

Statistics for Action Soil Quality Guide: Digging into the Dirt

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Acknowledgments

Contributors include
Mary Jane Schmitt
Martha Merson
Ethan Contini-Field
Sara Lacy
Sherry Soares
Valerie Martin
Kathryn Edmunds

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Statistics for Action Soil Quality Guide: Digging into the Dirt

Introduction to this Guide

WHAT'S HERE

This guide focuses on how citizens can be part of the soil testing process. We offer suggestions and activities to deepen your understanding. Use the guide to learn:

- 1) How to get started—what to know before you start pushing for testing (including where to test and for what).
- 2) What steps are part of the testing process.
- 3) How to handle the results—how to decode lab results and consultants' reports that are full of unfamiliar terms.
- 4) How to communicate results to neighbors and decision-makers without losing your audience.

Scribble questions. Circle numbers. Underline text. List your questions.



Going Solo?

This guide tells the story of a community facing contamination from a junkyard. Following the story and examining their data will give you ideas for how to tackle the test data you receive.

Got a Group?

Statistics for Action has activity ideas and resources for groups to use. These are meant to make it easier to use the data from reports. The goal is for everyone in the group to feel more confident reviewing and talking about test results.

Activities marked with the SfA icon are on the SfA website: sfa.terc.edu/materials/activities.html



Try the activities to deepen understanding and help with planning.

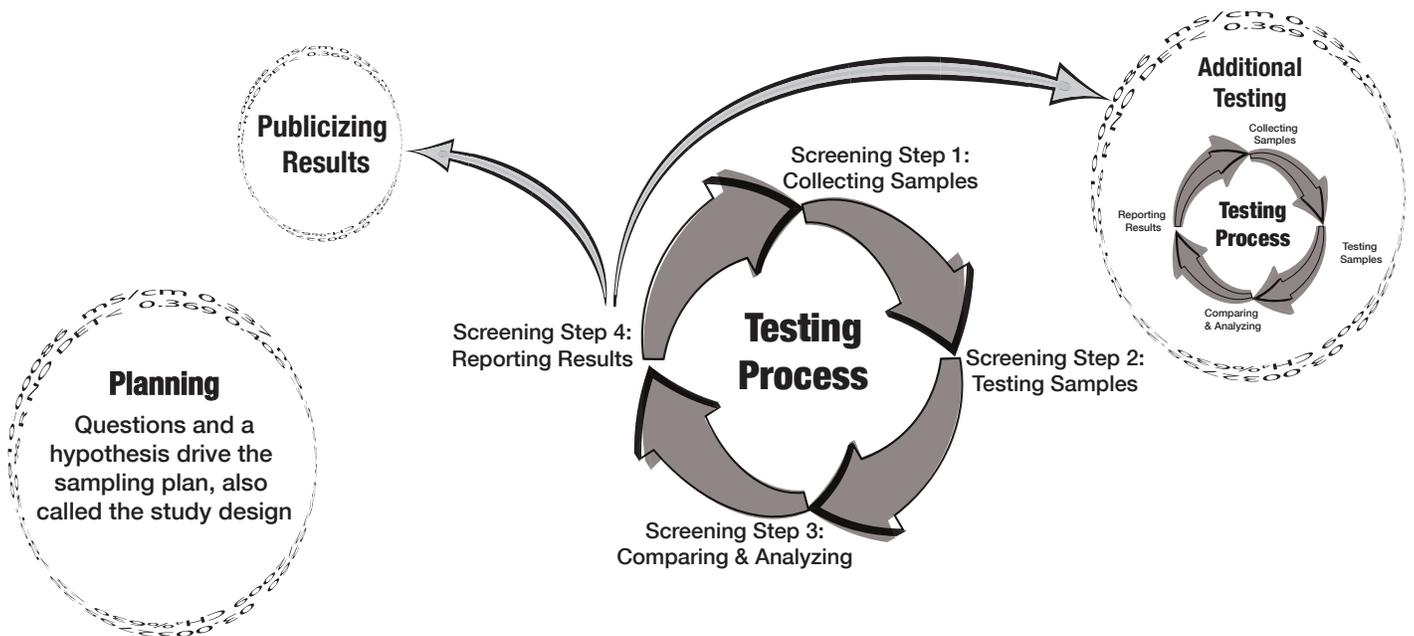
Note: If your main interest is in collecting your own samples, look in the appendix for resources on testing.



