



Foundry Sand Reuse in Alabama

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, size-specific silica sand used by Alabama's robust metal casting industry to create molds and cores. In Alabama, this sand is typically high-grade quartz, often containing additives such as bentonite clay or chemical binders (e.g., phenolic urethanes). After multiple reuse cycles within the foundry, the sand becomes "spent" and requires off-site management.

What is Beneficial Reuse?

In Alabama, beneficial reuse is the diversion of industrial byproducts—categorized as "by-product materials"—from landfills to productive applications where they serve as functional substitutes for virgin materials. This process is governed by the Alabama Department of Environmental Management (ADEM).

What is the TCLP Test?

The **Toxicity Characteristic Leaching Procedure (TCLP)** (EPA Method 1311) is the mandatory protocol used to determine if a waste is hazardous. Under ADEM rules, spent foundry sand must be certified as non-hazardous via TCLP analysis for heavy metals to be eligible for any beneficial reuse program.

4. Regulatory Guidelines

ADEM Land Division

The **Alabama Department of Environmental Management (ADEM)** oversees solid waste and beneficial reuse through its Land Division.

Specific Legal Citations:

- **ADEM Admin. Code Chapter 335-13-16:** "Beneficial Use of By-Product Materials for the Purpose of Land Application." This is the primary regulatory framework for Alabama foundries.
- **ADEM Admin. Code Chapter 335-13-4-.26:** Outlines the requirements for the management and disposal of "Special Waste."
- **Solid Wastes and Recyclable Materials Management Act (SWRMMA):** Provides the statutory authority for Alabama's \$1.00 per ton state disposal fee.

Registration Requirements

- **Quarterly Certification:** Per ADEM 335-13-16, generators must certify their foundry waste quarterly, submitting a Solid/Hazardous Waste Determination Form and

current TCLP results.

- **Volume Threshold:** Entities handling 100 dry tons or more per year for beneficial use must register formally with ADEM and submit a detailed operation plan.

5. Reuse Applications and Alabama Examples

Application	Description	Alabama Context
Road Base / Sub-base	Substitute for virgin aggregate in road construction.	Frequently used in ALDOT local road projects as a cost-effective base layer.
Landfill Daily Cover	Alternative Daily Cover (ADC).	Widely accepted at Jefferson and Montgomery county landfills for odor/pest control.
Manufactured Soils	Blending sand with compost for topsoil.	Regulated under ADEM land application rules; popular in Central AL landscaping.
Concrete/Asphalt	Partial replacement of fine aggregate.	Used by major Alabama contractors like Dunn Construction and Vulcan Materials .
Cement Raw Material	Silica source for cement kilns.	Potential for delivery to regional cement plants (e.g., Argos).

6. Environmental and Technical Considerations

Physical Stability

Alabama SFS, particularly from ferrous foundries, exhibits high structural stability. However, the clay content in "Green Sand" must be monitored for its effect on drainage in road base applications.

Leaching Profile

- **Heavy Metals:** Foundries must monitor for Lead, Chromium, and Cadmium, which are the most common TCLP failure points in non-ferrous casting.
- **Quarterly Sampling:** ADEM requires quarterly composite sampling to ensure the material profile remains consistent with the initial characterization.

7. Funding, Grants, and Incentives

ADEM Recycling Grants

ADEM administers the **Alabama Recycling Grant Program**, which provides funding to local governments and non-profits to improve recycling infrastructure. While industrial foundries do not apply directly, they can partner with municipal recycling hubs to receive subsidized sand intake.

Department of Commerce Incentives

Alabama offers statutory tax incentives (e.g., the **Alabama Jobs Act**) for manufacturers that invest in "green" technology. Foundries installing thermal reclamation systems to reduce their waste footprint may qualify for significant investment tax credits.

8. Active Participants in Alabama

Major Foundries:

- **AMERICAN Cast Iron Pipe Company** (Birmingham) - Ductile Iron Pipe and Valves.

