HAWAII STATE DEPARTMENT OF HEALTH

The Hazard Evaluation and Emergency Response Office (HEER Office) is part of the Hawai'i Department of Health (HDOH) Environmental Health Administration, whose mission is to protect human health and the environment. The HEER Office provides leadership, support, and partnership in preventing, planning for, responding to, and enforcing environmental laws relating to releases or threats of releases of hazardous substances.

A Guide to Soil Testing for Organochlorine (OC) Termiticides at Residential Sites in Hawai'i

This brochure is intended to provide construction or demolition contractors, homeowners, and others with a general guide to soil testing procedures for organochlorine termiticides (pesticides that were used to control termites) at residential areas in Hawai'i. This brochure will discuss how to make a sampling plan, collect soil samples, work with a laboratory to analyze the samples, and evaluate the laboratory results. Resources for further information are also provided.

Background Information

Organochlorine termiticides (OC termiticides) are a group of persistent pesticides that were formerly used for termite control in and around wooden structures from the mid-1940s to the late 1980s. These OC termiticides used in the past include **chlordane, aldrin, dieldrin, heptachlor**, and **DDT**. They were used primarily by pest control operators in Hawaii's urban areas, but also by homeowners, the military, and counties to protect buildings against termite damage. The U.S. Environmental Protection Agency (EPA) banned all uses of these OC termiticides in the 1970s (for DDT) and 1980s (for other OC termiticides). Chlordane was the most widely used OC termiticide in Hawai'i. OC termiticides were commonly applied directly to soil underneath foundations and adjacent to building foundations. They were applied underneath the house (if accessible) and around the perimeter of the foundation for occupied structures, or in trenches excavated around the foundation, or by injection through holes drilled next to the foundation or in the flooring at the edge of foundation walls. In some cases, OC termiticides have been found in soil at residential sites above recommended safe levels and can remain a significant health concern unless the contaminated soil (or exposure to the soil) is removed. For information on the health concerns associated with OC termiticides, refer to the HDOH HEER Office website fact sheet: *Past Use of Organochlorine Pesticides for Termite Control in Hawai'i: Safe Management Practices around Treated Foundations or during Building Demolition.*

Home Foundation Construction in Hawai'i

Two types of foundations for home construction are generally found in Hawai'i: "post-and-pier" and "slab-on-grade." Post-and-pier foundation construction is elevated off the ground by a few feet or more, and the home is supported by a series of posts installed under the home and mounted to piers or cement blocks that distribute the weight across the ground. The posts are mounted around the perimeter of the structure and at key points in the middle. In slab-on-grade construction, a large cement pad is poured on the ground to support the house structure and serves as a floor base. Elevated concentrations of OC termiticides have been reported to HDOH for both types of home foundation construction at sites that were built on or before 1989. Residual concentrations of OC termiticides under slab-on-grade construction could be higher than post-and pier construction because the slab may act as a barrier or cap that protects the soil underneath from elements that can help to slowly degrade the OC termiticides over time. This brochure addresses soil sampling techniques for OC termiticides at both types of home foundation construction.

Above : Post-and-pier construction home and the storage space under a post-and-pier construction home.

Right: Slab-on-grade construction home.

Planning for Soil Sampling

There are generally two scenarios for conducting soil sampling for OC termiticides at a residential structure:

- ***Scenario 1: Current Home Occupants Protection –*** Homeowner wants an initial screening conducted to determine the presence or absence of OC termiticides around the home for general health, safety and exposure concerns.

- ***Scenario 2: Demolition/Construction Contractor and Future Building Occupant Protection*** – Homeowner or contractor wants an initial screening for the protection of demolition and construction contractors and future site occupants in the event that the home is intended for demolition and the property is to be reused or redeveloped.

The chance of exposure to OC termiticide impacted soil is different for each scenario. For home occupants residing in the home, exposure may be due to gardening, play, or pet activities near the building foundation (or under the structure in the case of post-and-pier construction). For demolition/construction contractor or future building occupants, exposure can occur when contaminated material is exposed and moved around during housing re-development projects. During the demolition process, any OC termiticide-impacted soil around or under the structure can become exposed and in the process of grading it may also be spread about the property. This activity puts the demolition and construction contractors at risk of exposure to termiticides in the soil, and future site inhabitants could also be exposed to the contaminated soil. Therefore HDOH recommends assessment for residual contamination prior to redevelopment of a site where OC termiticides have or may have been applied. If a residence was built in 1990 or later, on a site that does not have suspect contamination from historical use of OC termiticides, then it is not necessary to sample soil. However, if there is available

information documenting details of historic termiticide use, that information could be used to help make decisions on the need for or locations for soil testing.

