



Foundry Sand Reuse in Massachusetts

Best Practices & Regulatory Compliance

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3. Key Concepts and Definitions

What is Foundry Sand?

Foundry sand is high-quality silica sand used in metal casting to create precise molds and cores for Massachusetts' high-tech manufacturing sector, which includes aerospace, defense, and medical device casting. Once the sand can no longer be used internally—due to thermal fatigue or binder saturation—it is removed as **spent foundry sand (SFS)**. In Massachusetts, SFS is considered a solid waste unless it is formally determined to be a "Beneficial Use" material.

What is Beneficial Reuse?

In Massachusetts, beneficial reuse is a formal determination by MassDEP that a solid waste is a suitable substitute for a commercial product or raw material. This determination allows the material to be managed outside of standard solid waste disposal regulations, provided it poses no significant risk to public health or the environment.

What is the TCLP Test?

The **Toxicity Characteristic Leaching Procedure (TCLP)** (EPA Method 1311) is the standard test required by MassDEP to verify that a material is not hazardous. Passing TCLP is a mandatory prerequisite for entering the Beneficial Use Determination (BUD) application process in Massachusetts.

4. Regulatory Guidelines

Massachusetts Dept. of Environmental Protection (MassDEP)

MassDEP regulates the reuse of industrial byproducts through its Bureau of Air and Waste.

Specific Legal Citations:

- **310 CMR 19.060:** "Beneficial Use of Solid Waste." This is the primary regulatory framework for Massachusetts foundries. It outlines the requirements for obtaining a formal Beneficial Use Determination (BUD).
- **BUD Application SW 39-42:** The formal permit application series (SW 39 for general BUD, SW 40-42 for specific modifications) required to authorize the reuse of solid waste as a product ingredient or aggregate.
- **Massachusetts 2030 Solid Waste Master Plan:** Establishes the state's goals for a 30% reduction in waste disposal by 2030, specifically targeting the diversion of inert industrial byproducts.

Pre-Application Mandatory Rule

Per MassDEP guidance, all applicants **must** schedule a pre-application meeting with their regional MassDEP office (Northeast, Southeast, Central, or Western) before submitting a formal BUD request.

5. Reuse Applications and Massachusetts Examples

Application	Description	Massachusetts Context
Asphalt Manufacturing	Fine aggregate in hot-mix asphalt.	A common and well-documented BUD application; widely used in Western MA.
Flowable Fill	Controlled low-strength material (CLSM).	High demand in Boston and Worcester urban utility and trenching projects.
Landfill Intermediate Cover	Use as cover between active phases.	Helps regional landfills meet strict MassDEP closure and odor rules.
Cement/Concrete Raw Material	Silica source for concrete products.	Viable for regional pre-cast concrete firms (e.g., in the Pioneer Valley).
Structural Fill	Bedding for building pads or embankments.	Requires a comprehensive BUD risk assessment and site-specific evaluation.

6. Environmental and Technical Considerations

The Massachusetts Capacity Crisis

Massachusetts is facing a critical disposal shortage, with only 7 active landfills remaining for a population of 7 million. This has led to:

- **Lowest Per-Capita Capacity:** Massachusetts has the lowest in-state disposal capacity in the continental U.S.
- **Waste Export Premium:** Over 30% of MA waste is exported to out-of-state landfills (NH, ME, OH), adding **\$40-\$80/ton** in transportation surcharges to the base disposal rate.

Leaching mobility

Due to the state's reliance on sensitive groundwater basins and proximity to the Atlantic coast, MassDEP requires a detailed risk assessment for any un-bound reuse project. Foundries must ensure SFS meets the state's S-1/GW-1 soil and groundwater risk standards if used as un-bound fill.

7. Funding, Grants, and Incentives

Recycling Business Development Grants (RBDG)

MassDEP provides **RBDG** grants of up to \$400,000 to Massachusetts companies that expand their capacity to process and use recyclable materials. Foundries can apply for these funds to install sand cleaning or thermal reclamation systems.

MassCEC Industrial Efficiency Programs

The **Massachusetts Clean Energy Center (MassCEC)** supports businesses that improve industrial efficiency and reduce their carbon footprint. Projects that significantly reduce "waste-miles" through local sand reuse may qualify for technical or financial support.

