A Homeowner's Guide to Soil Sampling for PFAS

Can I sample my soil for PFAS?

Maine DEP has developed this guidance to help homeowners identify methods for conducting soil sampling on their property. Homeowners may wish to conduct their own sampling based on the information in this guidance, but the DEP encourages homeowners to work with an environmental professional to ensure that they get the most useful site-specific results possible. Collecting a soil sample that is representative of an entire property, field, soil pile, or garden area is not as simple as it may appear. The most suitable method for sampling any given area is likely to differ depending on the intended use of the area as well as the overall geography and environment in that location.

Maine DEP highly recommends farms generating products for commercial sale/profit hire an environmental professional to design a site-specific sampling plan to collect soil samples based on the specific needs of the farm. An environmental professional is someone qualified and properly trained to collect representative PFAS samples. Please see "Additional Resources" below for information pertaining to farming.

How do I find a laboratory?

The DEP has compiled a list of Maine laboratories that will subcontract for these services. Maine Laboratories that Subcontract Residential PFAS Analysis for Water and Soil. Maine does not yet have in-state laboratories accredited to conduct PFAS testing.

The cost of PFAS soil analysis typically ranges from $400 to $500 per sample, depending on the laboratory. If an environmental professional is used to collect your samples, there will be additional fees.

This guidance document is recommended for use by homeowners and residents in Maine interested in understanding more about PFAS in the soil around their homes.

What do I ask for from the lab?

1. Request sample containers to analyze soil for PFAS.
2. Ask the lab to use "Method 537.1, modified with isotope dilution" to test your soil for PFAS. The compound list should include a list of 28 different PFAS.
3. Ask that the laboratory reports include all quality control information. This is generally referred to as a "Level 2 Report."
4. Ask the laboratory for an ***electronic data deliverable (EDD)*** in DEP's latest format. This is helpful if you require technical assistance from state agencies.

The laboratory will send you clean sample containers, usually 4-ounce or 250-mL in size for you to put your soil sample into and labels for the container(s). You need to fill most of the container with soil.

Where do I collect a soil sample?

Determine your target area: for example, a garden, high-tunnel, lawn, chicken coop, etc.

Determine the depth at which you will collect the sample. For many situations, the surface soils in the upper 6 to 8 inches will be where you want to sample. A lawn area that is not tilled each year may target the upper 6 inches. If you are sampling a tilled garden where root vegetables are grown, you should collect a deeper soil sample from the depth of the tilled zone, or root vegetable zone, depending on your soils and vegetables (for example, 12 to 16 inches deep).

When deciding where to sample, you should also consider the size of the area under evaluation. For large gardens, you should collect a composite sample, as described below. For several small to medium sized gardens, or raised beds, you may select one sample from each, then mix them together to form one composite sample if all gardens received the same amendments (i.e., sludge-amended compost). Contact DEP if you need assistance in deciding where to collect samples.

How do I collect a soil sample?

The goal is to collect a soil sample that best represents the area in question. Attempting to do this with one single soil sample in the center of the area may not provide a good estimate of the average levels across your sampling area. It would require collecting multiple single samples and submitting each one to the laboratory in a separate container for analyses to understand the range of concentrations in the soil. This approach can become quite expensive at $400 - $500, or more, per sample. A more common approach is to collect one composite sample to submit to the laboratory for analyses that represents the average concentration of the area. The drawback with composite sampling is that you will not know the range of concentrations within the sample area, but the benefit is that you only pay for one sample that represents the extent of the area sampled. If the composite sample results are elevated, a decision could be made to collect additional samples.

A composite sample is made by combining multiple small samples, mixing them together, then submitting a single portion from the mixture to the laboratory for analysis.

Collecting a composite sample across an area involves collecting multiple equal-size soil portions, placing all the small portions in a clean, stainless steel bucket or bowl, and mixing the soils together before filling a soil jar that will be sent to the laboratory. This is done by collecting 10 equally spaced portions from across the garden and placing the equal-sized soil portions into one clean bucket or bowl and mixing them together (see garden photo below). Use care to remove organics (i.e., grass, roots, sticks, worms) and rocks from the bowl and to break up any clumps. Some laboratories will provide a stainless-steel spatula or trowel for collecting soil samples.

How many soil samples do I collect?

How many samples are needed depends on the size of the area in question, the number of gardens or areas being evaluated, the history and use of impacted amendments, and if the areas being evaluated are adjoining one another or on multiple non-adjoining parcels. The number of samples will also depend on how the soils are collected (discrete single sample or composite samples).