INTRODUCTION TO TESTING

Testing is part of the outline for the Environmental Protection Agency's (EPA) phases for dealing with contaminated sites. Testing may or may not lead to a clean-up and if it does, testing will be ongoing. Testing happens before, during, and after the clean-up process. Every test yields data that describe conditions in the environment.

Ask for help understanding test data. It's complex and a lot may be at stake. But before you do, take time to look over tables and site map.



TERMS YOU MAY RUN ACROSS

■ Milligram (mg)

1,000 times smaller than a gram, which is about the weight of a packet of sweetener or a little less than a paper clip.

■ Kilogram (Kg)

1,000 times larger than a gram, so about the weight of 1,000 packets of sweetener or 1,000 paper clips. Compared to pounds, a kilogram is 2.2 pounds, or about the weight of half a 5-pound bag of sugar.

■ Microgram (μ)

1,000 times smaller than a milligram, a million times smaller than a gram. Even at an amount measured in micrograms per kilogram, some contaminants are toxic.

I've heard of milligrams. My meds come in milligrams. Is a microgram smaller than that?



■ Ppm

Parts per million; another way to express milligrams per kilogram. Milligrams are 1,000 times smaller than a gram and kilograms are 1,000 times larger, so a milligram is a million times smaller than a kilogram.

■ Ppb

Parts per billion; another way to express micrograms per kilogram. Micrograms are 1,000 times smaller than a milligram and kilograms are 1,000,000 times larger, so a microgram is a billion times smaller than a kilogram.

■ ND

Not detected. Reported when the amount of a contaminant is too small to be detected.

■ Detection limit

The limits of a given scale. When a bathroom scale tops out, it can't distinguish between the weight of two hefty men and ten (if they could all fit). Similarly, the amount of a contaminant is sometimes too small to be detected with the lab's equipment.

■ Reporting limit

The lowest amount a lab's equipment can be counted on to measure.

■ SS

Soil Sample. On a map, SS-01 is the first sample taken; SS-02, the second one, and so on.

■ RSSL

Residential Soil Screening Limits. These standards, set by the EPA, are meant to protect people exposed to contaminants in their homes for many hours every day. Workplace standards are often less strict because people spend less time at work. Regulators and public health professionals call strict standards "conservative" and "health protective."

■ <5

The symbol < followed by a number indicates that the amount was less than the lab test could measure accurately; <5 may be anything from .001 to 4.99.

■ Order of magnitude

Useful for approximate comparisons. If two amounts differ by an order of magnitude, one amount is roughly ten times greater than the other. If lead levels should be 400 ppm but are an order of magnitude greater, they are 400×10 or 4,000 ppm.

■ Standards

Limits for soil contamination. A state can set limits that are more strict than EPA standards, but never less strict.

Got a Group?

Use fact sheets from *Common Units and Limits and Levels* to get a better grasp of these units.



SNEAK PREVIEW: WHAT YOU MIGHT SEE ON A RESULTS PAGE

ANALYTICAL DATA TABLE G
METALS IN SOIL AND SEDIMENT
milligrams per Kilogram

SITE: RHOADES SALVAGE
PROJECT NO. 08100044/08100045
LABORATORY: OEME

Where do I find out if the soil is from one depth or a combination?

Where is this? Near my house?

10,000 milligrams—Is that good or bad?

Not detected? Is that good or bad?

INORGANIC ANALYTES	METHOD	SS-22		SS-23		SS-24	
		RL	Q	RL	Q	RL	Q
ALUMINUM	ICP	10000	20	8700	21	6700	21
ANTIMONY	ICP	ND	1.9	ND	1.9	ND	1.9
ARSENIC	ICP	4.4	1.9	3.4	1.9	3.2	1.9
BARIUM	ICP	29	1.9	25	1.9	18	1.9
BERYLLIUM	ICP	ND	0.74	ND	0.78	ND	0.78
CADMIUM	ICP	ND	0.93	ND	0.97	ND	0.97
CALCIUM	ICP	620	9.3	550	9.7	450	9.7
CHROMIUM	ICP	21	1.9	15	1.9	12	1.9
COBALT	ICP	5.2	1.9	2.6	1.9	2.6	1.9
COPPER	ICP	9.6	1.9	4.3	1.9	3.3	1.9
IRON	ICP	17000	3.7	14000	3.9	13000	3.9
LEAD	ICP	13	1.9	5.4	1.9	4.8	1.9
MAGNESIUM	ICP	2100	9.3	1300	9.7	1200	9.7
MANGANESE	ICP	190	1.9	100	1.9	120	1.9
NICKEL	ICP	19	1.9	10	1.9	9.4	1.9
SELENIUM	ICP	ND	1.9	ND	1.9	ND	1.9
SILVER	ICP	ND	0.93	ND	0.97	ND	0.97
THALLIUM	ICP	ND	1.9	ND	1.9	ND	1.9
VANADIUM	ICP	20	0.93	20	0.97	18	0.97
ZINC	ICP	71	1.9	130	1.9	110	1.9

