Testing & Analysis Guide

In addition to taking samples, there are a myriad of questions to explore regarding what to test for in your samples and how to analyze the results. This document will give a general summary of these considerations. For more information on what we tested for and how we analyzed our test results, please see our final report.

In this Guide:

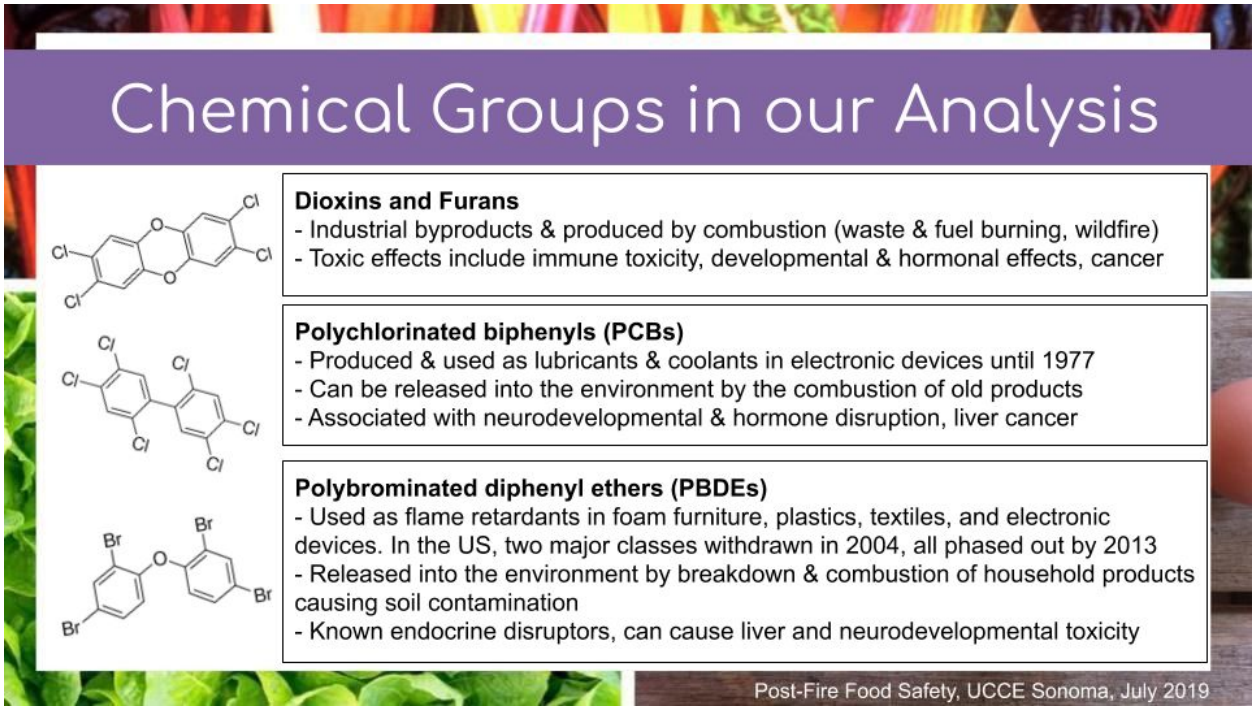
Testing Samples:

How do I decide what to test for?

There are many different chemicals that could be released from a wildfire or urban burn that are worthy of analysis. Fires can cause some chemicals to vaporize, turning into gas, while other chemicals attach themselves to particulates, which are the non-combusted solids suspended in smoke. Additionally, the combustion process can transform existing chemicals into new chemicals. Some chemicals have highly toxic effects to humans quickly, while others may not show health effects for years. Some build up in your body, or build up through the ecosystem over time.

Altogether, this makes it really hard to decide what to test for. You can narrow the scope of possible chemicals to test for by conducting a site history, identifying your lab and its capacity, and determining your budget.

Here are the chemical groups that we chose to look at in our analysis. We looked at chemicals of concern to community members, chemicals studied in urban agriculture, and a letter from the FDA to California Department of Food and Agriculture explaining what chemicals are likely to be of concern.



Taking a site and neighborhood history List of resources

By conducting a detailed site history of your neighborhood and the area that burned, you can identify what chemicals might have entered your environment from the fire (such as if a particular industry burned), and what *chemicals may have already been present before the fire*. Have any of the previous property owners done soil testing? Have your neighbors? What are the major polluters in the area, or previously in the area that might contribute to contamination? This could include industrial activities, highways, or even common household issues like lead paint chipping off of a house built before 1979.