In general, it is recommended that one composite sample be collected for each non-adjoining garden.

How do I avoid unintentionally adding PFAS to my samples?

Many materials (e.g., certain types of tubing, sample containers, and sampling tools) normally used in field and laboratory operations contain PFAS and cannot be used while sampling and analyzing for PFAS. In addition, many consumer goods, such as water-resistant clothing, boots, gloves, cosmetics, or food packaging may contain PFAS and can contaminate samples, especially because PFAS is measured in the low parts per billion range for soils.

To ensure a useful, representative sample, make sure your sample area, clothing, and hands are free of any PFAS-containing material. Do not wear water-proof or water-resistant clothing. Clean disposable nitrile gloves (the kind you see medical professionals use, which can be purchased at a hardware store) should be used to eliminate cross-contamination from your body or clothing. DEP recommends hard plastic or stainless-steel sampling equipment (do not use glass or plastic bags). All sampling equipment, including the bucket or bowl, measuring cup, or spoons, should be cleaned with PFAS-free soap (visit the EPA Safer Choice webpage to identify options) and PFAS-free water (Poland Spring® or other bottled water companies that provide testing information, or water may be requested from the testing laboratory for an additional fee) before and after collecting each composite sample.

What are the steps for collecting composite soil samples?

1. Select your target area
2. Select 10 equally spaced locations across the target area and stay away from edges
3. Place a small, ¼-cup size soil portion from each of the locations into a clean bucket or bowl
4. Mix all 10 to 12 ¼-cup portions together by hand to break up any clumps, and remove rocks, roots, grass, sticks, etc.
5. From the mixture, place soil and fill to the neck of the laboratory provided container(s)
6. Fill out labels for each container
7. Fill out the Chain of Custody forms provided by the laboratory, and don't forget to request a Maine EDD (electronic data deliverable) file from the laboratory
8. Place laboratory samples in a cooler with ice cubes (DO NOT USE BLUE FREEZER PACKS) to cool samples to 4 degrees Celsius (40 °F)
9. Transport samples to the laboratory as soon as possible. Overnight shipping may be required.

When will I receive my results?

You should receive your results in 2 to 4 weeks. Due to the recent increase in PFAS sampling, some laboratories may take longer to return results.

What do the results mean?

Interpreting your results is complicated. Currently, there are very few screening levels to compare your soil results to. The Maine DEP, the Maine Center for Disease Control and Prevention, and the Maine Department of Agriculture, Conservation and Forestry have identified those currently available. These action levels are not legally enforceable standards. Rather, they are intended as guidance to determine if your soil is impacted by PFAS at levels that may potentially impact plants or animals. There are currently no guidance limits for PFAS in food available from the U.S. Food and Drug Administration. Please see "Who can help me read my lab report" below for contact information.

Who can help me read my lab report?

The DEP has created guidance to help you read your laboratory report.

If you have questions about PFAS in soil, please forward your laboratory report, along with your contact information, to DEP so that we can review your results and contact you directly. Please send the information to pfas.dep@maine.gov and you may also call Tracy Kelly at 207-480-0583.

If you have questions regarding PFAS in plants and vegetables, please forward your laboratory report, along with your contact information to the Maine Center for Disease Control and Prevention. Please send the information to pfas.mecdc@maine.gov. You may also call 207-287-4311 and ask to speak with a PFAS toxicologist.

Does DEP want my results?

Yes, please consider providing the DEP with your laboratory report along with an electronic data deliverable (EDD) in DEP's latest format. DEP will check the laboratory information and data to make sure you have received quality data. DEP will be able to use good data to help us understand more about the distribution of PFAS within soil in Maine.

Additional Resources

Maine Department of Environmental Protection
https://www.maine.gov/dep/spills/topics/pfas/

Maine Department of Agriculture, Conservation and Forestry
https://www.maine.gov/dacf/ag/pfas/index.shtml

Maine Center for Disease Control and Prevention
https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/pws/pfas.shtml

United State Environmental Protection Agency
https://www.epa.gov/pfas

Information on assessing PFAS contamination in your garden or on your farm:
University of Maine Cooperative Extension
https://extension.umaine.edu/

PFAS information, farmer support, and professional contacts:
Maine Organic Farmers and Gardeners Association
https://www.mofga.org/category/toxics/

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