The location of soil sample collection is generally based on the use of the property and potential exposure concerns. The following section will provide details on how and where to collect soil samples based on these concerns.

- ***Multi-Increment Sampling and Decision Units***

To obtain a representative soil sample, HDOH recommends the use of ***multi-increment[1] sampling.*** A multi-increment soil sample consists of 30 to 50 individual soil increments collected across the area of interest, called the "**decision unit",** that are combined to form one larger sample for lab analysis. The individual increments of a multi-increment sample are small in size (approximately half to several tablespoons) and are typically collected with a cylinder-shaped tool (soil coring device – see section on sampling equipment). The individual soil increments should be collected from random locations spaced somewhat evenly throughout the entire decision unit. There is typically a range of OC termiticide concentrations across any given (contaminated) decision unit. Combining numerous soil increments collected across the entire decision unit provides the best strategy to obtain a good estimate of the average concentration of OC termiticides in that decision unit.

Two separate decision units are typically considered when sampling for OC termiticides:

- ***Perimeter*** – Around the perimeter of the building foundation in a narrow strip next to the foundation and extending no more than 30 inches out.

- ***Underneath Building*** –Across the entire area of the building footprint.

Within each of these decision units, samples are also generally collected at two or more depth intervals in order to evaluate contamination across the depth interval (or layer). If OC termiticides are present, concentrations are generally found within the top 2 feet of soil, and the highest concentrations are typically in the 0-6" and/or 6-12" intervals below ground surface. Samples should be collected from one or more vertical depth zones within the decision units, such as the 0-6 inch and 6-12 inch vertical depths, or possibly deeper intervals if testing data from the 6-12" interval indicates significant levels (see recommendations in the summary table). Keeping the depth intervals to no more than 6 inches helps to improve the ability to look at potential concentration differences over the depth range that OC termiticides may generally be found, as well as to keep the multi-increment samples to a manageable size for subsequent processing by the laboratory. Increments collected from each unique depth interval are combined into a multi-increment sample for that particular depth interval (e.g. all 30-50 increments from the 0-6 inch deep interval are combined into one multi-increment sample, all 30-50 increments from the 6-12 inch deep interval are combined into a separate multi-increment sample, etc., and labeled for that specific depth). The at-depth interval samples can be collected from the same 30-50 randomly located sample locations as the initial surface sample (i.e. 0-6 inch interval), as long as the sampling method does not mix up the soil from one vertical increment to the next. In some cases rocky or dense soils prohibit easy collection of soil samples to depth with a soil coring device and a clean shovel or trowel is needed to dig down to a specified depth at each increment location, where the soil coring device (or trowel if necessary) is then used to collect the desired soil interval.

In the case where the building will be demolished and removed before sampling occurs, the soil around the foundation perimeter (out away from the former exterior of the house at least 3 feet) and the soil under the former house should be left as undisturbed as possible. Dragging significant amounts of soil away from these areas could contaminate outlying or additional areas where the soil is relocated.

[1] Multi-increment sampling is a registered trademark of Envirostat, Inc.

Table: Summary of Recommended Sample Collection Based on Scenario

Scenario	Exposure Concerns	Recommended Sample Collection
Current Home Occupants Protection ***Note – Building to remain intact***	Regular outdoor activities such as gardening, play, pet activities, or areas with edible produce, near the building foundation (or under the structure in the case of post-and-pier construction)	▪ Collect two multi-increment samples from within the exterior foundation perimeter[1] (next to the foundation and extending no more than 30 inches out from the building perimeter): one at a depth of 0-6 inches below ground surface, and one at a depth of 6-12 inches below ground surface[3].
Demolition/Construction Contractor and Future Home Occupant Protection ***Note – Site to be redeveloped and structure may be demolished***	Re-development of site exposes OC-termiticide-impacted soil around or under the structure through the demolition process and in the process of grading, may be spread about the property.	▪ Collect two multi-increment samples from the exterior foundation perimeter[2] (right to the foundation and extending no more than 30 inches out from the building perimeter): one at 0-6 inches, and one at 6-12 inches below ground surface[3]. ▪ Collect two multi-increment samples from under the building (in the crawl space) or from the former building footprint area: one at 0-6 inches and one at 6-12 inches below ground surface[3].