DATE PREPARED: 11/10/2008 11/10/2008 11/10/2008
 DATE ANALYZED: 11/13/2008 11/13/2008 11/13/2008
 DILUTION: 1 1 1

ANALYTICAL METHOD
 ICP = Inductively Coupled Plasma. Samples were analyzed following EPA Region I SOP EIASOP-INGDVICP1, for Metals in Soil Medium Level by ICP.

NOTES
 START has reported the data as it was received from the EPA OEME Laboratory. START has not performed data validation of the EPA OEME Laboratory data. An internal data review was performed by EPA OEME Laboratory personnel prior to submittal to the EPA Contracting Officer's Representative.
 OEME = EPA Office of Environmental Measurement and Evaluation.
 Results are reported on a Dry Weight Basis.
 RL = Reporting Limit
 Q = Qualifier
 ND = Non-Detected
 J1 = Estimated value due to MS (Matrix Spike) Recovery outside acceptance criteria.
 J3 = Estimated value due to RPD (Relative Percent Difference) result outside acceptance criteria.
 All results reported in milligrams per Kilogram (mg/Kg).

Rhoades_lab soil 137
Page 6 of 6



EXPRESSING CONCERNS

When the junkyard owner in a small Vermont town sold off some of his property, a neighborhood grew up around his business. Parents and their kids moved in next to his yard with its large drums, old cars, and a pile of thousands of tires. Neighbors could smell fumes when the owner burned trash. They could see that the pond bordering the junkyard had discolored water. They started to wonder.

Fluids from drums or old cars on the junkyard property could be getting into the soil and then into the drinking water.

Chemicals from the junkyard could be contaminating soil and making plants unsafe for wildlife to eat.

Chemicals from the junkyard could be contaminating the soil and making it unsafe for children to play in their yards or next to the pond.

The community formulated these questions for soil testing:

Are levels of contaminants higher near the junkyard than they are downstream?

Do test results show levels of contamination that could affect the health of children if they were playing in the soil or pond?

Junkyard neighbors were the only ones who wanted testing. The owner was not interested. He wasn't planning to sell the land, so no bank was demanding testing. Nevertheless, the community members pushed for testing.



Talk to others

Explain what soil testing will and will not do.

Soil testing CAN help you:

- ✓ Identify levels of concern for contaminants
- ✓ Identify hot spots of soil contamination
- ✓ Enable you to compare contamination levels in your community to other communities or to published standards

Soil testing will NOT directly:

- × Tell you levels of pollution in the air or water, or in your home
- × Tell you who will get sick
- × Result in money for health care or clean-up
- × Indicate if a lawsuit is a good idea

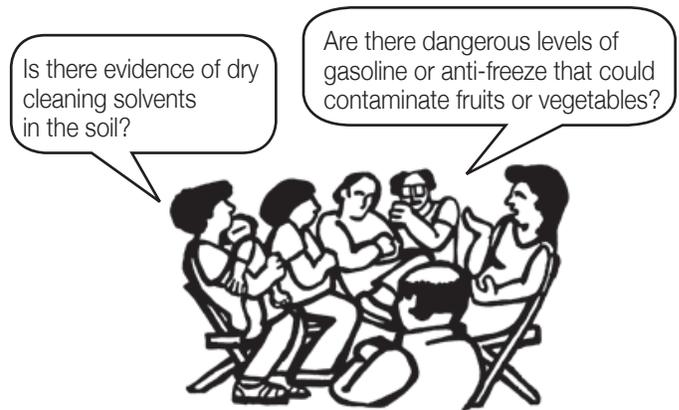


PLANNING

Typically, nothing will happen on the site until the potentially responsible parties (PRPs) are identified. They may look for ways to delay or avoid testing or they may begin hiring an environmental professional. Meanwhile, community members can be gathering information and forming their own hypotheses.

