HAWAII STATE DEPARTMENT OF HEALTH

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.

# Dredged Sediment Sampling and Beneficial Reuse

## Background Information


Hawaii is an island state, and there are many harbors and navigable waterways that need to be maintained. Part of this maintenance includes the removal of accumulated sediments and debris from the harbor floor, known as dredging. Accumulated sediments come from various sources including shoreline erosion, surface runoff (sediment and other particulates carried off the land by storm water), and streams. Sediments within harbors may be contaminated due to a variety of sources, including runoff from urban, industrial, and agricultural sources; discharges from industrial and municipal operations; and releases of contaminants into the subsurface and groundwater.

In many cases the dredged material may be disposed of in a pre-established permitted open-water disposal area; however, in some cases the sediment needs to be brought to shore for either upland disposal or beneficial reuse. While the Hawai'i Department of Health (HDOH) encourages the reuse of dredged sediment over landfill disposal, due to the potential for the sediment to be contaminated it should be adequately characterized to determine whether reuse of the material is protective of human health and the environment, as well as identify appropriate reuse alternatives.

## Determining the Intended Use

In order to determine how to properly characterize dredged material, it must first be determined whether the material is intended for disposal or potential reuse. Failure to make this determination prior to characterizing the material could lead to delays and additional costs. As part of determining whether the material can be beneficially used or should be disposed of, the location(s) to be dredged should first be evaluated. This evaluation includes answering the following questions:

- Is there a known contamination source nearby (such as a release site listed in the HEER Office database, or an industrial discharge point)?
- Has the harbor been dredged in the past, and were contaminants detected in previous sediment samples?
- Has there been an incident or activity at the harbor that might have affected sediment quality (e.g., Lahaina fire, known release(s) within the harbor from boats or other activities, etc.)?
- What is the anticipated lithology of the sediment to be dredged (e.g. predominantly sand with little to no

fines, or fine-grained material with a higher potential to bind contaminants)?

- Is the sediment anticipated to exceed salinity (i.e., sodium adsorption ratio and electrical conductivity) Environmental Action Levels (EALs)?

Review of the HDOH's **iHEER** database (https://eha-cloud.doh.hawaii.gov/iheer#!/home) can help answer many of these questions and guide site-specific decision making.

## Sampling and Characterization Requirements

Once the intended use is established, the sediment must be characterized using appropriate sampling strategies. Sampling can be conducted in-situ (before dredging), during the dredging process, or after dredging but prior to off-site transport. Proper sampling and chemical analysis of dredged sediments is critical for safe reuse and environmental compliance in Hawai'i. The HDOH HEER Office Clean Fill Guidance (HDOH 2017) provides detailed guidance on how to assess contamination risks in stockpiled fill material, especially when reuse is planned at residential (i.e., unrestricted), commercial, or industrial sites.

### • Decision Unit (DU) Designation


Characterization will likely be required if there is insufficient generator knowledge of potential for contamination in the dredge material. Soil When characterizing sediment, the soil should be sampled and analyzed in accordance with Decision Unit Multi Increment Sample (DU-MIS) investigation methods described in the HEER Office Technical Guidance Manual (TGM) Section 3. In addition, unless the material is relatively homogeneous and not suspected to be contaminated, a minimum of 50 increments should be collected per DU.

For material intended for beneficial reuse, Decision Unit (DU) volumes must not exceed 800 cubic yards, unless it can be demonstrated to both the HEER Office and the Solid and Hazardous Waste Branch (SHWB) that the sediment is relatively homogeneous and uncontaminated. In certain large-scale dredging projects, larger DU volumes may be justified, particularly for beach nourishment. Responsible parties should contact the HEER Office and the SHWB to discuss and provide justification for any proposed value. Example questions that can be used to help designate DUs for assessment and sample collection include:

- Is there a particular area of the waterbody that is more likely to contain contaminants (e.g. outfalls, river mouths, etc.)?
- Is it likely that contaminants may be restricted to a specific layer or layers of sediment?
- Is the sediment considered relatively uniform, such as a sand bar which is coarse-grained with very little fines and is less likely to accumulate contaminants?

### • Recommended Analytes

Below is a general list of analytes typically associated with dredged material. This list may be adjusted (analytes added/removed) based on site conditions.

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| • Organochlorine pesticides | • Heavy metals | • Polycyclic Aromatic Hydrocarbons (PAHs) |
| • Polychlorinated Biphenyls (PCBs) | • Total petroleum hydrocarbons | • Sodium absorption ratio/ electrical conductivity |

## Beneficial Reuse as Fill Material

Beneficial reuse of dredged sediment is encouraged when it is safe for human health and the environment. Reuse may include applications such as beach nourishment or use as fill material. However, all beneficial reuse proposals must follow proper characterization protocols, and the material must meet the most conservative HDOH Tier 1 Environmental Action Levels (EALs).

In many cases none of the contaminants of potential concern are present in the material at concentrations above the HDOH Tier 1 EALs except for sodium absorption ratio and/or electrical conductivity due to elevated salinity. Elevated salinity has the potential to pose a hazard to freshwater aquatic and terrestrial organisms, as well as impact drinking water resources. Specifically, if the electrical conductivity exceeds the EAL of 2,000 micro-Siemens per centimeter (µS/cm) or a Sodium Absorption Ratio is greater than 5, the following restrictions apply to the reuse of the dredge material:

- Cannot be reused above the underground injection control (UIC) line.
- Cannot be reused on agricultural land.
- Cannot be reused within 150 meters of the nearest freshwater surface waterbody.

Elevated salinity may also affect plant growth, and users of this material as fill, should take this into consideration.

## Disposal at a Landfill

When the material is planned for disposal at a landfill, it is recommended that the landfill is contacted to determine if they have any specific sampling and analysis requirements. Most landfills in Hawaii will only accept analytical results from multi-increment samples collected in accordance with the HDOH TGM. However, in many cases, if there are not indications that the area being dredged may have been impacted by potential contaminants, then larger DUs may be acceptable to characterize the material for landfill disposal.

## Legal and Regulatory Compliance

If dredged material is not properly characterized and is later found to contain contaminants above HDOH Tier 1 EALs, it is classified as solid waste. Unauthorized reuse of such material, particularly off-site reuse, may be considered illegal dumping under Hawai'i Revised Statutes (HRS) Chapter 342H. Violations can result in administrative or civil penalties of up to $10,000 per day per incident, and may be prosecuted as a Class C felony. In addition, knowingly releasing a hazardous substance into the environment in an amount exceeding the reportable quantity may constitute a violation of HRS §128D-10 and be subject to civil penalties of up to $100,000 per day.

## *Further Information*

***For questions about this information sheet, contact:***
Hawai'i Department of Health, Hazard Evaluation and Emergency Response Office
Website: http://hawaii.gov/doh/heer
Telephone: (808) 586-4249

***For questions about dredging, sampling, and reuse, contact:***
Hawai'i Department of Health, Solid and Hazardous Waste Branch,
Website: http://health.hawaii.gov/shwb/
Telephone: (808) 586-4226

***Links***

- HEER Office TGM - https://health.hawaii.gov/heer/tgm/
- Underground Injection Control Line Maps - https://health.hawaii.gov/sdwb/underground-injection-control-program/