Notes:

[1] Perimeter sample increments may not need to be collected on all sides of the building foundation. Collect sample increments from sides that are exposed (i.e. not covered by shrubbery, mulch, etc. near building) and where it's possible for building occupants to come in direct contact with the soil. If the soil is exposed on all sides of the building, then collect samples from all sides.

[2] These sample increments should be collected from all sides of the building since the building will be demolished and any shrubbery, mulch, etc. will likely be removed as part of the demolition/construction process.

[3] Deeper soil intervals may need to be collected and tested in the event the 6-12 inch depth interval shows termiticide residues above applicable Action Limits.

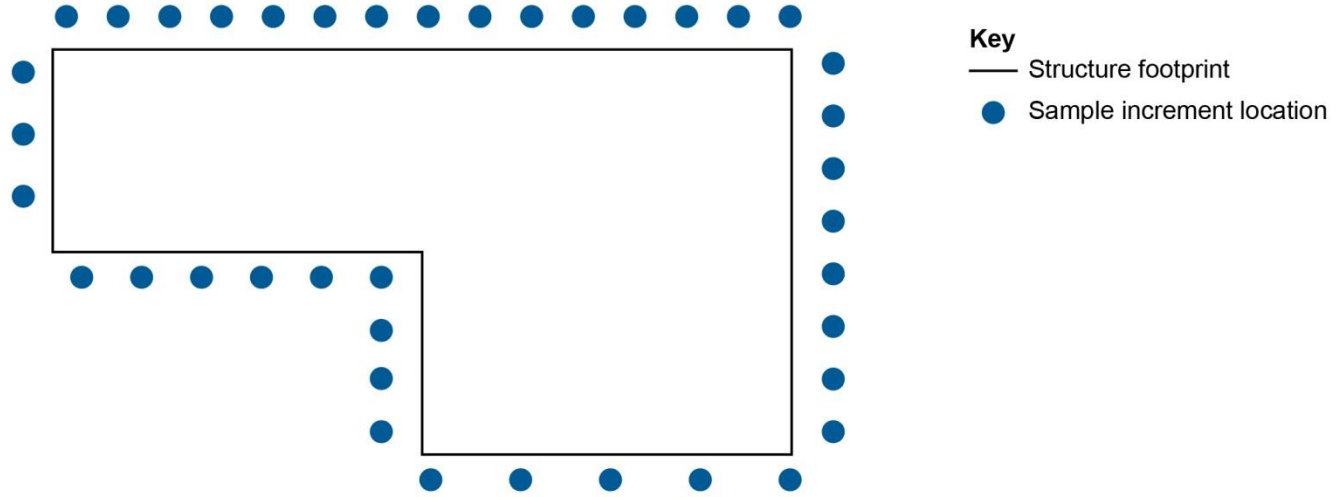
- ***Considerations for Sampling Slab-on-Grade Foundations***

Sampling underneath a slab-on-grade foundation is appropriate when the slab is planned to be demolished as part of a site redevelopment project[2]. Sampling before demolition would require use of a concrete-coring device to drill 30 to 50 holes distributed across the entire slab footprint. These holes would then be used to access the soil underneath with the use of a hand soil coring device or other appropriate tool to collect multi-increment samples at the 0 to 6 inch depth and 6 to 12 inches depth below the slab. Use of a concrete coring device is high-hazard, intrusive work and should be conducted only by a trained professional such as a demolition or construction contractor or other contractor that has been hired to provide the service. If a structure still remains and it will be inhabited for any time after the coring and sampling, the coring holes should be refilled with concrete after sampling. If the structure will remain vacant until demolition, refilling the coring holes is not necessary.