Get involved

- **Find out past and current uses.** List the businesses that have operated on the site.
- **Take note of health problems** in the community that seem to be related to soil contamination. These could be direct and dramatic (like getting a rash from touching the soil) or long-term (like an increase in cancer rates.)
- **Take note of anything unusual** on the site and nearby, such as plants growing in some areas but dying in others or animals avoiding the area.
- **Track ownership.** In some states, owners are legally responsible for contamination on their property, whether or not they caused it. The owner may or may not be easy to locate.
- **Locate the point person.** Find out who will communicate with community group members or the public about what contaminants will be tested for and why, results, and timeline.
- **Consider how test results** could affect the community. If the test results come back showing contamination, will that reduce the property value of nearby homes?
- **Find allies** who can help. Contact an environmental non-profit, faculty at a local university, or the public health department to ask for advice or resources.



Formulate a hypothesis and key questions

Based on the information you have, formulate a **hypothesis**, that is, the most likely explanation for what is happening with soil.

Sample hypothesis:

Chemicals from a dry cleaning business were not handled properly and contaminated the soil. It's unsafe for children to play in the yard next door.

This vacant lot once had old cars stored on it. If they leaked fluids now it may be unsafe to garden.

Next list specific questions that once answered will help you determine if your hypothesis is correct or not.

Community Member Checklist

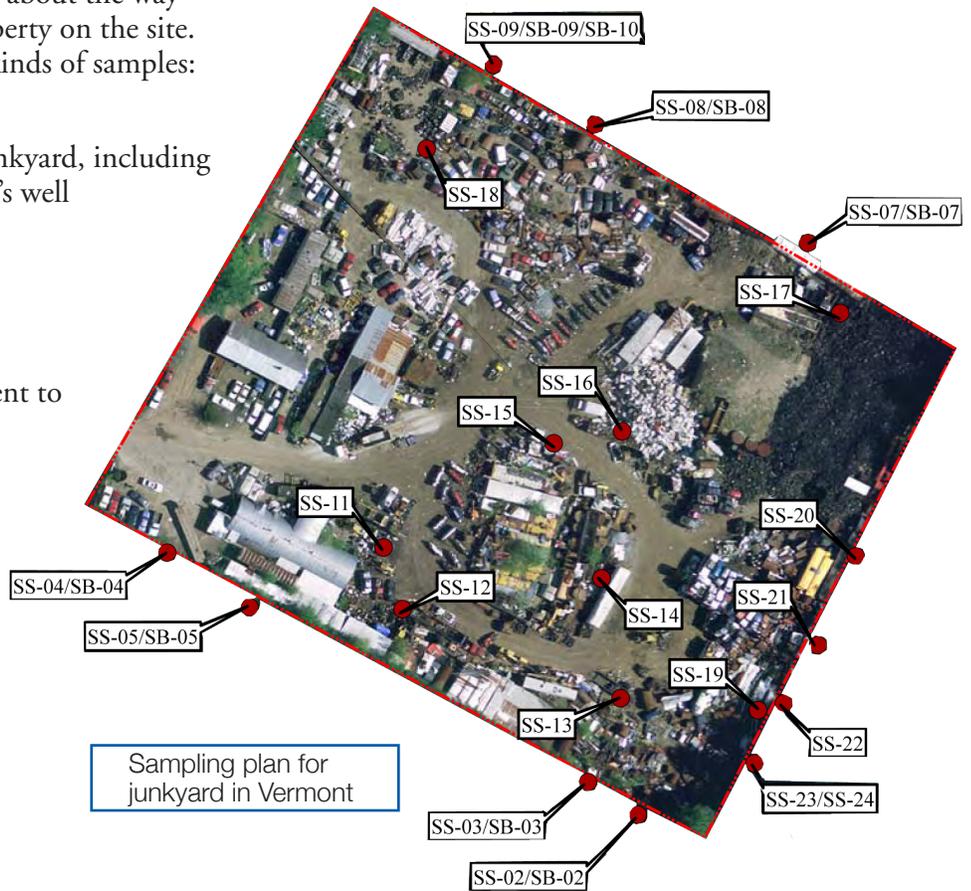
- Review site history, past and current uses.
- List concerns.
- Create pressure for testing.
- Spread the word about what testing can be accomplished.
- Watch for conflicts of interest in hiring environmental professionals.

