



Foundry Sand Reuse in Vermont

Best Practices & Regulatory Compliance

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3. Key Concepts and Definitions

What is Foundry Sand?

Foundry sand is high-purity silica sand used in the metal casting process to create precise molds and cores for Vermont's specialized manufacturing sectors, including wood stove production and precision industrial components. 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 Vermont, this material is categorized as a solid waste unless formally authorized for **Beneficial Use**.

What is Beneficial Reuse?

In Vermont, beneficial reuse is the utilization of a solid waste in a manner that provides a documented environmental or economic advantage, serving as a functional substitute for virgin materials. This process is governed by the Vermont Agency of Natural Resources (ANR) to ensure that industrial byproducts are diverted from the state's limited landfill capacity.

What is the TCLP Test?

The **Toxicity Characteristic Leaching Procedure (TCLP)** (EPA Method 1311) is the standard analysis used to verify that a waste is not hazardous. Given Vermont's strict environmental standards and reliance on sensitive surface water systems, passing TCLP is the first technical requirement to qualify for the Beneficial Use permitting process.

4. Regulatory Guidelines

Vermont Agency of Natural Resources (ANR)

Vermont ANR, specifically the Department of Environmental Conservation (DEC) Solid Waste Program, regulates the reuse of industrial byproducts.

Specific Legal Citations:

- **Vermont Solid Waste Management Rules (SWMR)**: Provides the foundational regulatory framework for all waste disposal and reuse in the state.
- **SWMR Subchapter 13**: Outlines the requirements and procedures for obtaining a **Beneficial Use Determination (BUD)**.
- **10 V.S.A. § 6601 et seq.**: The state's primary "Waste Management" statute, which grants ANR the authority to promote waste reduction and resource recovery.

The BUD Process

Vermont typically evaluates reuse projects on a case-by-case basis. Generators must demonstrate that the SFS is chemically stable and serves as an effective substitute for a commercial product (e.g., aggregate in asphalt).

5. Reuse Applications and Vermont Examples

Application	Description	Vermont Context
Asphalt Manufacturing	Fine aggregate in hot-mix asphalt.	A common and well-documented BUD application; used by regional paving firms.
Landfill Daily Cover	Alternative Daily Cover (ADC).	Critical demand at the Coventry Landfill and regional transfer sites.
Road Sub-base	Foundation layer for road construction.	High potential in VTrans infrastructure and municipal road beds.
Manufactured Soil	Blending with organics for landscaping.	Subject to DEC Residuals Program standards for agronomic use.
Flowable Fill	Low-strength concrete for utility trenching.	Demand in Burlington and Montpelier urban utility upgrades.

6. Environmental and Technical Considerations

Groundwater and PFAS Protection

Vermont is a national leader in regulating emerging contaminants. For un-bound structural fill, the DEC requires rigorous characterization to ensure zero risk of metal, binder, or PFAS-

related leaching into the state's vital watersheds. Any material used in land-based applications must meet the state's strict Groundwater Protection Rule standards.

Physical Stability

SFS from Vermont's historic stove foundries (e.g., Vermont Castings) often exhibits high thermal stability and uniform gradation. This makes it a superior material for high-compaction embankments and specialized concrete mixes that must withstand the state's severe freeze-thaw cycles.

7. Funding, Grants, and Incentives

DEC Solid Waste Management Grants

The DEC occasionally offers grants for "Waste Diversion and Material Recovery" to support projects that reduce the state's landfill burden. Foundries investing in internal sand reclamation or high-value reuse hubs can apply for these funds.

Vermont Economic Development Authority (VEDA)

VEDA provides financing and loans for industrial manufacturers. Projects that improve environmental efficiency or reduce the state's reliance on out-of-state waste disposal may qualify for favorable financing terms.

8. Active Participants in Vermont

Major Foundries and Hubs:

- **Vermont Castings** (Bethel/Randolph) - World-renowned manufacturer of cast iron wood and gas stoves.

