



Foundry Sand Reuse in West Virginia

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 the metal casting industry. West Virginia's industrial base—which includes long-standing gray iron and steel foundries supporting the mining, rail, and energy sectors—generates significant volumes of this material. Once the sand can no longer be used for casting due to thermal fatigue, it is categorized as **spent foundry sand (SFS)**. In West Virginia, SFS is recognized as a non-hazardous industrial byproduct with high potential for beneficial reuse in civil engineering.

What is Beneficial Reuse?

In West Virginia, beneficial reuse refers to the practice of utilizing a solid waste material as an effective substitute for a commercial product or virgin material in a manner that provides an environmental or economic advantage. This process is managed by the West Virginia Department of Environmental Protection (WVDEP) to ensure that industrial byproducts are diverted from limited landfill capacity.

What is the TCLP Test?

The **Toxicity Characteristic Leaching Procedure (TCLP)** (EPA Method 1311) is the standard analytical protocol required by WVDEP to verify that a waste is not hazardous. Under West Virginia law, only non-hazardous SFS is eligible for the Beneficial Use Determination (BUD) process or classification as a "Non-Hazardous Industrial Waste."

4. Regulatory Guidelines

West Virginia Dept. of Environmental Protection (WVDEP)

The **WVDEP**, specifically the Division of Water and Waste Management, regulates the disposal and reuse of industrial byproducts.

Specific Legal Citations:

- **CSR 33-1:** "Solid Waste Management Rule." Provides the foundational regulatory framework for all waste handling and material recovery in the state.
- **CSR 33-08:** "Standards for Beneficial Use of Materials Similar to Sewage Sludge." While often used for organic materials, this rule provides the administrative precedent for high-volume byproduct diversion.
- **W. Va. Code § 22-15-1 et seq.:** The "Solid Waste Management Act," which grants WVDEP the authority to manage waste reduction and recycling programs.

The Special Waste Request

Foundries seeking to reuse sand in structural fill or road base typically submit a "Special Waste Request" or "Beneficial Use Determination" to WVDEP. This process involves providing detailed chemical characterization to prove that the SFS is stable and will not pose a risk if used in un-bound applications.

5. Reuse Applications and West Virginia Examples

Application	Description	West Virginia Context
Road Sub-base	Foundation layer for road beds.	High potential in WVDOH infrastructure and mining haul roads.
Landfill Daily Cover	Alternative Daily Cover (ADC).	Widely used at the Charleston and Northwestern landfills.
Cement/Concrete Aggregate	Silica source or fine aggregate.	Potential for delivery to regional cement kilns (e.g., in neighboring PA).
Structural Fill	Bedding for building pads or embankments.	Subject to case-specific WVDEP evaluation and risk screening.
Flowable Fill	Low-strength concrete for utility bedding.	Demand in Charleston, Huntington, and Morgantown urban utility projects.

6. Environmental and Technical Considerations

Groundwater and Karst Protection

Like its neighbors, West Virginia has sensitive karst regions where groundwater can be easily impacted. For un-bound structural fill projects, WVDEP requires rigorous characterization to ensure zero risk of metal or binder leaching. Sand used in un-bound applications must meet the state's conservative environmental health standards for soil and water contact.

Physical Stability

SFS from West Virginia's industrial foundries often exhibits high structural stability and uniform gradation. This makes it a superior material for high-compaction embankments and specialized "flowable fill" compared to some naturally occurring silty-clay soils found in the Appalachian region.

7. Funding, Grants, and Incentives

WVDEP REAP Program

The **Rehabilitation Environmental Action Plan (REAP)** program provides funding for recycling and litter prevention. Foundries partnering with local governments to create "Regional Aggregate Hubs" may qualify for technical or financial support through REAP-administered grants.

West Virginia Dept. of Economic Development

The state offers various tax incentives (e.g., the **Manufacturing Investment Tax Credit**) for manufacturers that invest in new equipment. Foundries installing thermal sand reclamation systems to reduce their waste generation may qualify for significant state tax savings.

