



Foundry Sand Reuse in Washington

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 in metal casting to create molds and cores. In Washington's high-tech manufacturing corridors—stretching from the aerospace hubs of Everett and Seattle to the industrial centers of Tacoma and Spokane—this sand is a high-volume byproduct. Once the sand can no longer be reused internally, it is removed from the system as **spent foundry sand (SFS)**. In Washington, SFS is considered a solid waste unless formally authorized for **Beneficial Use**.

What is Beneficial Reuse?

In Washington, beneficial reuse is the utilization of a solid waste in a manner that serves as an effective substitute for a commercial product or raw material. This process is governed by the Washington State Department of Ecology (Ecology) to ensure that industrial byproducts are diverted from landfills in a way that protects the state's sensitive surface and groundwater.

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 Washington, passing TCLP is the first technical requirement to qualify for the Beneficial Use permitting process under **WAC 173-350-200**.

4. Regulatory Guidelines

Washington State Dept. of Ecology

Ecology, specifically the Solid Waste Management Program, regulates the reuse of industrial byproducts under the state's solid waste management rules.

Specific Legal Citations:

- **WAC 173-350-200**: "Beneficial Use Permit Exemptions." This is the primary regulatory framework for Washington foundries. It outlines the requirements for obtaining a statewide or project-specific Beneficial Use Determination (BUD).
- **WAC 173-350-990**: Outlines the criteria for determining if a material is a "Solid Waste" versus a "Recovered Material."
- **RCW 70A.205.005**: The state's primary "Solid Waste Management" statute, which establishes the hierarchy prioritizing recycling and reuse over landfilling.

The BUD Application

To secure a BUD in Washington, an applicant must demonstrate that the SFS is chemically stable and serves as an effective substitute for a commercial product (e.g., aggregate in asphalt). Projects used "solely as fill" to avoid disposal costs are generally not eligible for this permit exemption.

5. Reuse Applications and Washington Examples

Application	Description	Washington Context
Asphalt Manufacturing	Fine aggregate in hot-mix asphalt.	A preferred and well-documented BUD application; used by regional paving firms.
Flowable Fill	Controlled low-strength material (CLSM).	High demand in Seattle, Tacoma, and Spokane urban utility projects.
Landfill Intermediate Cover	Use as cover between active landfill cells.	Helps regional landfills meet strict Ecology closure and odor rules.
Cement/Concrete Raw Material	Silica source for concrete products.	Viable for regional pre-cast concrete firms in the Puget Sound corridor.
Structural Fill	Bedding for building pads or embankments.	Subject to project-specific BUD and rigorous risk assessment.

6. Environmental and Technical Considerations

Groundwater and Watershed Protection

Due to Washington's high precipitation and reliance on sensitive aquifers (e.g., the Spokane Valley-Rathdrum Prairie Aquifer), Ecology requires a detailed risk assessment for any unbound reuse project. Foundries must ensure SFS meets the state's Model Toxics Control Act (MTCA) cleanup levels for soil and water contact to ensure zero risk of contaminant migration.

Physical Stability

SFS from Washington's high-precision aerospace and marine foundries often exhibits excellent structural stability and uniform gradation. This makes it a superior material for "flowable fill" and high-compaction embankments that must resist the state's frequent freeze-thaw and high-moisture cycles.

7. Funding, Grants, and Incentives

Ecology Waste-to-Resources Grants

The Department of Ecology occasionally offers grants for "Waste Reduction and Recycling" to local governments and businesses through the Public Participation Grant and other programs. Foundries investing in internal sand reclamation or high-value reuse infrastructure can apply for technical support.

Washington State Dept. of Commerce

The state offers various incentives (e.g., the **Manufacturing Sales and Use Tax Exemption**) for manufacturers that invest in clean technology. Foundries installing sand reclamation systems may qualify for significant state tax savings on new equipment.