SCREENING STEP 1: COLLECTING SAMPLES

Neighbors of the junkyard told the EPA and state officials what they knew about the way the owner used and stored his property on the site. The EPA came and collected five kinds of samples:

- soil at various depths
- groundwater on and off the junkyard, including water samples from a neighbor's well
- fish tissue
- surface water
- sediment from the pond

These five kinds of samples were sent to the lab.



A basic rule of thumb: the more samples that are taken, the more sure you can be of the presence or absence of contamination from a release. The map above shows many sampling locations. Soil samples are marked SS.



During screening, environmental professionals take samples from spots around a site. It's expensive and not practical to test ALL the soil on a site. Instead a lab runs tests on the samples. Soil samples may be "grab samples" taken from one location or "composite samples," samples combined from various depths.

Think about tasting a sample of vanilla or chocolate ice cream. From one spoonful, or sample, you can generalize about a larger amount. You don't need to try the whole tub to get an idea. On the other hand, if the ice cream has chunks like marshmallows and chocolate chips or ripples of flavor, you do need more than one spoonful to get a sense of the whole. Soil tests work on the same idea.



Samples should come from areas:

- with dead grass or other types of distressed plant life
- with discolored soil
- with soil that has a chemical smell
- where hazardous chemicals were stored or used
- near surface soil where frequent contact is made, such as a playground

Samples **MUST** have a chain of custody that shows where the samples were at all times, who had access to them, and if proper care was taken to preserve them.

Got a Group?



Use the activity *Sampling Plans* to lay out your ideal sampling plan, or to critique someone else's sampling plan.

Community Member Checklist

If you have the opportunity to give input:

- Make sure samples are taken from all areas that might be contaminated.
- Make sure samples are taken from areas where children or other "sensitive receptors" could come into contact with contaminated soil.
- Ask from what depths samples will be mixed together. Deep samples will tell you more about the groundwater and risks to drinking wells. Surface samples will tell you more about the risk to gardeners or children playing in the soil. Learn if the samples are all mixed or are all grab samples from the top 6". Ask why the approach was taken.
- If you are not involved before samples are collected, it is still worth checking after the fact. With the report on sampling, you should find a site map where sample locations are marked. If spots were missed, you may need to make a case for more testing.



SCREENING STEP 2: TESTING THE SAMPLES

Community Member Checklist

- You may have to sit tight until the report comes back. When you have access to the results, check to see what contaminants were found.
- Check to see if the lab tests found the contaminants you suspected. Are any contaminants you expected not seen on the report?
- Look over the results. Make sure that the equipment limit was sensitive enough to detect even small levels of contamination.
- You may need to ask for tests to be done again with more sensitive equipment, especially if you know that a chemical was used on the site.

The lab will check for heavy metals like lead as well as other chemicals like PCBs or petroleum hydrocarbons.



Going Solo? Got a Group?

Find the fact sheet called *Detection Limits* in the SfA resource *Limits and Levels*.



Use a digital scale and guess the scale's detection limits. What amounts are too big or too small to be detected?

In the screening stage, environmental professionals often ask for a wide range of tests for each sample. Screening gives you an overall picture of what contaminants of concern are present on the site.

Sometimes the amount of a contaminant is too small to be detected. That doesn't mean the contaminant is not present, it just means the testing process didn't pick it up below the "detection limit." On the report, you may see ND.

The results of screening might be reassuring, with no contamination over the state limits or standards. On the other hand, trace amounts of contaminants can be important too. They indicate the chemical might be found at greater concentrations in the next round of testing.

Notice which metals are ND on the summary tables. At the junkyard, cadmium and silver are not detected in SS-01, 02, or 03.

TABLE 6
SUMMARY OF METALS RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES

SAMPLE LOCATION	SS-01	SS-02	SB-02	SS-03	EPA R3	EPA R3
SAMPLE NUMBER	R01-081020GL-0001	R01-081020GL-0003	R01-081020GL-0004	R01-081020GL-0005	Residential Soil Screening Levels *	Industrial Soil Screening Levels *
SAMPLE DEPTH	6 inches	6 inches	12 inches	6 inches		
PARAMETER						
Aluminum	4,600	8,900	8,300	8,500	77,000	990,000
Arsenic	7.7	5.8	4.9	4.6	0.39	1.60
Barium	28	29	36	31	15,000	190,000
Cadmium	ND	ND	ND	ND	70	810
Calcium	580	500	640	480	NL	NL
Chromium	13	23	19	18	280	1,400
Cobalt	2.1	4.9	4.6	4.4	23	300
Copper	4.7	7.5	6.2	6.2	3,100	41,000
Iron	9,800	16,000	15,000	16,000	55,000	720,000
Lead	50	17	9.8	14	400	800
Magnesium	950	2,600	1,900	2,000	NL	NL
Manganese	66	240	230	250	NL	NL
Nickel	8.1	19	17	14	1,600	20,000
Silver	ND	ND	ND	ND	390	5,100
Vanadium	18	20	17	19	550	7,200
Zinc	20	50	38	32	23,000	310,000
Mercury	0.12	0.032	0.027	0.025	6.7	28





