



The **Hawai'i Department of Health (HDOH), Hazard Evaluation and Emergency Response Office (HEER Office)** is a state environmental health division 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.

## Evaluation of Fill Material for Chemical Contaminants

This fact sheet provides consultants, engineers, construction contractors, developers, landowners, and other interested parties with guidance on evaluating fill materials or soil stockpiles to determine whether significant levels of chemical contaminants may be present, as well as recommendations when contamination is found. This fact sheet may be useful to general construction and redevelopment projects that require the import or export of fill material, particularly to potentially “sensitive” sites such as schools, daycare facilities, residential housing, parks, and other areas where children may be exposed to soils over extended periods. This information does not apply to projects involving fill materials that will be placed in State of Hawai'i waters. This fact sheet includes a general description of “acceptable” fill material, how to determine if fill materials are acceptable, and other fill material management considerations. More detailed guidance on the evaluation of fill materials and soil stockpiles for project sites that may involve HEER Office oversight is included in the HEER Office's Technical Guidance Manual (TGM).

### ***What potential chemical hazards are related to imported or exported fill material?***

There are multiple potential hazards related to importing or exporting fill which may be chemically contaminated during construction or redevelopment projects. Hazards include direct exposure to chemicals in the fill material, leaching of soluble chemicals to groundwater and groundwater contamination, runoff of chemicals to surface waters, soil vapor emissions from volatile contaminants, or general nuisance hazards such as odors. Contaminated fill materials may be attributed to current or historical land use or operations at the fill source property. For example, fill material originating from a bulk petroleum facility may contain petroleum products (leaching hazards), or fill material originating from pre-1988 building foundation areas may contain pesticide residues from former termite control activities (direct exposure hazards). Because fill material may come from a variety of known or unknown sources, it is important to determine that the proposed fill material does not pose unacceptable environmental hazards to human health and the environment.

The construction industry generally characterizes fill material with respect to specific geotechnical requirements (e.g., suitability for structural support), but may not include an evaluation of potential environmental hazards. Although importing and exporting fill material is a common practice in the construction and redevelopment process, users may be unaware if fill material brought onto or removed from their property is contaminated.

### ***What is Acceptable Fill Material?***

The HEER Office generally identifies “acceptable fill material” as:

***Natural materials consisting of soil, clay, sand, volcanic cinder and ash, and rocks; or a mixture or combination of such materials that are:***

- Excavated from a quarry, borrow pit, earthen bank, or other natural source; and
- Not suspected to be significantly impacted by a release of a hazardous substance based on the historical use of the fill source area (e.g., as documented by an environmental due diligence review).



“Not significantly impacted” by a hazardous substance means that levels of any suspect contaminants are less than applicable HDOH Environmental Action Levels (EALs). The HEER Office *Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater* and associated “EAL Surfer” Excel file list the HDOH Environmental Action Levels for over 150 chemicals. In addition, these documents include several EAL variations based on key site conditions (i.e., whether or not the site is above a drinking water aquifer; whether or not the site is within 500 feet of a surface water body; and whether the site is intended for residential or commercial/industrial use).

Acceptable fill material also should not contain any visible free liquids or create public nuisances (e.g., odors) to users at the receiving site or at adjacent properties. Use of fill material containing construction and demolition debris, street sweepings, asphalt paving, incinerator ash, or any similar manmade waste is also not recommended due to the potential for chemical contamination.

### ***Can “non-acceptable” materials be used as fill material in some instances?***

Fill materials that do not meet the characteristics noted above may be suitable for use as fill material on a case-by-case basis. Decisions would be based on variety of factors, including but not limited to: type and condition of proposed fill material, volume of fill material, location and size of site, planned site use and operations, sampling data results from fill materials, historical use of the fill source property, etc. As necessary, the HEER Office or an environmental consultant with experience conducting soil contaminant investigations could be contacted to provide advice regarding evaluation of specific fill materials before excavating or moving the material.

### ***How do I determine if fill material is acceptable concerning potential chemical contamination?***



***Can you tell which fill material is contaminated based on these photos? Without performing an environmental due diligence review of the fill source property or sampling the proposed fill material, there is no accurate, representative way to determine if any fill material has potential environmental hazards.***

An accurate and representative fill material evaluation will help ensure that fill material used for a project will not introduce chemical contaminants that could adversely impact human health or the environment. The HEER Office recommends that fill material evaluation be completed prior to delivering any fill material to the receiving site. Two options are suggested for conducting the fill material evaluation:

#### **Option 1 – Environmental Due Diligence Review**

This option involves obtaining and reviewing or conducting an environmental due diligence evaluation of the fill source property to determine the likelihood of releases of hazardous materials at the fill source property that could have impacted the proposed fill material. These due diligence evaluations are typically a Phase I Environmental Site Assessment (ESA) of the fill source property in accordance with ASTM Standard Practice E 1527-05 and the United States Environmental Protection Agency’s *Final Rule on Standards for Conducting All Appropriate Inquiry*.

A formal Phase I ESA is generally not necessary for the import or export of small volumes of fill material from known source properties, especially if past evaluations of the fill source area are available to document that the fill material is not suspected to be contaminated. The Phase I ESA guidance does provide key information to be reviewed, such as owner and operator interviews, reviews of previous investigations, and other pertinent information. Phase I ESAs generally do not include any sampling. If the findings from the Phase I ESA result in a likelihood that a hazardous substance release has occurred or chemical contamination is suspected, follow-up sampling (see Option 2 below) is recommended.

