



Foundry Sand Reuse in Tennessee

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 to create molds and cores for metal casting. Tennessee's robust manufacturing sector—including iconic cookware manufacturers, automotive suppliers, and aerospace fabricators—generates significant volumes of this material. Once the sand can no longer be used internally due to thermal fatigue, it is categorised as **spent foundry sand (SFS)**. In Tennessee, SFS is recognised as a non-hazardous industrial byproduct with high engineering value.

What is Beneficial Reuse?

In Tennessee, beneficial reuse refers to the practice of utilizing a solid waste material as an effective substitute for a virgin material in a manner that provides a documented environmental or economic advantage. This process is governed by the Tennessee Department of Environment and Conservation (TDEC).

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. In Tennessee, passing TCLP is the first technical requirement to qualify for the state's Beneficial Use Determination (BUD) process or classification as "non-hazardous industrial waste."

4. Regulatory Guidelines

Tennessee Dept. of Environment and Conservation (TDEC)

TDEC, specifically the Division of Solid Waste Management (recently transitioning into the Division of Land Protection), regulates the disposal and reuse of industrial byproducts.

Specific Legal Citations:

- **Rule 0400-11-01:** "Solid Waste Processing and Disposal." Provides the foundational regulatory framework for waste management in the state.
- **Rule 0400-11-01-.01:** Outlines the definitions for "Energy Recovery" and "Beneficial Use," creating the legal pathway for industrial material diversion.
- **T.C.A. § 68-211-101 et seq.:** The "Tennessee Solid Waste Disposal Act," which grants TDEC the authority to manage waste reduction and recycling programs.

Beneficial Use Determination (BUD)

TDEC evaluates reuse projects on a case-by-case basis. Generators must provide a detailed chemical characterization to prove that the SFS is stable and suitable for the intended application (e.g., structural fill or aggregate replacement).

5. Reuse Applications and Tennessee Examples

Application	Description	Tennessee Context
Asphalt Aggregate	Partial replacement of fine aggregate.	A preferred reuse pathway; used by major regional paving firms.
Landfill Daily Cover	Alternative Daily Cover (ADC).	Widely used at regional Subtitle D landfills to conserve cell space.
Road Sub-base	Foundation layer for road construction.	High potential in TDOT infrastructure and regional highway projects.
Flowable Fill	Low-strength concrete for utility bedding.	Demand in Nashville, Memphis, and Chattanooga urban utility projects.
Structural Fill	Bedding for building pads or embankments.	Subject to case-specific TDEC evaluation and risk screening.

6. Environmental and Technical Considerations

Karst and Groundwater Protection

Significant portions of Tennessee—particularly in the Middle and East regions—sit on "Karst" topography (caves and sinkholes). Any beneficial reuse of SFS in un-bound

applications must ensure zero risk of metal or binder leaching into these highly sensitive groundwater systems. TDEC requires rigorous leaching data for such projects.

Physical Stability

SFS from Tennessee's iron and steel foundries (e.g., Lodge) often exhibits high structural stability and uniform gradation. This makes it a superior material for high-compaction embankments and specialized "flowable fill" compared to naturally occurring silty-clay soils found in many parts of the state.

7. Funding, Grants, and Incentives

TDEC Waste Reduction Grants

The Division of Land Protection offers various grants for "Waste Reduction and Recycling" to local governments and non-profits. While foundries are private, they can partner with municipal recycling coordinators to receive technical support for regional byproduct diversion hubs.

Tennessee Dept. of Economic and Community Development (TNECD)

The state offers various incentives (e.g., the **Job Tax Credit**) for manufacturers that invest in sustainable technology and infrastructure. Foundries installing thermal sand reclamation systems may qualify for regional development credits and support from the state's industrial efficiency programs.

8. Active Participants in Tennessee

Major Foundries and Hubs:

- **Lodge Cast Iron** (South Pittsburg) - World-renowned manufacturer of cast iron cookware.
- **Dameron Alloy Foundries** (Regional service) - High-precision investment casting.
- **Patriot Foundry & Castings** (Regional service) - Specialized non-ferrous sand casting.
- **Numerous Precision Fabricators:** Concentrated in the Nashville, Memphis, and Knoxville industrial corridors.

Potential End-Users:

- **TDOT (Tennessee Dept. of Transportation)** - Major consumer of aggregate for highway projects.
- **Rogers Group, Inc.** (Regional) - Large-scale paving, asphalt, and aggregate producer.
- **Vulcan Materials Company** (Regional) - Major aggregate and asphalt supplier.
- **Waste Management (Central Landfill)** - User of Alternative Daily Cover (ADC).

9. Success Story Highlights

South Pittsburg Industrial Loop: Iconic manufacturers in the South Pittsburg area, such as **Lodge Cast Iron**, have successfully implemented high-efficiency sand reclamation systems. By characterizing the final spent fines as a non-hazardous, stable byproduct, these facilities provide a local aggregate source for regional infrastructure and landfill daily cover. These initiatives avoid the rising disposal fees in the Tennessee Valley while supporting the state's waste reduction goals and enhancing industrial resource efficiency.

10. Clear Business Case Summary

1. **Avoidance of Gate Fees:** Saving up to **\$55.00 per ton** (Urban Commercial MSW rate).
2. **Transportation Savings:** By utilizing sand in local Tennessee Valley or Delta construction rather than hauling to remote Subtitle D 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 Liability:** The primary risk in Tennessee's karst regions. Reuse projects must be preceded by professional hydrogeological and chemical assessments to satisfy TDEC water protection standards.
- **Compliance Monitoring:** Foundries must maintain accurate records of all diverted tonnage for annual state environmental audits and corporate sustainability reporting.

12. Step-by-Step Workflow for Foundries

1. **Analytical Profiling:** Conduct a full 32-parameter chemical profile, including TCLP and totals.
2. **TDEC Consultation:** Engage with the Division of Land Protection to discuss the project scope and Beneficial Use criteria.
3. **End-User Partnership:** Secure an intake agreement with a local asphalt plant or infrastructure 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 TDEC concurrence.

13. Real Cost Savings Example

Scenario: A Nashville-area foundry generating 3,000 tons of sand annually.

- **Disposal Cost (at \$48.00/ton average):** \$144,000
- **Reuse Program (Testing + TDEC Filing + Local Logistics):** \$40,000
- **Annual Savings:** \$104,000

15. General FAQ & Landfill-Specific FAQ

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

A: Asphalt and concrete ingredients are common, but TDEC generally requires a material-specific review to ensure binder chemistry is safe.

Q: Are Nashville and Memphis fees the same?

A: No, Nashville rates are currently around **\$48/ton** (MSW), while Memphis residents enjoy some free disposal, commercial rates are rising, making diversion profitable statewide.

16. References

1. **Rule 0400-11-01:** [Tennessee Solid Waste Processing and Disposal Rules.](#)
2. **TDEC:** [Land Protection Division Laws and Rules.](#)

3. **Nashville Waste Services:** Convenience Center and Disposal Fees.
4. **City of Memphis:** Solid Waste Collection and Disposal Rates.
5. **Tennessee Code Annotated § 68-211-101:** Solid Waste Disposal Act.
6. **EPA SMM Technical Guidance:** Foundry Sand in Transportation Applications.