



Foundry Sand Reuse in South Carolina

Best Practices & Regulatory Compliance

Abrasive Removal Services (ARS)

Kelley, Iowa

Phone: (515) 720-7081 | Email: team@abrasiveremovalservices.com

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3. Key Concepts and Definitions

What is Foundry Sand?

Foundry sand is high-quality silica sand used to create molds for South Carolina's robust metal casting industry, which supports the state's world-class automotive (BMW ecosystem) and aerospace sectors. After multiple casting cycles, the sand becomes **spent foundry sand (SFS)**. In South Carolina, SFS is recognized as a non-hazardous industrial byproduct that is physically stable and highly valuable for civil engineering and construction applications.

What is Beneficial Reuse?

In South Carolina, beneficial reuse refers to the practice of diverting industrial byproducts from landfills to productive applications where they serve as functional substitutes for virgin materials. This process is governed by the South Carolina Department of Health and Environmental Control (SCDHEC) to ensure the protection of the state's soil and water resources.

What is the TCLP Test?

The **Toxicity Characteristic Leaching Procedure (TCLP)** (EPA Method 1311) is the core test required by SCDHEC to verify that a waste is not hazardous. Under South Carolina law, only non-hazardous SFS is eligible for simplified beneficial reuse pathways or industrial byproduct exemptions.

4. Regulatory Guidelines

SC Dept. of Health and Environmental Control (SCDHEC)

SCDHEC, specifically the Bureau of Land and Waste Management, regulates the reuse of industrial byproducts under its solid waste management framework.

Specific Legal Citations:

- **S.C. Regulation R.61-107.19:** "Solid Waste Management: Beneficial Use." This is the primary regulatory framework for South Carolina foundries, outlining the requirements for obtaining a formal Beneficial Use Determination (BUD).
- **R.61-107.19.C:** Outlines the definitions for "eligible byproducts" and "legitimate end uses."
- **S.C. Code § 44-96-10 et seq.:** The "Solid Waste Policy and Management Act," which provides the statutory authority for SCDHEC to promote waste reduction and resource recovery.

The BUD Process

South Carolina generally evaluates industrial reuse on a case-by-case basis through BUDs. Generators must demonstrate that the SFS is chemically stable and provides a functional benefit for the intended application (e.g., structural fill or road sub-base).

5. Reuse Applications and South Carolina Examples

Application	Description	South Carolina Context
Road Sub-base	Foundation layer for road construction.	High potential in SCDOT infrastructure and regional highway projects.
Landfill Daily Cover	Alternative Daily Cover (ADC).	Widely used at the Bees Ferry (Charleston) and Twin Chimneys landfills.
Asphalt Aggregate	Partial replacement of fine aggregate.	Applicable for use at regional paving firms like Banks Construction .
Flowable Fill	Low-strength concrete for utility bedding.	Demand in Greenville and Columbia urban utility expansion projects.
Cement Raw Material	Silica source for cement production.	Potential for delivery to regional kilns (e.g., Giant Cement).

6. Environmental and Technical Considerations

Piedmont and Coastal Plain Protection

South Carolina's geography—ranging from the clay-rich Upstate to the sandy Lowcountry—requires site-specific evaluation for un-bound reuse. SCDHEC requires leaching data to ensure that metal or binder residues do not impact regional groundwater basins, especially in the sensitive coastal aquifer zones.

Physical Stability

SFS from South Carolina's automotive foundries often exhibits high structural stability and uniform gradation. This makes it a superior material for high-compaction embankments and structural fill compared to naturally occurring silty-sands found in many parts of the state.

7. Funding, Grants, and Incentives

SCDHEC Recycling Grants

The Bureau of Land and Waste Management offers various grants for "Recycling and Waste Reduction." Foundries partnering with local governments to create "Regional Aggregate Hubs" may be eligible for technical or financial support to offset initial processing costs.

South Carolina Dept. of Commerce

The state offers various tax incentives (e.g., the **Job Tax Credit**) for manufacturers that invest in sustainable technology. Projects that significantly reduce the state's landfill burden through high-volume sand recycling may qualify for regional development credits and support from the SC Recycling Market Development Advisory Council (RMDAC).

