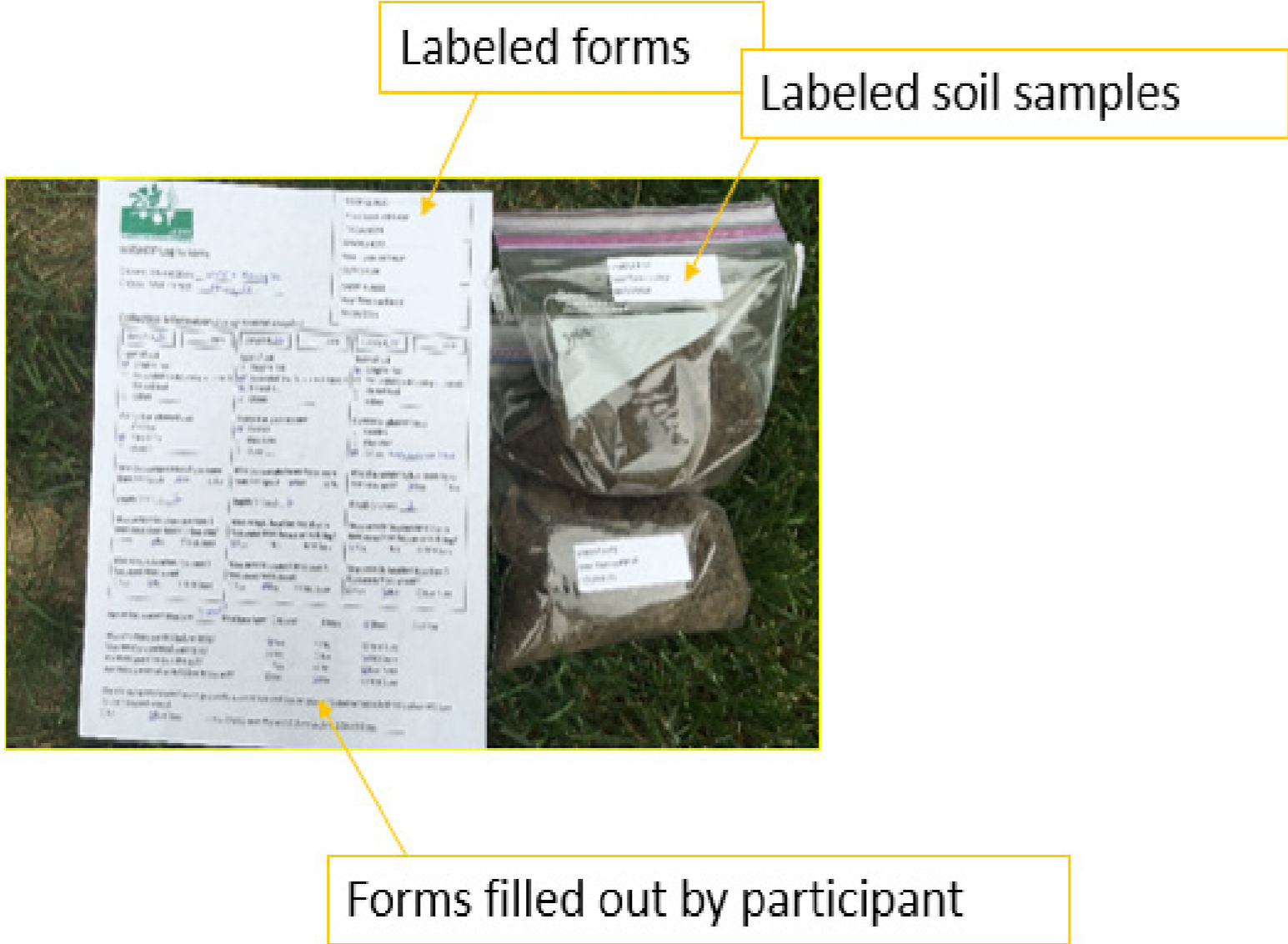


XRF runner
drop-off area
and health
educator runner
pick-up area



During event

Event example: sample package and screening



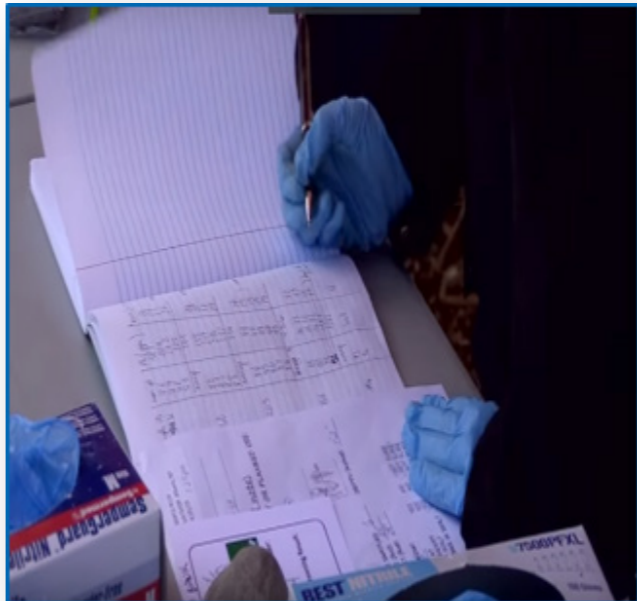
Completed sample package example



Sample is placed on flat and stable surface, and XRF equipment is directly on soil sample for accurate reading.

During event

Event example: sample recording

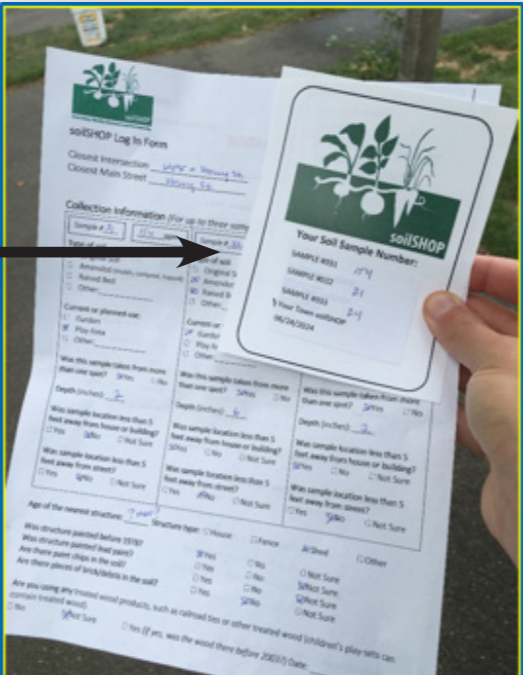


Log book for record keeping.

SalsaFair soil SHOP
Lawrence, MA
Pb in soil by XRF

Sample #	Sample #	Results ppm Pb
1205	SRM 2711	1115
1208	SRM 2710	5367
1207	SRM 2709	18
1206	SiO ₂ Blank	<5
1209	SRM 2711	1133
1280	1	657
1281	2	302
1282	3	367
1283	4	380 (reported)
1284	4 Lab Rep	376
1285	SRM 2711	1114
1286	21	41
1287	22	40
1288	23	141
1289	24	133
1290	25	48
1291	SRM 2586 1st	408
1292	SRM 2586 2nd	443
1293	5	54
1294	6	54
1295	7	245
1296	8	233
1297	9	39
1298	10	44
1299	11	105
1300	12	202
1301	13	210

Sample result card for participant and health educator to review.



Post-event

- Team should meet to review follow-up procedures (e.g., high levels of lead found in soil, samples that were not screened).
- Finalize plan to screen any samples that were not addressed during the event and provide participants with follow-up contact information.
- Collect log-In forms and log books and follow the team's data management plan.
- Ensure screener station is cleaned and XRF equipment is properly stored.
- Conduct after-action meeting to identify what worked and lessons learned.

Resources

All tools are available on the soilSHOP website:

www.atsdr.cdc.gov/soilSHOP

Specific Resources:

[Example Soil Screening Guidance](#)

[soilSHOP Log In Form](#)

[Example Soil Screening Result Card](#)

[Event Staff List](#)

[Email](#)

[ATSDR Regional Office](#)

Please continue to **Part 5** of the series for information for Health Educators Training.

Agency for Toxic Substances and Disease Registry