8. Active Participants in Washington

Major Foundries and Hubs:

- **Jorgensen Forge** (Tukwila) - Specialized iron and steel castings for aerospace and defense.
- **Western Cast Inc.** (Regional service) - Precision fabrication and casting hubs.
- **Patriot Foundry & Castings** (Regional service) - Specialized non-ferrous sand casting.
- **Numerous Precision Hubs:** Concentrated in the Seattle, Tacoma, and Spokane industrial corridors.

Potential End-Users:

- **WSDOT (Washington State Dept. of Transportation)** - Major consumer of aggregate for highway construction.
- **Lakeside Industries, Inc.** (Puget Sound/Regional) - Large-scale paving and asphalt contractor.
- **Granite Construction** (Regional) - Major asphalt and aggregate producer.
- **King County Solid Waste Division** - Significant user of Alternative Daily Cover (ADC).
- **Spokane County Regional Solid Waste** - Major user of industrial aggregate.

9. Success Story Highlights

Puget Sound Industrial Loop: Leading aerospace fabricators in the Tukwila-Seattle corridor have successfully implemented "Closed-Loop" sand reclamation systems. By securing a Beneficial Use Permit Exemption under WAC 173-350-200, these facilities divert their final spent fines to municipal utility projects as a certified fine aggregate. These initiatives avoid the extreme gate fees in the Puget Sound region (which can exceed **\$240.00 per ton**) while directly supporting Washington's state waste reduction goals and enhancing regional industrial efficiency.

10. Clear Business Case Summary

1. **Avoidance of Extreme Gate Fees:** Saving up to **\$243.38 per ton** (King County 2026 self-haul rate).

2. **Transportation Savings:** By utilizing sand in local Puget Sound construction rather than long-hauling to remote Subtitle D landfills.
3. **ESG Supply Chain Alignment:** Helping major aerospace (e.g., Boeing) and defense customers meet their sustainability targets by diverting 100% of mold sand from landfills.

11. Risk Management Overview

- **Regulatory Compliance:** Operating a reuse project without a valid Ecology Beneficial Use Determination or notification is a violation of WAC 173-350.
- **Leachate Liability:** For projects in un-bound structural fill, foundries must maintain professional engineering documentation proving that the sand meets Washington's strict MTCA soil and water risk benchmarks.

12. Step-by-Step Workflow for Foundries

1. **Analytical Profiling:** Conduct a full 40-parameter chemical profile, including TCLP and totals per MTCA standards.
2. **Ecology Consultation:** Contact the Solid Waste Management Program to discuss the "Beneficial Use" criteria for the specific sand stream.
3. **BUD Submission:** Prepare and submit the formal application per **WAC 173-350-200**.
4. **End-User Partnership:** Secure an intake agreement with a local asphalt plant or construction project.
5. **Implementation:** Maintain daily tonnage records and annual characterization updates for state environmental audits.

13. Real Cost Savings Example

Scenario: A King County foundry generating 2,000 tons of sand annually.

- **Disposal Cost (at \$243.00/ton Gate Rate):** \$486,000
- **Reuse Program (BUD Filing + Testing + Local Logistics):** \$80,000
- **Annual Savings:** \$406,000

15. General FAQ & Landfill-Specific FAQ

Q: Does Washington have "pre-approved" beneficial uses for sand?

A: Asphalt and concrete ingredients are common, but Ecology generally requires a material-specific review to ensure binder chemistry is safe.

Q: Why are King County fees so much higher than the rest of the state?

A: King County rates (\$243/ton) reflect the extreme cost of operating a self-funded municipal system in a high-density urban environment with no long-term local landfill capacity.

16. References

1. **WAC 173-350-200:** Beneficial Use Permit Exemptions.
2. **Washington Department of Ecology:** Beneficial Use Determinations (BUD) Guidance.
3. **King County Solid Waste:** 2026 Disposal Rates and Fee Schedule.
4. **Spokane County:** Regional Solid Waste System Fees (Effective 2026).
5. **RCW 70A.205:** Solid Waste Management Statute.
6. **EPA SMM Technical Guidance:** Foundry Sand in Transportation Applications.