SCREENING STEP 3: COMPARING AND ANALYZING

The environmental professionals will work with the lab's results, reporting the amounts and highlighting those that are above the screening levels. Look in the tables for a number in bold or with a colored background. Sometimes errors occur. Make sure the numbers from the lab match the numbers in the tables.

Some contaminants are common. Arsenic is very common. Arsenic in the soil does not necessarily mean there was a release or a spill. Check the background numbers to see what's typically found in the soil. You might be looking at something that would be there anyway.

On p. 11, the table lists results for arsenic at the junkyard. Everyone knows arsenic is toxic, but to get a feel for the range, neighbors looked for the lowest and highest amounts. For just these samples it goes from 4.6 up to 7.7 mg/Kg. Even the lowest amount wasn't below the screening level of 0.39. Comparing it to the screening level, they found the levels in the soil to be 10 to 20 times higher!

Statistics for Action Activities

Results Sheet

a) Record the levels for each sampling spot.

Sample #	Lead Level in ppm 6" only	Sample #	Lead Level in ppm	Sample #	Lead Level in ppm
SS-01	50	SS-08	22	SS-15	350
SS-02	17	SS-09	20	SS-16	190
SS-03	14	SS-10	Not included	SS-17	100
SS-04	40	SS-11	3300	SS-18	60
SS-05	9.1	SS-12	570	SS-19	39
SS-06	37	SS-13	12	SS-20	13
SS-07	69	SS-14	22	SS-21	8.4

b.) Add a ✓ or X to show how many results you got in each category.

Lead							
Compared to background level of 400 ppm	Less than or equal to 400 ppm	More than the standard but not double	2 x more	Between 2 and 10x more	10 x exactly	Between 10x and 100x more	More than 100 x

Adapted from SFA Activity Results Sheet



Comparing the amounts found in tables to screening values can give the numbers more meaning. To make a meaningful comparison, figure out your priorities and what your audience cares about. Is it risks to children, liability, or concern for destruction of natural resources? Use comparisons to relate the amounts to these issues.

Compare amounts found on the site to:

- Levels that cause negative health effects
- The cost of clean up, to show there is a way to fix the problem
- Other standards to show that in other states regulations are more protective of health
- Background levels, to show the impact the PRP has had
- New standards not in effect yet can show that the contamination is unacceptable

Junkyard neighbors saw 110,000mg/Kg of iron on their test results. At SS-11, the amount of iron was twice as high as the screening level and zinc was 1,100 mg/Kg, twice as high as the reporting limit. Did they need to worry?

110,000 mg/Kg seems high, but the Centers for Disease Control has no risk listings for iron levels this high. Double the reporting limit doesn't call out danger. That just means it's in the range the lab can accurately measure. Let's move on to other comparisons.



**SUMMARY OF METALS RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
RHOADES SALVAGE SITE
MILTON, VERMONT**

SAMPLE LOCATION	SB-08	SS-09	SB-09
SAMPLE NUMBER	R01-081020GL-0020	R01-081020GL-0021	R01-081020GL-0022
SAMPLE DEPTH	12 inches	6 inches	12 inches
PARAMETER			
Aluminum	6,800	6,900	7,000
Arsenic	5.0	4.4	3.9
Barium	26	27	23
Cadmium	ND	ND	ND
Calcium	590	700	650
Chromium	16	19	20
Cobalt	5.8	5.8	5.8
Copper	13	48	9.2
Iron	15,000	14,000	14,000
Lead	18	20	12
Magnesium	2,600	2,800	3,100
Manganese	400	330	320
Nickel	20	23	24
Silver	ND	ND	ND
Vanadium	14	14	13
Zinc	41	59	46
Mercury	ND	ND	ND



For every possible comparison, there are pitfalls. Watch out.