- **Patriot Foundry & Castings** (Regional service) - Specialized non-ferrous sand casting.
- **Numerous Precision Fabricators**: Concentrated in the Burlington and Rutland industrial corridors.

Potential End-Users:

- **VTrans (Vermont Agency of Transportation)** - Major consumer of recycled aggregate for highway maintenance.
- **Pike Industries, Inc.** (Regional) - Major aggregate, asphalt, and paving contractor.
- **Casella Waste Systems** (Coventry/Williston) - Major user of Alternative Daily Cover (ADC).
- **Whitcomb Construction** (Regional) - Large-scale paving and civil contractor.

9. Success Story Highlights

Bethel-Coventry Industrial Loop: Iconic manufacturers in the Bethel area, such as **Vermont Castings**, have successfully implemented high-efficiency sand reclamation systems. By transitioning the final spent fines into Alternative Daily Cover (ADC) for the **Coventry Landfill**, these facilities maintain near-zero sand disposal costs while providing the state's sole operating landfill with a high-performance odor-control material. These initiatives support Vermont's waste reduction goals and significantly reduce the carbon footprint of industrial waste transport.

10. Clear Business Case Summary

1. **Avoidance of Gate Fees:** Directly saving up to **\$150.00 per ton** (Urban Commercial MSW rate).
2. **Transportation Savings:** By utilizing sand in local North-Central VT construction rather than hauling to remote landfills.
3. **ESG Supply Chain Alignment:** Helping major retail and industrial customers meet their sustainability targets by diverting 100% of mold sand from landfills.

11. Risk Management Overview

- **Environmental Standard Compliance:** Failure to meet Vermont's Groundwater Protection Rule standards can lead to the revocation of BUD status and retroactive classification of the material as solid waste.
- **BUD Reporting Compliance:** Failure to maintain accurate daily tonnage records and report to the DEC (as required by the specific BUD) can result in enforcement penalties.

12. Step-by-Step Workflow for Foundries

1. **Analytical Profiling:** Conduct a full 40-parameter chemical profile, including TCLP and totals.
2. **DEC Consultation:** Contact the Solid Waste Program to discuss the "Beneficial Use" criteria for the specific sand stream.
3. **End-User Partnership:** Secure a delivery agreement with a local asphalt plant or construction project.
4. **Logistics Documentation:** Maintain records of material weights and destinations for 5 years.
5. **Annual Review:** Re-verify sand chemistry annually to ensure consistency with initial DEC concurrence.

13. Real Cost Savings Example

Scenario: A Chittenden County manufacturer generating 2,000 tons of sand annually.

- **Disposal Cost (at \$140.00/ton average):** \$280,000
- **Reuse Program (Testing + DEC Filing + Local Logistics):** \$60,000
- **Annual Savings:** \$220,000

15. General FAQ & Landfill-Specific FAQ

Q: Does Vermont have "pre-approved" beneficial uses for sand?

A: No, the DEC typically requires a material-specific and site-specific BUD to ensure the unique binder chemistry of the sand is safe for the intended application.

Q: Are tipping fees higher in Burlington than the rest of the state?

A: Yes, regional transfer station rates in Chittenden County are among the highest in New England, making sand reuse highly profitable.

16. References

1. **Vermont Solid Waste Management Rules:** [Subchapter 13 - Beneficial Use](#).
2. **Vermont Agency of Natural Resources (ANR):** [Procedures and Guidance Documents](#).
3. **Casella Waste Systems:** [Williston Transfer Station and Coventry Landfill Rate Information](#).
4. **Chittenden Solid Waste District (CSWD):** [Drop-Off Center Fees and Hours](#).
5. **10 V.S.A. § 6601:** [Vermont Waste Management Statute](#).
6. **EPA SMM Technical Guidance:** [Foundry Sand in Transportation Applications](#).