Alternatively, if the slab is broken up and removed from the house footprint area before sampling (for example, the concrete is stockpiled nearby), multi-increment samples of the soil in the slab footprint and foundation perimeter area could be collected with a hand soil coring device at the 0 to 6 inch depth and 6 to 12 inch depth below ground surface. Note that if the slab is broken and removed from the house footprint, the soil underneath the slab should be left as undisturbed as possible. Dragging significant amounts of soil away from the footprint in the slab removal process could contaminate the truck, container, or area where the concrete is relocated. Figures 1-3 on the next two pages depict the sampling scenarios discussed in this section.

[2] If the slab will remain in place, it will provide protection from exposure to potentially OC termiticide impacted material underneath, in which case sub-slab sampling is not necessary.

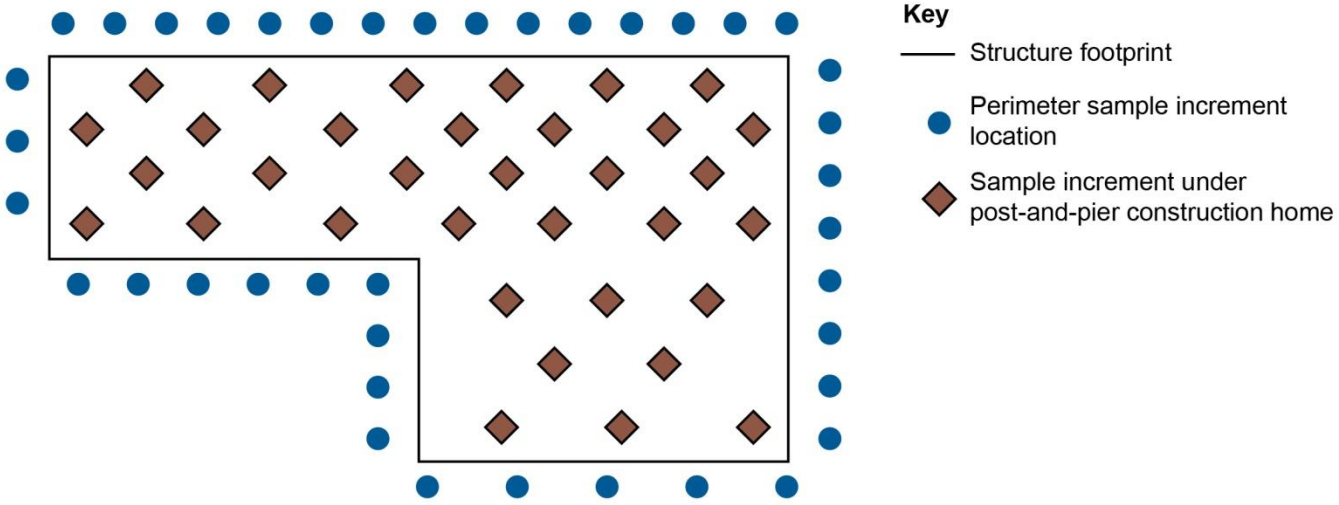
Figure 1: Scenario 1A - Sampling to Evaluate Occupied Building Exposures for Slab-on-Grade Construction



Notes

- Collect 30-50 increments for each multi-increment sample in each decision unit (DU).
- Two separate DUs are typically designated around the perimeter - one at 0-6" depth and one at 6-12" depth. The same increment locations can be used for each DU (see text description in **Mullti-Increment Sampling and Decision Units**).
- Perimeter increments are collected in a narrow strip next to the building foundation and extending no more than 30 inches out.