A UC Cooperative Extension Publication on Urban Agriculture has the following tips:

- Some examples of prior uses of sites that may have caused soil contamination are parking lots, junkyards, auto repair/auto painting, carpentry, machine shops, dry cleaners, gas stations, railroad yards, and illegal dumping. The history of the site will help to determine what kind and how much soil testing is necessary. A site that has been primarily residential or used as green space is generally lower risk. A site that has had past industrial or commercial uses should be more carefully analyzed.
- Talking to the property owner and neighbors is a good strategy, as neighbors are often familiar with past use of the property.
- At some public libraries it is possible to access Sanborn maps, which were used in the past by insurance companies to determine the risk involved with insuring individual properties. These maps can provide information about prior uses of a proposed site. These are available at public libraries, and may be available online through some libraries.
- Old aerial photographs, which can sometimes be found in local libraries or online, can help identify a site's history as well. The local city hall may also have some of these aerial photographs accessible in their archives. There is also a fee-for-service website, http://www.historicalaerials.com, which includes aerial maps of various regions of California where the history of a site can be researched.
- The county tax assessor's office and city hall are important sources of tax records and permits that have been obtained for the property, which can help uncover past uses of the site.
- Potential sites can be checked on the California Department of Toxic Substances website at http://www. envirostor.dtsc.ca.gov/public/ to see if there are any documented issues or ongoing cleanup activity associated with the property.
- Full report available here: https://ucanr.edu/sites/UrbanAg/files/197207.pdf

Identify your lab, methods, and detection limits

Early in the decision-making process, it is important to identify what lab you will work with, what tests it can conduct, and what level of resolution their methods can provide (the “detection limit”).

You have many choices of both public and private labs. Your Cooperative Extension’s Master Gardener program may have a listing of local labs for soil testing. There are public labs associated with Universities where you can send samples, and there are also private labs that accept small sample sizes from community groups. We used two private labs: TestAmerica in Sacramento and Enthalpy in Berkeley. We continued to partner with Enthalpy because they offered a generous discount to us as a community project.

When you contact a lab, you will often be assigned a project manager who will be your liaison to the lab throughout the project. Send an email (or if possible, arrange a meeting with your project manager) to specify the chemicals you’re interested in and the sample material (eg soil or plant tissue) and ask these questions:

Of this list of chemicals:

- Which of these can your lab test for?
- What methods do you use? (These generally have a specific EPA code number)
- What is the typical detection limit for this method?
- How much sample material do you need in order to run each of these tests?
- How much does it cost to test for each of these chemicals?
- Does the lab provide any help in interpreting the results?

The answers will vary based on the sampling media (soil versus plant tissue), and so this should be clearly specified.

In our study, we ran into several issues from not considering some of these questions in advance. One issue we had was with sample material volume. We had not collected enough plant material to run some of the tests that we wanted. We also ran into issues with the detection limit. For our analysis of PAHs and PCBs in plant tissue, our lab’s detection limit was higher than the Proposition 65 safety threshold we were using. This is an issue because even though our tests came back saying “no detections”, we still can not confirm whether or not these chemicals are present above the safety threshold, but below our ability to detect.

If you consider these questions upfront, you can reduce your budget by examining only the chemical groups that you have the sample volume for, and for which you will receive meaningful results.

Determine Your Budget

While it would be ideal to test for all of the chemicals that are of concern based on your site history, determining your budget provides critical information on the scope of what you can possibly study. For instance, a heavy metals panel is often less than $100, while a dioxin & furan panel is likely to be several hundred dollars.

Testing triplicates or composites?

In determining your budget and the number of samples you can test and number of chemicals per sample, an important decision you need to consider is whether to test triplicates or composites. “Triplicates” means that you would test three samples from each site, and these samples should be as similar as possible (see the sampling guide). Ideally, when you get your results back, the three triplicates should have similar results. This helps show the validity of your findings, and that your results reflect something in the environment, and not a fluke of your testing method.

Finalize your list of contaminants

This guide has presented this as a linear process, but often it may be iterative. For instance, you may pick a lab and decide on a set of tests that it can conduct, but then your background research and site history may point you towards another chemical group and thus the need for another lab. Or perhaps your initial budget only covers metals, but then you identify additional funding that allows you to conduct additional tests on your samples. Thus, answering these questions is never as straight-forward and clear-cut as they may appear.