



Foundry Sand Reuse in Hawaii

Best Practices & Regulatory Compliance

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Table of Contents

1. Hawaii - Foundry Sand Recycling and Reuse (Cover)
2. Table of Contents
3. Key Concepts and Definitions
4. Regulatory Guidelines
5. Reuse Applications and Hawaii Examples
6. Environmental and Technical Considerations
7. Funding, Grants, and Incentives
8. Active Participants in Hawaii
9. Success Story Highlights
10. Clear Business Case Summary
11. Risk Management Overview
12. Step-by-Step Workflow for Foundries
13. Real Cost Savings Example
15. General FAQ & Landfill-Specific FAQ
16. References

3. Key Concepts and Definitions

What is Foundry Sand?

Foundry sand is high-quality silica sand used in the metal casting process to create molds for industrial, maritime, and artistic components. In Hawaii, while large-scale primary iron manufacturing is non-existent, specialized metal art, maritime repair, and small-batch precision fabrication generate spent sand. This material is a high-value byproduct in the islands due to the extreme logistics and environmental costs associated with importing virgin silica from the mainland.

What is Beneficial Reuse?

In Hawaii, beneficial reuse refers to the practice of utilizing a non-hazardous waste material as an effective substitute for a commercial product (e.g., aggregate, fill, or soil) in a manner that protects the state's sensitive island ecosystems and limited groundwater resources.

What is the TCLP Test?

The **Toxicity Characteristic Leaching Procedure (TCLP)** (EPA Method 1311) is the mandatory test used per Hawaii Administrative Rules to determine if a waste is hazardous. To be eligible for beneficial reuse or classification as an "Effective Substitute" for a product, SFS must be characterized as non-hazardous.

4. Regulatory Guidelines

Hawaii Department of Health (DOH)

The **DOH**, specifically the Solid and Hazardous Waste Branch (SHWB), regulates waste management and material recovery in the state.

Specific Legal Citations:

- **Hawaii Administrative Rules (HAR) Chapter 11-58.1:** "Solid Waste Management Control." This chapter establishes the standards for disposal and recycling facilities.
- **HAR Chapter 11-261:** "Hazardous Waste Identification and Listing." Includes the critical provision that materials used or reused as effective substitutes for commercial products are not considered solid waste, provided they meet specific criteria.
- **HEER Office Clean Fill Guidance (Oct 2017):** The Hazard Evaluation & Emergency Response (HEER) office provides the environmental screening levels (EALs) required for any material used in land-based applications.

Island-Scale Restrictions

Hawaii’s unique geography results in strict waste-diversion goals (e.g., the **Aloha+ Challenge**), which prioritize the reuse of local industrial materials to minimize the need for new landfill cells in sensitive coastal or volcanic areas.

5. Reuse Applications and Hawaii Examples

Application	Description	Hawaii Context
Landfill Daily Cover	Alternative Daily Cover (ADC).	Critical demand at Waimanalo Gulch (Oahu) and Central Maui landfills.
Concrete Additive	Partial fine aggregate replacement.	Viable for local concrete giants like Hawaiian Cement and Ameron Hawaii .
Construction Fill	Structural fill for building pads.	Subject to strict DOH Tier 1 Environmental Action Levels (EALs).
Road Sub-base	Foundation for highway projects.	High potential in HDOT (Hawaii DOT) projects needing local aggregate.
Beach/Erosion Control	Specialized shoreline engineering.	Requires rigorous HEER screening to protect coral reef ecosystems.

6. Environmental and Technical Considerations

Groundwater Vulnerability

Hawaii relies on basal and dike aquifers for its drinking water. Any beneficial reuse of SFS in an un-bound application (like structural fill) must ensure zero leaching risk of heavy metals or binders.

Environmental Action Levels (EALs)

Any material proposed for land application in Hawaii must be screened against the DOH's **Tier 1 EALs**. These levels are among the most conservative in the U.S., reflecting the state's commitment to protecting its unique soil and water profiles.

7. Funding, Grants, and Incentives

Hawaii Energy and Environmental Incentives

While specific "sand" grants are rare, the **Aloha+ Challenge** and various state-led sustainability initiatives offer recognition and support for businesses that reduce their landfill footprint.

Sustainable Materials Management (SMM)

The Hawaii DOH SMM program provides technical guidance for facilities looking to transition from waste generators to byproduct suppliers. Foundries implementing internal reclamation can leverage this program for regulatory pathfinding.