8. Active Participants in Massachusetts

Major Foundries:

- **Trident Alloys, Inc.** (Springfield) - Ductile iron and specialized alloy sand castings.
- **Palmer Foundry** (Palmer) - High-quality vacuum-tight aluminum sand castings.
- **Patriot Foundry & Castings** (Regional service) - Non-ferrous alloy castings.
- **Marlborough Foundry Inc.** (Marlborough) - Custom precision aluminum castings.
- **IBC Advanced Alloys** (Wilmington) - Precision non-ferrous manufacturing.

Potential End-Users:

- **Aggregate Industries** (Regional) - Major asphalt, concrete, and aggregate producer.
- **Tilcon Massachusetts** - Large-scale paving and civil contractor.
- **MassDOT (Dept. of Transportation)** - Significant consumer of recycled aggregate for infrastructure.
- **Casella Waste Systems** (Regional) - Major user of Alternative Daily Cover (ADC).

9. Success Story Highlights

Pioneer Valley Industrial Synergy: Foundries in the Springfield-Palmer industrial corridor, such as **Trident Alloys, Inc.** and **Palmer Foundry**, have successfully established long-term "Closed-Loop" partnerships with local asphalt plants. By securing a Beneficial Use Determination (BUD) under 310 CMR 19.060 for their spent mold sand, these facilities bypass the high gate fees at regional transfer stations (which can exceed **\$140.00 per ton**) while providing paving companies with a high-purity, local silica source that replaces expensive virgin aggregate. These initiatives directly support the Massachusetts 2030 Solid Waste Master Plan by significantly reducing the state's industrial waste footprint and reliance on out-of-state disposal.

10. Clear Business Case Summary

1. **Avoidance of "Export Surcharges":** Saving up to **\$140.00 per ton** by eliminating the need to long-haul waste to other states.

2. **Regulatory Security:** An approved BUD provides a durable legal framework that protects the foundry from changing solid waste disposal rules.
3. **ESG Supply Chain Alignment:** Helping major aerospace and defense customers meet their sustainability targets by diverting 100% of mold sand from landfills.

11. Risk Management Overview

- **Waste Ban Liability:** Massachusetts maintains 23 specific material bans. While SFS is not currently banned, MassDEP's general policy is to force the diversion of all recyclable industrial streams via high tipping fees.
- **BUD Reporting Compliance:** Failure to meticulously track diverted tonnage and report annually to MassDEP can result in the revocation of the BUD and retroactive disposal penalties.

12. Step-by-Step Workflow for Foundries

1. **Regional Consultation:** Schedule a pre-application meeting with your regional MassDEP office (Western, Central, Northeast, or Southeast).
2. **Comprehensive Characterization:** Conduct a full suite chemical profile, including TCLP, totals, and polyaromatic hydrocarbons (PAHs).
3. **BUD Submission:** Prepare and submit the formal **SW 39-42** application.
4. **End-User Partnership:** Secure an intake agreement with a local asphalt or concrete plant.
5. **Implementation:** Maintain daily diversion logs and submit the required annual report to MassDEP.

13. Real Cost Savings Example

Scenario: A Worcester County foundry generating 2,500 tons of sand annually.

- **Disposal Cost (at \$115.00/ton average):** \$287,500
- **Reuse Program (BUD Filing + Testing + Local Logistics):** \$85,000
- **Annual Savings:** \$202,500

15. General FAQ & Landfill-Specific FAQ

Q: Does MassDEP have a "pre-approved" list of BUDs for sand?

A: While asphalt is a common pathway, MassDEP generally requires a case-specific BUD to account for the unique binder chemistry of each individual foundry.

Q: Are tipping fees higher in Boston than Springfield?

A: Yes, Boston-area rates can exceed **\$140.00/ton**, while Western MA rates typically range from **\$85-\$110/ton**, but both offer a high ROI for sand reuse.

16. References

1. **310 CMR 19.060:** Massachusetts Solid Waste Management Regulations (Beneficial Use).
2. **MassDEP:** Beneficial Use Determination (BUD) Application and Guidance.
3. **Massachusetts 2030 Solid Waste Master Plan:** Statewide Waste Reduction Goals.
4. **Casella Waste Systems:** Regional Fee and Disposal Information.
5. **ecomaine:** 2025-2026 Tipping Fee Schedule (Regional Benchmark).
6. **EPA SMM Technical Guidance:** Foundry Sand in Transportation Applications.