8. Active Participants in South Carolina

Major Foundries:

- **Grede Greenville** (Greenville) - World-class ductile and gray iron casting for automotive and industrial sectors.
- **Numerous Automotive Suppliers:** Concentrated in the Upstate region supporting the BMW manufacturing hub.
- **Regional Casting Hubs:** Specialized precision shops in the Columbia and Charleston corridors.

Potential End-Users:

- **SCDOT (South Carolina Dept. of Transportation)** - Major consumer of aggregate for highway projects.
- **Banks Construction Company** (Charleston) - Large-scale paving, asphalt, and civil contractor.
- **Sloan Construction** (Regional) - Major aggregate and asphalt producer.
- **Richland County Solid Waste** - Significant user of Alternative Daily Cover (ADC).
- **Giant Cement Company** (Harleyville) - Significant silica consumer for clinker production.

9. Success Story Highlights

Upstate Automotive Synergy: Foundries in the Greenville-Spartanburg industrial corridor, such as **Grede Greenville**, have successfully established long-term "Closed-Loop" partnerships with local paving companies. By securing a Beneficial Use Determination (BUD) under S.C. Regulation R.61-107.19 for their spent "Green Sand," these facilities avoid the gate fees at regional industrial landfills while providing paving companies with a high-purity, local silica source that replaces expensive virgin aggregate. These initiatives directly support the Upstate region's sustainability targets and significantly reduce the industrial waste footprint of South Carolina's world-class automotive manufacturing hub.

10. Clear Business Case Summary

1. **Avoidance of Gate Fees:** Saving up to **\$100.00 per ton** (Charleston Bees Ferry MSW rate).
2. **Reduced Transport Burden:** Beneficial reuse sites (local construction/asphalt) are often significantly closer than the remote Subtitle D landfills used for industrial waste.
3. **Regulatory Efficiency:** An approved BUD provides long-term legal protection, removing the "waste" stigma and allowing the foundry to market SFS as a product.

11. Risk Management Overview

- **BUD Reporting Compliance:** Failure to maintain accurate daily tonnage records and report annually to SCDHEC can result in the revocation of the BUD and retroactive classification of the material as solid waste.
- **Leachate Verification:** For projects in un-bound structural fill, foundries must maintain professional engineering documentation proving that the sand meets SCDHEC's conservative soil-risk benchmarks.

12. Step-by-Step Workflow for Foundries

1. **Analytical Profiling:** Conduct a full 32-parameter chemical profile, including TCLP and totals.
2. **BUD Application:** Prepare and submit the formal application per **R.61-107.19**.
3. **Pre-Application Meeting:** Consult with regional SCDHEC staff (Greenville, Columbia, or Charleston) to review the project scope.
4. **End-User Match:** Secure a delivery agreement with a local SCDOT project or asphalt plant.
5. **Implementation:** Maintain daily tonnage records and annual characterization updates for state environmental audits.

13. Real Cost Savings Example

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

- **Disposal Cost (at \$34.00/ton Industrial rate):** \$102,000
- **Reuse Program (BUD Filing + Testing + Local Logistics):** \$40,000
- **Annual Savings:** \$62,000

15. General FAQ & Landfill-Specific FAQ

Q: Does South Carolina require a permit for sand reuse in asphalt?

A: Incorporation into asphalt is a preferred pathway and often requires a simplified Beneficial Use notification rather than a full solid waste permit.

Q: Are gate fees higher in Charleston than Columbia?

A: Yes, Charleston rates for MSW are around **\$100/ton**, while Richland County (Columbia) rates are around **\$27-\$29/ton**, making reuse particularly profitable in the Lowcountry.

16. References

1. **S.C. Regulation R.61-107.19:** Solid Waste Management: Beneficial Use.
2. **SCDHEC:** Bureau of Land and Waste Management Industrial Waste Guidance.
3. **Richland County:** Solid Waste Enterprise Fee and Rate Schedule.
4. **Charleston County:** Bees Ferry Landfill Rate Information.
5. **Greenville County:** Twin Chimneys Landfill Fee Schedule.
6. **EPA SMM Technical Guidance:** Foundry Sand in Transportation Applications.