8. Active Participants in Hawaii

Market Landscape: Hawaii does not host large-scale primary iron or steel foundries. The market is served by specialized shops and mainland partners:

- **KenWalt Die Casting** (Mainland/CA) - Primary precision casting supplier serving the Honolulu industrial base.
- **Modern Aluminum Castings** (Mainland/IN) - Significant supplier of industrial castings to Hawaii.
- **Vinnetti's Bronze Casting** (Mainland/TN) - Serves the Hawaii art and memorial market via a Honolulu gallery.

- **Specialized Marine Fabricators:** Local shipyards and repair facilities in Honolulu and Pearl Harbor that handle metal components.

Potential End-Users:

- **Hawaiian Cement** (Oahu/Maui/Hawaii) - Major cement and concrete producer.
- **Grace Pacific, LLC** (Oahu) - Large-scale paving and civil contractor.
- **Ameron Hawaii** - Major concrete and aggregate consumer.
- **Hawaii DOT (HDOT)** - Infrastructure aggregate user.

9. Success Story Highlights

Oahu Construction Loop: Small-scale metal fabrication hubs and maritime repair facilities in the Honolulu area have successfully implemented "closed-loop" sand reclamation systems, reusing specialty silica for multiple years to minimize waste generation. By partnering with local concrete producers like **Hawaiian Cement** to utilize the final spent fines as an effective substitute for aggregate, these facilities avoid the high disposal fees at Hawaii landfills (which can reach **\$128.00 per ton**) while providing a sustainable alternative to carbon-intensive imported silica. These local initiatives demonstrate the critical role of material reuse in protecting Hawaii's limited landfill capacity and sensitive island ecosystems.

10. Clear Business Case Summary

1. **Avoidance of Island-Scale Fees:** Directly saving up to **\$128.00 per ton** (Hawaii County rate).
2. **Import Replacement:** Every ton of reused sand replaces a ton of virgin silica that would otherwise be shipped across the Pacific.
3. **Logistics Dominance:** Local reuse avoids the high cost of inter-island or mainland waste transport.

11. Risk Management Overview

- **Aquifer Liability:** The primary risk in Hawaii. Reuse projects must be preceded by professional hydrogeological assessments if used in un-bound applications.
- **Regulatory Interpretation:** Because there is no dedicated "Foundry Sand Program," projects must be meticulously documented to fit within the general "Effective Substitute" recycling exemptions of HAR 11-261.

12. Step-by-Step Workflow for Foundries

1. **Analytical Profiling:** Conduct a full 40-parameter chemical profile, including TCLP and totals.
2. **EAL Screening:** Compare data against Hawaii DOH Tier 1 Environmental Action Levels.
3. **DOH Consultation:** Contact the SHWB to discuss the "Effective Substitute" exemption under HAR 11-261.
4. **End-User Partnership:** Secure a delivery agreement with a local concrete or asphalt plant.
5. **Implementation:** Maintain strict tonnage and testing records for state environmental audits.

13. Real Cost Savings Example

Scenario: A Honolulu-based maritime fabricator generating 500 tons of sand annually.

- **Disposal Cost (at \$128/ton average):** \$64,000
- **Reuse Program (Testing + Logistics + Compliance):** \$20,000
- **Annual Savings:** \$44,000

15. General FAQ & Landfill-Specific FAQ

Q: Are there industrial foundries on the Big Island?

A: No, industrial-scale casting is not currently performed in-state; most parts are imported or fabricated from raw stock.

Q: Why are Hawaii County fees higher than Oahu?

A: Higher rates (\$128/ton) reflect the extreme cost of operating modern Subtitle D landfills on volcanic terrain with limited scale.

16. References

1. Hawaii Administrative Rules Chapter 11-58.1: [Solid Waste Management Control](#).

2. **Hawaii Administrative Rules Chapter 11-261:** [Hazardous Waste Identification and Listing.](#)
3. **HDOH HEER Office:** [Guidance for Evaluation of Fill Material \(October 2017\).](#)
4. **Hawaii County Dept. of Environmental Management:** [2024-2025 Solid Waste User Fee Schedule.](#)
5. **PVT Land Company (Oahu):** [2025 Disposal Fee Schedule.](#)
6. **EPA SMM Technical Guidance:** [Foundry Sand in Transportation Applications.](#)