



Foundry Sand Reuse in South Dakota

Best Practices & Regulatory Compliance

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3. Key Concepts and Definitions

What is Foundry Sand?

Foundry sand is high-quality, size-specific silica sand used by South Dakota's manufacturing industry to create molds and cores for metal casting. This industry supports the state's agricultural, industrial, and defense sectors (e.g., specialized components for machinery and infrastructure). Once the sand can no longer be used internally due to thermal fatigue—it is removed as **spent foundry sand (SFS)**. In South Dakota, SFS is recognized as a non-hazardous industrial byproduct with significant potential for civil engineering.

What is Beneficial Reuse?

In South Dakota, 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 South Dakota Department of Agriculture and Natural Resources (DANR).

What is the TCLP Test?

The **Toxicity Characteristic Leaching Procedure (TCLP)** (EPA Method 1311) is the standard analytical protocol required by DANR to determine if a waste is hazardous. To be eligible for beneficial reuse or classification as an "Inert Material," SFS must be verified as non-hazardous via TCLP analysis for heavy metals.

4. Regulatory Guidelines

South Dakota Dept. of Agriculture and Natural Resources (DANR)

The **DANR**, specifically the Waste Management Program, regulates the disposal and reuse of industrial byproducts under the state's solid waste management rules.

Specific Legal Citations:

- **ARSD 74:27:** "Solid Waste Management." Provides the foundational regulatory framework for all waste handling and material recovery in the state.
- **ARSD 74:27:13:17:** Addresses "Special Wastes" and provides a precedent for the localized remediation and reuse of industrial materials.
- **South Dakota Codified Laws (SDCL) 34A-6:** The state's primary solid waste management statute, which grants DANR the authority to promote waste reduction and recycling.

Beneficial Use Determination

South Dakota typically evaluates high-volume industrial reuse on a case-by-case basis. Generators seeking to reuse sand in structural fill or aggregate must provide chemical characterization data to DANR to prove that the material is stable and poses no risk to public health.

5. Reuse Applications and South Dakota Examples

Application	Description	South Dakota Context
Road Sub-base	Foundation layer for road beds.	High potential in SDDOT infrastructure and regional highway projects.
Landfill Daily Cover	Alternative Daily Cover (ADC).	Widely used at the Sioux Falls Regional Landfill and Rapid City landfill.
Flowable Fill	Low-strength concrete for utility bedding.	Demand in Sioux Falls and Rapid City urban utility and trenching projects.
Agricultural Infrastructure	Bedding for lagoons or feedlots.	Specialized potential given South Dakota's extensive livestock sector.
Structural Fill	Bedding for industrial building pads.	Subject to case-specific DANR review and "Inert Material" classification.

6. Environmental and Technical Considerations

Groundwater Protection

South Dakota relies heavily on vital aquifers for agriculture and municipal water. Any beneficial reuse of SFS in un-bound applications (like structural fill) must ensure zero risk of metal or binder leaching into regional water systems. DANR requires detailed chemical profiles to verify material stability.

Physical Stability

SFS from South Dakota's iron foundries often exhibits high angularity and structural stability. This makes it a superior material for specialized "flowable fill" and high-compaction road sub-base compared to some naturally occurring silty soils found in the region.

7. Funding, Grants, and Incentives

DANR Waste Management Grants

The DANR occasionally offers funding to support projects that reduce the state's landfill burden through the Solid Waste Management Program. Foundries developing regional "Recycled Aggregate Hubs" may qualify for technical or financial support.

South Dakota Governor's Office of Economic Development (GOED)

The state offers various incentives (e.g., the **Reinvestment Payment Program**) for manufacturers that invest in new facilities or equipment. Foundries installing sand reclamation systems may qualify for support through regional development initiatives.

8. Active Participants in South Dakota

Major Foundries and Hubs:

- **Dakota Foundry Inc.** (Pierre) - Custom gray and ductile iron castings for agriculture and industry.
- **Eagle Sales and Casting** (Regional service) - Precision casting and fabrication components.
- **Ermak Foundry & Machining** (Regional service) - Significant aluminum casting supplier for SD manufacturers.
- **Numerous Precision Hubs:** Concentrated in the Sioux Falls and Rapid City industrial corridors.

Potential End-Users:

- **SDDOT (South Dakota Dept. of Transportation)** - Major consumer of aggregate for highway construction.
- **Sioux Falls Regional Landfill** - Significant user of Alternative Daily Cover (ADC).
- **Rapid City Solid Waste Division** - Major user of industrial aggregate and ADC.
- **Myrl & Roy's Paving** (Sioux Falls) - Large-scale paving and civil contractor.

9. Success Story Highlights

Pierre Industrial Loop: Industrial manufacturers in the Pierre corridor, including **Dakota Foundry Inc.**, have successfully established internal sand reclamation systems to minimize waste. By characterizing the final spent fines as a non-hazardous, inert material, these facilities provide a local aggregate source for municipal infrastructure and landfill daily cover. These initiatives avoid the high gate fees (reaching **\$41.00 per ton** in major hubs) 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 **\$41.00 per ton** (Sioux Falls 2026 rate).
2. **Reduced Transport Burden:** Beneficial reuse sites (local construction/ADC) are often significantly closer than remote Subtitle D landfills.

3. **Statutory Relief:** Securing an "Inert Material" designation removes the material from standard solid waste disposal rules and reporting.

11. Risk Management Overview

- **Aquifer Liability:** The primary environmental risk in South Dakota. Reuse projects must be preceded by professional chemical assessments to satisfy DANR water protection standards.
- **Compliance Reporting:** Foundries must maintain accurate records of all diverted tonnage for annual state environmental audits and waste reduction tracking.

12. Step-by-Step Workflow for Foundries

1. **Analytical Profiling:** Conduct a full 32-parameter chemical profile, including TCLP and totals.
2. **DANR Consultation:** Contact the Waste Management Program to discuss the project scope and "Inert Material" criteria.
3. **End-User Partnership:** Secure a delivery agreement with a local construction project or municipal landfill.
4. **Logistics Documentation:** Maintain records of material weights and destinations for 5 years.
5. **Implementation:** Deploy the reuse program and re-verify sand chemistry annually to ensure consistency.

13. Real Cost Savings Example

Scenario: A Sioux Falls-area manufacturer generating 2,000 tons of sand annually.

- **Disposal Cost (at \$41.00/ton Gate Rate):** \$82,000

- Reuse Program (Testing + DANR Filing + Local Logistics): \$25,000
- Annual Savings: \$57,000

15. General FAQ & Landfill-Specific FAQ

Q: Does South Dakota 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 rising in Sioux Falls and Rapid City?

A: Yes, Sioux Falls rates are currently **\$41/ton**, and Rapid City increased fees by **\$7/ton** effective 2026, making sand diversion highly profitable.

16. References

1. **ARSD 74:27:** South Dakota Solid Waste Management Rules.
2. **DANR:** Environmental Permitting and Regulation Guides.
3. **City of Sioux Falls:** Sioux Falls Regional Landfill 2026 Rate Schedule.
4. **City of Rapid City:** Solid Waste and Landfill Fee Resolutions (2026).
5. **South Dakota Codified Laws 34A-6:** Solid Waste Management Statute.
6. **EPA SMM Technical Guidance:** Foundry Sand in Transportation Applications.