Background levels might be higher than screening levels and the PRPs may argue they aren't responsible.

Negative health effects come about with exposure. If the contamination is confined to one area, below the surface where children and others are unlikely to make contact with it, claiming danger to health will not be a strong argument.

Keep in mind that you have to compare like units. 4,000 $\mu\text{g}/\text{kg}$ sounds worse than the screening level of 400 mg/kg , but it's not. Micrograms are 1,000 times smaller than milligrams. Convert the units to find that 4,000 $\mu\text{g}/\text{kg}$ is 4 mg , not over the screening level at all.

Be aware of the sample type and condition. You could strengthen or weaken your claim if your samples were taken during a dry spell, or during a rainy season. Comparing to screening values is not the only way to go, either: You can compare test results to test results from the same spots under different conditions, or compare to the background levels of contamination in your state, or compare samples from different depths.

What if we compare levels of toxic metals in soil near the incinerator to average background levels in the US?



Got a Group?



The activity *Compare to Standards* gives a group an easy and visual way to make comparisons. Also, check out the fact sheet on *Background Levels* from the resource *Limits and Levels*.

Community Member Checklist

- When you get the report, check the summary table results against your state's reporting limits. Is the site now part of the state's system?
- Look over the results. Compare what was found to the screening levels and reporting limits. Use the Results Sheet.
- You may want to compare the results to background levels. Some chemicals are so widespread that no one landowner will be blamed. If the amounts are much above what is common in your area that means more testing will be needed.
- Remember, screening levels have no legal weight. No court case or clean up will be triggered by a single round of screening test results.



SCREENING STEP 4: REPORTING RESULTS

The environmental professionals write up the results and send a report to the property owner. The report should include a map, the scope of the work, and lists of any test results over state limits.

If you have the results reviewed by experts, they will check the numbers as well as the information on the testing procedures to make sure everything was done properly and the results are believable.

Got a Group?



Check that the lab results were written up correctly with the SfA activity *The Summary vs. the Lab*.

I found a mistake: the number for dibenzo(a,h)anthracene was <math><0.023</math> and it should have been 0.23 in bold.



If you collect a sample for something that's volatile... that means if they're exposed to air they volatilize and you can't find them anymore. So if you collect your sample and you don't evaluate it within a stringent period of time you are not going to find what it was that was there.

Even years later in the final steps of the Dow clean-up, there were occasions when some of the samples were held too long. - Linda Segal, Wayland, MA

Community Member Checklist

- Make sure the report is complete and comprehensive.
- Review the results and identify and questions or concerns.
- Meet to plan a response.
- Publicize the results.



ADDITIONAL TESTING

If there are contaminants above screening levels, the site will need additional testing. The property owner has to show how far the contamination has spread, even testing beyond his or her property lines. You may hear this round of testing called Phase II.

At this stage, environmental consultants have to do a risk assessment, figuring out who could be exposed to contaminants and in what ways. Risk assessors will be determining:

- **Concentration:** Effects are generally stronger when there are high levels of the contaminant in the soil.
- **Frequency of exposure:** Effects are stronger when the contamination is a place people or animals visit often.
- **Length of exposure:** Effects are generally stronger as people or animals spend longer periods in contact with the contaminated soil.
- **Type of exposure:** For example, swallowing contaminants by sucking on a toy that's been in the dirt result in stronger effects than simply touching a toy with contaminated dirt on it.
- **Bioaccumulation:** Some contaminants build up in the body over time; others the body flushes out.
- **Age and body size:** Some contaminants can have a stronger effect on elderly people whose bodies do not process toxins quickly. Children may be at higher risk. Their bodies are still developing.

Additional testing lays the groundwork for the clean-up plan.

Data from soil tests on and around the junkyard gave the Attorney General's office enough evidence to build a case against the junkyard owner as the polluter. Throughout the process neighbors have asked questions of staff at the state's Agency of Natural Resources, the EPA, and the Attorney General's office. Community residents expect more testing will occur after the legal case is settled. At some point they hope a clean up will happen on the junkyard site.

Going Solo? Got a Group?

Pieces of the Risk Puzzle gives a short overview of the risk factors listed on this page. For each, there are other SfA activities and data to help you explore more deeply.

They found arsenic in the soil near our house! My kids play in the dirt in our backyard. Are they at risk?

What would you say the highest number of hours per year that children spend playing there?