- **McWane, Inc. / McWane Ductile** (Birmingham) - Global leader in water infrastructure products.
- **Franklin Iron** (Loxley/Aliceville) - All grades of ductile iron castings.
- **Cullman Casting** (Cullman) - Gray iron casting for industrial and automotive sectors.
- **Southern Metal Resources, LLC** (Talladega) - Gray and Ductile iron castings.
- **Northeast Alabama Aluminum, LLC** (Anniston) - High-quality aluminum castings.

Potential End-Users:

- **Vulcan Materials Company** (Birmingham) - Major aggregate and asphalt producer.
- **Dunn Construction** (Birmingham) - Paving and civil infrastructure.
- **Argos USA** (Calera) - Cement manufacturing and kilns.
- **Jefferson County Solid Waste** - Alternative daily cover (ADC) users.

9. Success Story Highlights

Birmingham Pipe-Sector Synergy: Large-scale pipe manufacturers in the Birmingham metro area, such as **AMERICAN Cast Iron Pipe Company (ACIPCO)**, have historically achieved high rates of internal sand reuse. ACIPCO has successfully diverted approximately 30,000 tons of sand annually from landfills for use as beneficial fill material. These initiatives demonstrate how high-volume generators can mitigate disposal costs while supporting local infrastructure projects, such as quarry reclamation and beneficial fill applications.

10. Clear Business Case Summary

1. **Avoidance of State Fees:** Bypassing the \$1.00/ton SWRMMA fee.
2. **Avoidance of Gate Fees:** Saving up to **\$55.00 per ton** (Average MSW rate in Central Alabama).
3. **Logistics Optimization:** Utilizing sand in local Central Alabama road projects rather than hauling to remote MSW landfills.

11. Risk Management Overview

- **TCLP Liability:** If sand fails TCLP, it must be treated as hazardous waste, increasing management costs by 10x.
- **Registration Compliance:** Operating a reuse project without an active ADEM 335-13-16 registration can lead to significant environmental enforcement penalties.

12. Step-by-Step Workflow for Foundries

1. **Initial Characterization:** Complete a 32-parameter chemical profile and TCLP analysis.
2. **ADEM Submission:** Complete the **Solid/Hazardous Waste Determination Form**.
3. **BUD Plan:** For projects >100 tons/year, draft an operation plan for ADEM review.
4. **End-User Match:** Partner with a local ADEM-registered user (e.g., an asphalt plant).
5. **Continuous Monitoring:** Perform quarterly verification testing to maintain BUD status.

13. Real Cost Savings Example

Scenario: A Jefferson County foundry generating 5,000 tons of sand annually.

- **Disposal Cost (at \$46.00/ton incl. state fee):** \$230,000
- **Reuse Program (ADEM Registration + Quarterly Testing + Logistics):** \$70,000
- **Annual Savings:** \$160,000

15. General FAQ & Landfill-Specific FAQ

Q: Does Alabama require a permit for internal sand reuse?

A: No, sand reused within the foundry's internal loop is not considered waste. Regulations only trigger when the material leaves the property.

Q: Are landfill gate fees rising in Alabama?

A: Yes, regional rates in the Birmingham and Montgomery areas have stabilized around **\$45.00 to \$55.00 per ton** including environmental fees, representing a steady increase over the last five years.

16. References

1. **ADEM Admin. Code Chapter 335-13-16:** [Requirements for Beneficial Use of By-Product Materials.](#)
2. **Alabama Solid Wastes and Recyclable Materials Management Act (SWRMMA):** [Code of Alabama Title 22 Chapter 27.](#)
3. **ADEM Land Division:** [Beneficial Use Program Overview and Forms.](#)

4. **Alabama Department of Revenue:** Solid Waste Disposal Fee Rates.
5. **EPA SMM Technical Guidance:** Foundry Sand in Transportation Applications.