8. Active Participants in West Virginia

Major Foundries and Hubs:

- **Centre Foundries** (Wheeling) - Specialized in gray and ductile iron castings for industrial and utility sectors.
- **Numerous Precision Fabricators**: Concentrated in the Kanawha Valley (Charleston) and Ohio River corridor (Huntington/Wheeling).
- **Mining Industry Suppliers**: Regional shops providing cast components for West Virginia's energy sector.

Potential End-Users:

- **WVDOH (West Virginia Division of Highways)** - Major consumer of aggregate for highway construction.
- **Republic Services (Mountaineer Transfer Station)** - Major node for industrial byproduct logistics in Northern WV.
- **City of Charleston Landfill** - Significant user of Alternative Daily Cover (ADC).
- **Regional Paving Contractors**: Local firms in the Huntington-Charleston corridor.

9. Success Story Highlights

Kanawha Valley Industrial Synergy: Industrial manufacturers in the Charleston corridor have successfully established diversion programs for their spent silica molding sand. By characterizing the material as a non-hazardous, stable byproduct, these facilities provide a local aggregate source for municipal utility bedding and landfill daily cover. These initiatives avoid the rising disposal fees in West Virginia (reaching **\$81.00 per ton** in some transfer stations) while supporting the state's waste reduction goals and enhancing regional resource efficiency.

10. Clear Business Case Summary

1. **Avoidance of Gate Fees:** Directly saving up to **\$81.25 per ton** (Morgantown Transfer Station rate).
2. **Exemption from State Fees:** Bypassing the mandatory **\$1.00/ton** state solid waste assessment fee.

3. **Logistics Optimization:** Utilizing sand in local Appalachian region construction rather than hauling to remote Subtitle D landfills.

11. Risk Management Overview

- **Environmental Liability:** The primary risk in West Virginia's sensitive mountain watersheds. Reuse projects must be preceded by professional chemical assessments to satisfy WVDEP water protection standards.
- **Permit Compliance:** Operating a reuse project without a valid WVDEP Beneficial Use Determination or Special Waste approval is a violation of state solid waste rules.

12. Step-by-Step Workflow for Foundries

1. **Analytical Profiling:** Conduct a full 32-parameter chemical profile, including TCLP and totals.
2. **WVDEP Consultation:** Contact the Division of Water and Waste Management to discuss the project scope and Beneficial Use criteria.
3. **End-User Partnership:** Secure an intake 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 WVDEP concurrence.

13. Real Cost Savings Example

Scenario: A Charleston-area foundry generating 2,500 tons of sand annually.

- **Disposal Cost (at \$41.00/ton incl. state fee):** \$102,500

- Reuse Program (Testing + WVDEP Filing + Local Logistics): \$30,000
- Annual Savings: \$72,500

15. General FAQ & Landfill-Specific FAQ

Q: Does West Virginia have a "pre-approved" list of beneficial uses?

A: No, WVDEP typically requires a material-specific and application-specific review to ensure the binder chemistry of the sand is safe.

Q: Are gate fees higher in Morgantown than Charleston?

A: Yes, Morgantown transfer station rates (over **\$81/ton**) are significantly higher than the Charleston Landfill (\$40/ton), making reuse extremely profitable in Northern West Virginia.

16. References

1. **CSR 33-1:** West Virginia Solid Waste Management Rules.
2. **WVDEP:** Water and Waste Management Programs and Guidance.
3. **City of Charleston:** Landfill Fee Schedule and Operations Information.
4. **Republic Services:** Mountaineer Transfer Station (Morgantown) Rate Information.
5. **WV Treasury:** Solid Waste Management Assessment Fee (\$1.00/ton).
6. **EPA SMM Technical Guidance:** Foundry Sand in Transportation Applications.