Community Member Checklist

- Make sure environmental professionals know who uses the property, how, and how often.
- Get on the map! If you believe your own property is affected, make sure the consultants put you on the map for sampling sites.
- If the plan is published ahead of time, review it. Does it make sense given the topography?
- Once all the results are in and the extent of contamination is a fact, the community may need a long-term plan to minimize exposure. Explore:
 - Containing contaminated soil and building new play spaces and gardens with clean fill
 - Hooking up to the town water supply instead of private wells
 - Pooling resources with neighbors to commission regular testing

PUBLICIZING THE RESULTS

In Vermont the local paper covered the problems at the junkyard. The community group decided to wait to publicize test results. They had a court case to consider and expected more testing to happen.

Consider your options

Highlight the findings. You may concentrate on the highest levels of contamination or include the range.

Graph the test results in the worst areas. After you verify the graphs are valid, consider including them in a fact sheet for decisionmakers.

Take amounts in units like micrograms per kilogram and scale them up to a size that is familiar to people, like a gram or teaspoon.



Seven Days

Vermont's Independent Voice

Junkyard Dog
by Ken Picard



Resources contacted his office a “few weeks ago” for help with ABC Metals/Rhoades Salvage, which has been operating without a license for more than eight years. Of particular concern to the EPA, Lipson said, are recent environmental tests showing that sediment in the pond adjacent to the junkyard contains PCBs and elevated levels of heavy metals, including lead, mercury, and copper.

Among the scrap-yard images on file that “caught my eye,” he added, was one that showed a partially submerged oil drum in a pond on the site. Town and state officials have long struggled to find ways to coax or cajole Rhoades into compliance, with limited success. Most recently, the Milton select board denied the junkyard a certificate of approved location, a prerequisite for a state junkyard license. In its decision, the board characterized [the owner’s] plan for removing his tire pile as “inadequate and insufficient” and said his “lack of past performance puts his credibility into question.” The board concluded that [the owner] “has manifested an attitude that his economic needs take priority over all other considerations.”

longer he’s allowed to remain open, accepting hazardous waste. During Seven Days’ visit to ABC Metals last month, Rhoades admitted that he doesn’t have the money or the inclination to remove the existing tire pile, nor does he

Got a Group?



Use the activities and strategy sheets in *Communicating with Numbers* for ideas about expressing numbers creatively in words and images, and on a fact sheet.

Practice explaining your message in 2 minutes or less!

Community Member Checklist

- Consider how and when to inform the community about the test results.
- Choose important facts.
- Use numbers from testing to make your case.
- Use analogies to make your story stick.





Appendix

LIST OF HELPFUL RESOURCES

Note: A specific web address for a resource may change with time.

If you can't find a resource directly, do an internet search for the title (in bold, below).

- **A Citizen's Guide to Risk Assessments and Public Health Assessments at Contaminated Sites**
<http://www.atsdr.cdc.gov/publications.html>
A guide to how a community goes about cleaning up sites that are contaminated.
- **"Dirt Alert" Soil Sample Guidance** – fortress.wa.gov/ecy/publications/summarypages/0609099.html
A short guide for taking soil samples.
- **Environmental Experts** – www.environmental-expert.com
A website that maintains a database of the most up-to-date environmental reports and concerns, including international news, health and safety, and news on the environment and industry.
- **EPA Integrated Risk Information Sheet (IRIS)** – epa.gov/iris/subst
You can search here for any pollutant/chemical compound and will receive information on its toxicity, including how dangerous it is for humans.
- **EPA Chemical References Index** – epa.gov/enviro/html/emci/chemref
The EPA's list of chemicals, their properties, and what their effects on human health are.
- **NIOSH Pocket Guide to Chemical Hazards** – cdc.gov/niosh/npg
Put out by the National Institute for Occupational Safety and Health. A very good quick reference guides to the toxicological properties of the most common chemicals. Better organized than the EPA's own list.
- **EPA New England Regional Laboratory Reports and Documents**
epa.gov/region1/lab/reportsdocuments.html
EPA most recently published documents and reports on environmental health issues in New England.
- **Soil Pollution** – greenpack.rec.org/soil/problems_and_threats_to_the_soil/03-03-03.shtml
A short guide put out by Green Pack that explains what the common forms of soil pollution are and their effects on human health. A good guide for beginners.
- **Soil Types and Testing** – www.rain.org/global-garden/soil-types-and-testing.htm
A basic guide to soil types and soil testing.