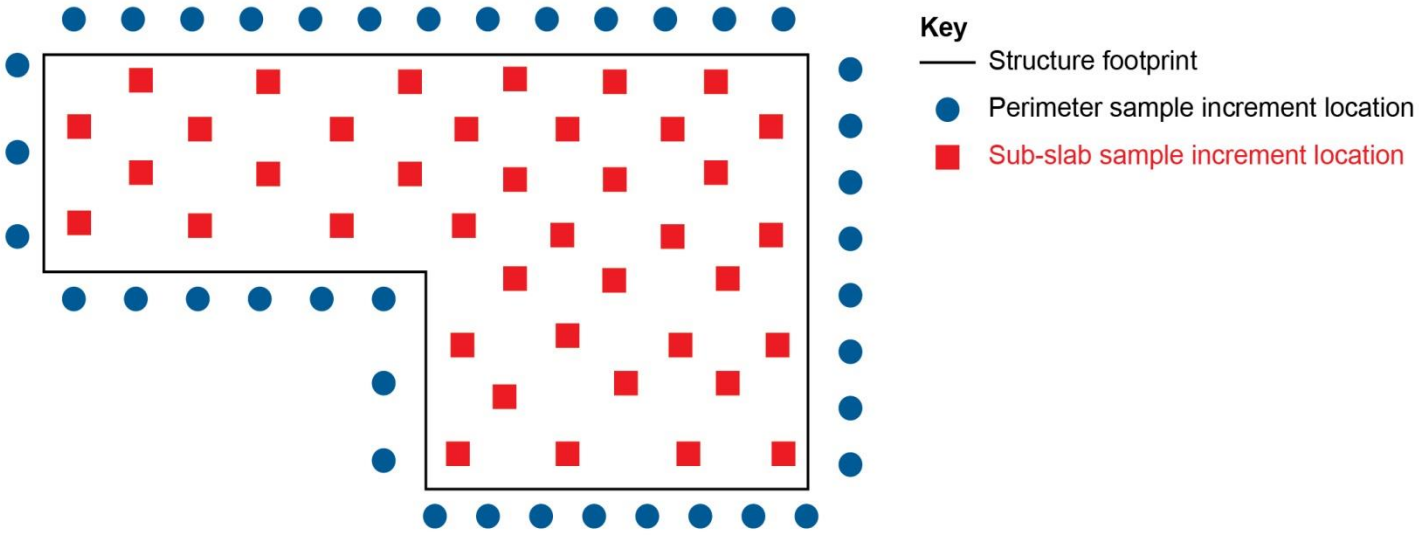
Figure 2: Scenario 1B - Sampling to Evaluate Occupied Building Exposures for Post-and-Pier Construction



Notes

- Collect 30-50 increments for each multi-increment sample in each decision unit (DU).
- Two separate DUs are typically designated for both the perimeter area and for the accessible/exposed area under the home - one at 0-6" depth and one at 6-12" depth. The same increment locations can be used for each DU (see text.). DU for exposed area under home could be just a portion of the house footprint.
- Perimeter increments are collected in a narrow strip next to the building foundation and extending no more than 30 inches out.
- If area under a post-and-pier home is not readily accessible for use (e.g. for storage) or the ground in accessible areas is covered so exposure is not likely to occur, then sampling under the home is not usually recommended.

Figure 3: Scenario 2 - Sampling to Evaluate Demolition/Construction Contractor or Future Home Occupant



Notes

- Collect 30-50 increments for each multi-increment sample in each decision unit (DU).
- Two separate DUs are typically designated for both the perimeter area and for the sub-slab area - one at 0-6" depth and one a 6-12" depth. The same increment locations can be used for each DU (see text.).
- Perimeter increments are collected in a narrow strip next to the building foundation and extending no more than 30 inches out.

Collecting Soil Samples

This section provides information on sampling equipment, procedures for soil sampling, guidelines for precision of data collected, and recommended health and safety precautions for soil sampling.

- ***Sampling Equipment***

The majority of supplies necessary to conduct soil sampling may be purchased from a local hardware or other local retail store (see equipment list). A quality hand soil coring device or "soil probe" should be purchased from an appropriate tool, agricultural equipment, or environmental equipment retailer. (The majority of this equipment is ordered through the Internet; search generally for "soil sampling tools" to find vendors.) One portion of the core-wall is generally cut away from the soil probes that helps the sampler to push out the soil core collected with a clean tool or gloved finger. Stainless steel soil coring devices, if available, are most desirable to prevent rusting over time, but many of the coring devices are available only in steel. A 0.75- to 1-inch diameter coring tool is recommended. Soil coring tools with foot-bar assists or slide hammer assists are also available and may be more effective where soils being sampled are dense or rocky. Use of hand trowels or shovels and pick axes followed by a coring device or hand trowels may be necessary in soils where the coring devices cannot be utilized effectively. If hand trowels are used to collect soil samples, the samples should be collected in a vertical "core-like" shape to the extent possible, rather than a wider or "scoop-like" shape.