**Option 2 – Fill Material Sampling**



This option involves sampling and analysis of the proposed fill material for evaluation and documentation. An environmental consultant with experience conducting soil contaminant investigations using guidance provided in the HEER Office TGM would typically be contracted by the fill material provider, importer, or exporter to carry out fill material testing and analysis. The HEER Office also offers consultation on available sampling guidance and sampling strategies. If sampling is conducted, it is important to record relevant information about the area sampled, sampling methods used, and the testing results for documentation purposes.

**Samples of proposed fill material are collected and analyzed prior to acceptance at the receiving site.**

The level of effort necessary to sample a fill source depends on a number of site-specific factors. For example, the proposed use of comingled, existing stockpiles of unknown origin will require a more detailed level of investigation than proposed fill material from a single, known source (e.g., fill material from a former agricultural field). The HEER Office supports the use of the multi-increment sampling (MIS) as a cost-effective approach to obtaining representative data. Additional information about developing a sampling program for characterizing proposed fill material can be found in the HEER Office TGM.

**Are some fill sources more likely to be contaminated?**

Certain property and land uses (current and historic) have a greater likelihood for the possible presence of contaminated soil. Fill material originating from these areas should be considered “suspect” and will generally require site-specific, representative sample data to make an acceptable fill evaluation. The following table provides a list of common, suspect fill sources:

**Table 1 – Suspect Fill Sources**

Commercial & Residential Sites	Industrial Sites	Agricultural & Other Sites
<ul style="list-style-type: none"> <li>• Fuel stations</li> <li>• Automotive repair or maintenance shops</li> <li>• Junkyards or recycling facilities</li> <li>• Dry cleaners</li> <li>• Photographic processing facilities</li> <li>• Painting facilities</li> <li>• Sites where hazardous materials or hazardous wastes were used, stored, or generated</li> <li>• Sites where environmental cleanup activities have occurred</li> <li>• Rail lines</li> <li>• Former building sites where buildings were painted with lead-based paints, or were treated with persistent termiticides</li> </ul>	<ul style="list-style-type: none"> <li>• Landfills or disposal facilities</li> <li>• Metal processing plants</li> <li>• Bulk petroleum facilities or oil refineries</li> <li>• Waste treatment plants</li> <li>• Wood treatment facilities</li> <li>• Manufacturing facilities</li> <li>• Sites where hazardous materials or hazardous wastes were used, stored, or generated</li> <li>• Sites where environmental cleanup activities have occurred</li> <li>• Rail lines</li> <li>• Former building sites where buildings were painted with lead-based paints, or were treated with persistent termiticides</li> </ul>	<ul style="list-style-type: none"> <li>• Agricultural fields (current or former)</li> <li>• Pesticide storage or mixing areas</li> <li>• Pesticide container disposal areas</li> <li>• Seed dipping areas</li> <li>• Settling ponds</li> <li>• Bagasse piles</li> <li>• Former plantation housing areas</li> <li>• Rail lines</li> </ul>



## **What about fill material that is determined to be contaminated or unacceptable?**

Soils and other materials that are determined to be unacceptable because of the fill material evaluation could be beneficially used or reused rather than being disposed in an off-site landfill. Possible “non-acceptable” fill material uses include:

- Fill material used under a long-term restrictive environmental covenant or environmental hazard management plan;
- Daily cover at landfills – some landfills will accept soil or fill material not categorized as a hazardous waste (based on toxicity characteristic leaching procedure [TCLP] testing criteria) for use as daily cover as long as the contaminant concentrations do not exceed HDOH EALs for commercial/industrial land use;
- Feedstock to asphalt or aggregate plants;
- Aggregate in road structure or sub-base;
- Manufactured soil (after treatment and analytical testing); and
- Disposal at a permitted landfill facility, if appropriate.

The HEER Office and HDOH Solid and Hazardous Waste Branch should be consulted on potential beneficial use or reuse of non-acceptable fill materials on a case-specific basis. A hazardous waste evaluation will generally be required before disposal of soil at a landfill.

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### **Further Information**

#### ***For questions about this fact sheet, contact:***

Hawai'i Department of Health, Hazard Evaluation and Emergency Response Office,  
Website: <http://hawaii.gov/health/environmental/hazard/index.html>  
Phone: (808) 586-4249

#### ***For questions about proper disposal of fill material in a permitted landfill, contact:***

Hawai'i Department of Health, Solid and Hazardous Waste Branch,  
Website: <http://hawaii.gov/health/environmental/waste/index.html>  
Phone: (808) 586-4226

#### ***Links***

HDOH, 2009. HEER Office Technical Guidance Manual (HEER Office TGM) – Provides additional background information on designating decision units, collecting samples using the multi-incremental sampling strategy, and includes the detailed guidance on the evaluation and management of imported or exported fill material. <http://www.hawaiidoh.org/tgm.aspx>

HDOH, 2008. HEER Office Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater – Provides details on environmental hazards associated with contaminated soil or groundwater. Includes Hawai'i Environmental Action Levels (EALs) for over 150 chemicals.

<http://hawaii.gov/health/environmental/hazard/eal2005.html>

The “EAL Surfer” provides a listing of all the EALs and related environmental hazards in an easy to access format and is located on the same website listed above.



U.S. Environmental Protection Agency (USEPA) – Describes the All Appropriate Inquiry process for evaluating a property’s environmental conditions and assessing potential liability for any contamination.

[http://www.epa.gov/brownfields/aai/aai\\_final\\_factsheet.pdf](http://www.epa.gov/brownfields/aai/aai_final_factsheet.pdf)

