



Foundry Sand Reuse in Wyoming

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 molds for industrial, energy, and mining components. In Wyoming, this sand is generated by specialized metal fabrication and repair hubs—primarily in the Casper and Cheyenne corridors—that support the state’s critical resource extraction sectors. Once the sand can no longer be reused internally, it is removed as **spent foundry sand (SFS)**. In Wyoming, this material is recognized as a non-hazardous industrial byproduct with high structural potential.

What is Beneficial Reuse?

In Wyoming, beneficial reuse refers to the practice of utilizing a solid waste material in a manner that provides a documented environmental or economic advantage, serving as a functional substitute for virgin materials. This process is managed by the Wyoming Department of Environmental Quality (WDEQ) to ensure that industrial byproducts are diverted from landfills in a manner that protects public health and the environment.

What is the TCLP Test?

The **Toxicity Characteristic Leaching Procedure (TCLP)** (EPA Method 1311) is the core analytical protocol used to verify that a waste is not hazardous. In Wyoming, passing TCLP is the first technical requirement to qualify for beneficial reuse pathways or industrial byproduct exemptions under state rules.

4. Regulatory Guidelines

Wyoming Dept. of Environmental Quality (WDEQ)

The **WDEQ**, specifically the Solid and Hazardous Waste Division (SHWD), regulates the disposal and reuse of industrial materials under the state's solid waste management rules.

Specific Legal Citations:

- **Wyoming Solid Waste Rules, Chapter 1:** "General Provisions." Provides the foundational regulatory framework for all waste handling and material recovery in the state.
- **Chapter 1, Section 1(e):** Defines "Beneficial Use" and establishes the Administrator's authority to approve the reuse of industrial materials as effective substitutes for commercial products.
- **Wyo. Stat. § 35-11-501 et seq.:** The "Wyoming Environmental Quality Act," which grants WDEQ the authority to promote waste reduction and recycling.

The Beneficial Use Approval

Wyoming typically evaluates industrial reuse on a case-by-case basis. Generators seeking to reuse sand in structural fill or road base must provide chemical characterization data to WDEQ to prove that the material is stable and poses no risk to the state’s vital surface and groundwater.

5. Reuse Applications and Wyoming Examples

Application	Description	Wyoming Context
Road Sub-base	Foundation layer for road beds.	High potential in WYDOT infrastructure and mining haul roads.
Landfill Daily Cover	Alternative Daily Cover (ADC).	Widely used at the Happy Jack (Cheyenne) and Casper landfills.
Concrete/Asphalt Aggregate	Silica source or fine aggregate.	Viable for local paving and concrete firms in the I-80 corridor.
Structural Fill	Bedding for building pads or embankments.	Subject to case-specific WDEQ evaluation and risk screening.
Flowable Fill	Low-strength concrete for utility bedding.	Demand in Cheyenne and Casper urban utility expansions.

6. Environmental and Technical Considerations

Groundwater Protection and Arid Soil

While much of Wyoming is arid, protecting regional aquifers for agriculture and energy production is a high priority for WDEQ. For un-bound structural fill projects, the department requires leaching data to ensure that metal or binder residuals do not impact water quality. Sand used in these applications must meet the state's conservative environmental screening levels.

Physical Stability

SFS from Wyoming's industrial shops often exhibits high uniformity and structural stability. This makes it a superior material for high-compaction embankments and specialized "flowable fill" compared to naturally occurring silty desert soils found in many parts of the state.

7. Funding, Grants, and Incentives

WDEQ Recycling and Waste Diversion Support

The WDEQ occasionally offers funding for recycling and waste reduction projects through the state's environment trust funds. Foundries partnering with local governments to create "Regional Aggregate Hubs" may qualify for technical or financial support.

Wyoming Business Council

The state offers various incentives (e.g., the **Business Ready Community Grant**) for manufacturers that invest in sustainable technology and infrastructure. Foundries installing sand reclamation systems may qualify for support through regional development initiatives.

8. Active Participants in Wyoming

Market Landscape: Wyoming does not host large-scale primary iron foundries; the market is served by specialized metal fabrication and casting repair shops:

- **Casper Metal Hubs:** Numerous facilities providing precision components for the oil, gas, and mining sectors.
- **Cheyenne Fabrication Shops:** Supporting regional logistics and infrastructure growth.
- **Regional Casting Partners:** Precision shops in Northern Colorado (e.g., in the Fort Collins/Greeley corridor) that serve the Wyoming industrial market.

Potential End-Users:

- **WYDOT (Wyoming Dept. of Transportation)** - Major consumer of aggregate for highway projects.
- **City of Cheyenne (Happy Jack Landfill)** - Significant user of Alternative Daily Cover (ADC).
- **City of Casper (Regional Landfill)** - Major user of industrial aggregate and ADC.
- **Knife River Corporation (Regional)** - Large-scale paving, asphalt, and aggregate producer.

9. Success Story Highlights

Casper Energy-Corridor Synergy: Specialized metal fabrication shops in the Casper area have successfully established diversion programs for their spent silica molding sand. By characterizing the material as a non-hazardous, stable byproduct under Chapter 1 rules, these facilities provide a local aggregate source for municipal flowable fill and landfill daily cover. These initiatives avoid the rising disposal fees in the energy corridor (reaching **\$49.00 - \$65.00 per ton**) 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 **\$65.00 per ton** (Urban Commercial rate estimate).
2. **Transportation Savings:** By utilizing sand in local Wyoming infrastructure rather than hauling to remote Subtitle D landfills.
3. **ESG Supply Chain Alignment:** Helping major energy and mining customers meet their sustainability targets by utilizing high-quality recycled industrial materials.

11. Risk Management Overview

- **Regulatory Pre-Approval:** In Wyoming, starting a reuse project without written Administrator concurrence is a violation of Chapter 1 rules.
- **Dust Mitigation:** Wyoming's dry and windy climate requires active dust suppression during SFS transport and application to prevent violations of regional air quality standards.

12. Step-by-Step Workflow for Foundries

1. **Analytical Profiling:** Conduct a full 32-parameter chemical profile, including TCLP and totals.
2. **WDEQ Consultation:** Contact the Solid and Hazardous Waste Division 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 WDEQ concurrence.

13. Real Cost Savings Example

Scenario: A Casper-area industrial hub generating 1,000 tons of sand annually.

- **Disposal Cost (at \$55.00/ton average):** \$55,000
- **Reuse Program (Testing + WDEQ Filing + Local Logistics):** \$20,000
- **Annual Savings:** \$35,000

15. General FAQ & Landfill-Specific FAQ

Q: Does Wyoming 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 Cheyenne than Casper?

A: Cheyenne (Happy Jack Landfill) rates are generally higher than Casper's, but both offer a significant ROI for industrial sand diversion.

16. References

1. **Wyoming Solid Waste Rules, Chapter 1:** General Provisions and Beneficial Use.
2. **WDEQ:** Solid & Hazardous Waste Division Programs and Guidance.
3. **City of Cheyenne:** Happy Jack Landfill Tipping Fees and Regulations.
4. **City of Casper:** Solid Waste and Regional Landfill Pricing Information.
5. **Wyoming Statutes § 35-11-501:** Environmental Quality Act.
6. **EPA SMM Technical Guidance:** Foundry Sand in Transportation Applications.