Above – A 7/8-inch-diameter soil core sampler that is a sampling device with a T-Handle. It may be used to collect soil samples to depths of 12 to 24 inches.

Concrete coring equipment may be rented or the service may be contracted. To locate a concrete coring vendor, search the Internet or check the yellow pages under "Concrete Breaking, Cutting, Sawing, Etc."

Equipment List

- Hand soil coring device (most effective in softer soils). Also available with step-on side bars or "slide hammers" to assist driving deeper into more dense soils.
- Stainless steel or aluminum trowel (elongated shape best to collect "core-like" shape samples)
- Concrete coring equipment (required for sub-slab samples only, when sub-slab will not be removed before sampling underneath)
- Small flags or stakes and flagging tape to mark boundaries of the exterior building decision units
- Gallon size re-sealable plastic bag (such as a Ziploc)
- Gallon bucket to carry sample collection bags
- Tape measure
- Permanent felt-tip marker (such as a Sharpie)
- Nitrile gloves
- Paper towels
- Non-phosphate soap (such as Simple Green)
- Gallon of distilled water
- Scrub brush
- Notebook and pen or pencil
- Cooler and several pounds of cubed ice or ice packets
- Optional: digital camera

- ***General Procedures for Collecting Soil Samples***

The following are general procedures to use when collecting soil samples for all scenarios discussed in this brochure (see Sections 3 and 4 of the on-line HEER Office Technical Guidance Manual for more information on identifying decision units and multi-increment soil sampling, www.hawaiidoh.org). This process is for the collection of **one** multi-increment sample:

(1) Before any subsurface work begins, know the location of all utilities, buried and overhead, and avoid work in these areas.
(2) Contact the laboratory where samples will be analyzed before samples are collected. See Laboratory Analysis section below.
(3) In the notebook, make a sketch of the lot. Include a footprint sketch of the structures, utilities, and other noteworthy features. Show the decision units (DUs) to be sampled in the sketch. Label the DUs with a unique sample ID #.
(4) Mark out decision unit for the exterior foundation perimeter strip with small flags or stakes with flagging tape. Measure dimensions of the decision unit with the tape and note on the sketch. (Optional) Use the digital camera to take photographs of the areas to be sampled.
(5) Clean all sampling equipment using non-phosphate soap; thoroughly rinse equipment using distilled water; and dry using clean paper towels. Also wear clean gloves when sampling.
(6) Use the felt-tip permanent marker to label the gallon size re-sealable plastic bag. Your label should include the following information: date, collector's full name, sample identification number (ID), depth interval to be collected, and area or decision unit to be sampled. An example of the sample bag label is provided below. Save recorded information in the notebook for future reference.

Top – Collection of soil sample with soil core sampler equipped with a T-Handle. Bottom – Soil increment deposited into labeled Ziploc bag.

Date:	Collector:	Sample ID:	Depth:
Sept. 1, 2011	Maile Doe	A1	0 – 6 inches

Sample Area: Exterior building perimeter strip around house, within 30 inches of exterior walls

(7) Each of the 30 to 50 increments (for a specific depth interval) should be collected directly into the labeled gallon Ziploc bag. A gallon-sized bucket can be used to support the bag while the increments are collected.
(8) Seal the plastic bag. Then, place the sample bag inside another re-sealable plastic bag and securely seal the second bag. Make sure the label on the inside bag is visible through the outside bag, or add label information on the exterior bag as well. This process of double-bagging the sample will help to ensure the integrity of the sample.
(9) Fill the cooler with ice and place the sample bag in the cooler. Avoid immersion of the samples in (melted) ice during storage in the cooler. Once placed on ice, it is important to keep the samples chilled until they are received by the laboratory (a temperature about 40 degrees Fahrenheit or 4 degrees Celsius is preferred).

- ***Additional Sampling to Determine the Precision of the Data Collected***

It is generally desirable to collect more than one multi-increment sample in the same decision unit and at the same soil depth to document just how precise the residue data are in a given decision unit (for example, a total of three multi-increment samples in one decision unit). These additional samples collected in the same decision unit are called "replicates." Typically, replicates are collected in just one of the number of decision units on a particular house site, and the data obtained regarding precision are applied to all the decision units at the site. When replicate samples are collected, the same decision unit and sample depth as an initial multi-increment sample is used, however, the 30 to 50 increments are collected in separate locations throughout that decision unit than the initial multi-increment sample (in other words, not right beside initial samples. The replicate samples are labeled as separate samples (different ID numbers) when they are sent to the laboratory for analysis.

Comparing replicate sample data provides a measure of the variation in the residue concentrations found in a decision unit, as well as any variation caused by the sample collection process and the sample processing and analysis by the laboratory. A desirable goal in soil sampling for contaminants is to demonstrate that replicate sample data varies by only 35 percent or less. If the replicate sample data is highly variable (e.g. more than 50 to 75 percent), it may indicate that residue concentrations found are unreliable for making decisions on the degree of hazard that may be present or for decisions on cleanup methods. Replicates can be collected as part of the initial sample plan (usually in the decision unit believed to be most likely contaminated) or at any time in the future, assuming the same decision unit area and soil depth are still known and accessible. Replicate data can be especially important in situations where the concentration of OC termiticides found are close to the applicable state "Action Levels" that trigger identification of a significant hazard or need for subsequent action. If that is the case, the amount of variability documented by collecting replicates could help determine if the concentrations found are above or below the applicable state Action Limits.

- ***Recommended Safety Precautions[3] for Soil Sampling***

Common sense safety precautions are necessary to protect the collector from potential exposure to OC termiticide-contaminated soil. The primary routes of exposure include accidental ingestion of termiticide-contaminated soil and, to a much lesser degree, inhalation of dust from the soil. The Department of Health recommends the following precautions to prevent exposure to soil:

- Wear clean gloves while sampling. Plastic gloves made of nitrile are preferred, but vinyl or latex plastic gloves are acceptable.
- Wear protective clothing (long-sleeve shirt and pants) to reduce exposure to soil on skin that could be transferred unintentionally to the mouth.
- A protective paper mask (N-95 type, with two elastic straps) should be worn if airborne dust is present.
- Working with contaminated soil may result in residues on your clothing. Change clothes and shower after you work with the soil, and avoid spreading dirt from clothes or shoes into your vehicle or house.

[3] These safety precautions are for soil sampling only. It is assumed that only a professional will conduct the high hazard work described in this guide such as concrete coring. Additionally, it is assumed that these professionals are knowledgeable of all the safety protocols associated with this work.

- Wash hands and face thoroughly after you work in soil near the building foundation, especially before meals and snacks.

Laboratory Analysis

A professional laboratory will be needed to analyze the multi-increment soil samples. All commercial laboratories qualified for this type of soil analysis in Hawai'i are located on O'ahu. If you live on an island other than O'ahu, shipping the samples will also need to be coordinated with the laboratory selected.

- ***Selecting and Working with a Laboratory***

It is best to identify and communicate with the laboratory before you begin any soil sampling. There are laboratories in Honolulu that offer analysis of soil for organochlorine termiticides and other environmental contaminants. Search the internet or check the yellow pages under "Laboratories – Analytical" for laboratories that may be able to analyze the samples. The HDOH HEER Office can also be contacted for information on selecting a laboratory.

Laboratories in Hawai'i should be generally familiar with the HDOH HEER Office guidance for analyzing multi-increment soil samples for OC termiticides. However, it is important to note that you have multi-increment samples for analysis per HEER Office protocols to make sure the laboratory will follow through with the correct soil processing and soil sub-sampling procedures for analysis. The following is a checklist of key points to request from the laboratory:

  - Conduct the required chemical analysis for the suite of organochlorine termiticides (see subsection below)
  - Process and sub-sample the samples using protocols in the HEER Office Technical Guidance Manual. These protocols include air drying the entire sample, sieving the entire sample to the less than 2 millimeter particle size, multi-increment sub-sampling of the entire sieved sample, and an analysis mass of at least 10 grams.
  - Follow procedures for delivering and packaging or shipping the samples
  - Specify requirements for shipping samples from an island other than O'ahu
  - Expected duration to wait for results to be available (the "turn-around-time")
  - Delivery method for results (many laboratories can send results electronically and also in the mail)
  - Cost estimate
  - Other recommendations or requirements on the part of the laboratory

- ***Contaminants to Include in Laboratory Analysis***

Soils samples should be analyzed using standard EPA Laboratory Method 8081. This method includes analysis for all organochlorine termiticides that are of concern. As noted in the background information section at the beginning of this brochure, chlordane was the most widely used OC termiticide in Hawai'i. Therefore, when you request analysis from the laboratory, specifically request analysis of "technical chlordane" using standard EPA Method 8081. Also instruct the laboratory to report any additional organochlorine termiticides, including aldrin, dieldrin, DDD, DDE, DDT, heptachlor, and heptachlor epoxide.

- ***Cost Estimates for Laboratory Analysis***

Costs can vary between laboratories. The preparation method and turn-around time also have an impact on the cost. Typically laboratories can have a 24-hour, 48-hour, and 5-day turn-around time. A shorter turn-around time will yield a higher cost. Generally costs can range from $150 to $225 for processing and analysis of *each* multi-increment soil sample for all the organochlorine termiticides using standard EPA Method 8081. Requesting a cost estimate from the laboratory before sampling can help you to decide on the number of samples that may be feasible to collect and analyze.

Evaluating Soil Sampling Test Results

The HDOH HEER Office has established "screening levels" or "environmental action levels" for OC termiticides. The analytical results for the soil samples can be compared against the HDOH HEER Office screening levels to evaluate whether the OC termiticides are at levels that warrant additional evaluation or action to avoid health concerns. OC termiticide residues at levels over the HEER Office screening levels do not mean that a health hazard necessarily exists, but rather that a health hazard could exist and further evaluation or action is necessary to address the situation. Further evaluation could include consideration of the magnitude of the residues over the screening level along with evaluation of the potential for you to be exposed to the contaminated soil. The table below provides the screening levels for the OC termiticides covered in this guide, as of September 2011 (always check the HEER Office website to ensure you have the most current screening levels). Levels are reported in units of milligrams (of contaminant) per kilogram (of soil), or mg/kg, which is the same as parts per million, or ppm.

Table: Screening Levels for OC-Termiticides

Organochlorine Termiticides	Screening Level (mg/kg)
Aldrin	0.029
Technical Chlordane	16.0
DDD	2.0
DDE	1.4
DDT	1.7
Dieldrin	0.0033
Endrin	0.004
Heptachlor	0.11
Heptachlor epoxide	0.0031

The HDOH HEER Office may be contacted for assistance in interpreting analytical results for OC termiticide residues. In addition, the HDOH HEER Office is interested in compiling results of soil OC termiticide analyses from across the State of Hawai'i. It is at the discretion of the property owner to share results with the HDOH HEER Office. Accumulated analysis data can aid the HEER Office in identifying areas where residents need to be alerted to potential elevated levels of termiticides and ways to avoid exposure.

Disposing or Managing Soils Contaminated above Screening Levels

If soil sampling reveals OC-termiticide contamination above the HDOH HEER Office screening levels, the HEER Office can be contacted for guidance regarding options for off-site disposal of the contaminated soils or on-site management of contaminated soils to prevent or reduce the potential for exposure. Any disposal options need to be closely coordinated with the local landfill and landfill regulations. Landfills typically require additional testing to evaluate the leaching potential of soil contaminants and whether the soil is appropriate for burial or possible use as "cover" for trash. Some landfills will accept soils with lower level contamination for use as cover, and therefore do not charge typical landfill disposal fees. On-site management options for contaminated soils focus on ways to cover the soil so potential exposure to residents or pets is eliminated. These methods could include covering contaminated soil with clean soils and landscaping with non-edible plants, covering contaminated soils with hard surfaces such as concrete or asphalt, or covering with other materials and maintaining the cover over time so exposure does not occur. With any on-site management control of contaminated soils, the ability to ensure long-term maintenance of the cover is important, as well as appropriate disclosure to potential buyers of the property.

For questions about this fact sheet or further information, contact:
Hawai'i Department of Health, Hazard Evaluation and Emergency Response Office, Telephone: (808) 586-4249, Website: http://eha-web.doh.hawaii.gov/eha-cma/Org/HEER/

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