



Foundry Sand Reuse in Ohio

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 a high-quality silica sand used by metal casting facilities to make molds for shaping molten metal into parts. After repeated use, the sand becomes "spent" and needs to be replaced, creating a large volume of by-product material.

What is Beneficial Reuse?

Beneficial reuse means finding safe, productive ways to repurpose industrial by-products (like foundry sand) instead of throwing them away. It protects the environment, saves natural resources, and cuts disposal costs. In Ohio, beneficial reuse helps businesses lower expenses and communities build infrastructure more sustainably.

Examples of beneficial reuse for foundry sand include:

- Replacing mined sand in concrete or road base

- Using sand as daily cover or structural material at landfills, when approved by Ohio EPA under current beneficial use permits
- Mixing into manufactured soils, potting media, and bioretention/raingarden blends under Ohio's general beneficial use permits

What is a TCLP Test?

TCLP stands for Toxicity Characteristic Leaching Procedure – a laboratory test required by the U.S. EPA to find out if a waste material might release harmful contaminants into groundwater.

How a TCLP test works:

- A sample of the material is soaked in a mild acidic solution that simulates rainwater or landfill conditions.
- Scientists measure what chemicals "leach out" of the sample into the fluid.
- If dangerous levels of metals (like lead) or chemicals are found, the material is classified as hazardous waste and must be managed under strict regulations.

If the material passes the TCLP test (meaning contaminants are below federal limits), it can be reused safely under environmental rules.

Why Should Readers Care About Foundry Sand Reuse?

- Environmental Protection: Reuse reduces waste sent to landfills and conserves natural sand resources, which are expensive and limited.
- Cost Savings: Foundries, cities, and contractors save money by reusing sand instead of buying new materials or paying high disposal fees.
- Public Safety: Proper testing (like TCLP) ensures that reused sand does not threaten drinking water, soil, or the environment.
- Economic Growth: Reuse projects create jobs, strengthen recycling industries, and make local construction and public works projects more affordable.

4. Regulatory Guidelines

Ohio EPA Beneficial Use Program

The Ohio Environmental Protection Agency (Ohio EPA) regulates beneficial use of industrial byproducts, including spent foundry sand, under Ohio Administrative Code (OAC) Chapter 3745-599 and a set of Beneficial Use General Permits and individual beneficial use permits.

Key concepts:

- **Beneficial Use Byproduct:** A solid waste, industrial waste, or other material that can be safely and productively used in place of virgin raw materials when it meets specified criteria.
- **General Beneficial Use Permits:** Standardized permits that authorize recurring beneficial uses of specific byproducts and uses (for example, certain classes of foundry sand in soil blends).
- **Individual Beneficial Use Permits:** Site- and project-specific permits issued for uses not covered by general permits or for unique materials.

Ohio's framework is designed to:

- Promote diversion of suitable byproducts (including foundry sand) from landfills.
- Ensure that uses are protective of public health, safety, and the environment.
- Provide clear permitting pathways and testing requirements.

Ohio EPA General Permits for Foundry Sand

Ohio EPA has developed foundry-sand-specific general permits that are directly relevant to most reuse projects:

- BUGPFS01 – Foundry Sand Soil Blend, Soil-less Potting Media, and Bioretention Media General Permit

This general permit authorizes the beneficial use of qualifying foundry sand as:

- An ingredient in a soil blend.
- An ingredient in a soil-less potting media.
- An ingredient in bioretention media for green infrastructure (e.g., raingardens, bioswales).

Key eligibility criteria include:

- Sand must consist of silica sand and binders from molds and cores that have been through the production process at iron (gray and ductile), steel, or aluminum foundries.
- The sand must not be a hazardous waste under Ohio law (ORC 3734.01; OAC 3745-50-10 and 3745-51-03).
- The 95% upper confidence limit (UCL) of the mean concentration for each total and leachate constituent must not exceed Table 1 limits in the permit guidance.
- Soil blends and soil-less potting media cannot exceed 50% foundry sand by volume; bioretention media also is limited to $\leq 50\%$ foundry sand by volume.

Important constraints:

- BUGPFS01 does not authorize use of foundry sand as fill or structural fill.
- Storage and blending must avoid sensitive groundwater areas and must control stormwater and fugitive dust.

- BUGPFS02 – Foundry Sand Structural Fill and Pipe Bedding General Permit

A companion general permit (commonly referenced as BUGPFS02) authorizes qualifying foundry sand to be beneficially used only by placement on the land as:

- A component in structural fill.
- Non-potable pipe bedding.
- A topsoil amendment (typically not to exceed 30% foundry sand by volume in the blend).

Key points:

- Applies to spent foundry sand from iron (gray and ductile), steel, and aluminum foundries that use silica sand with chemical or clay binders.
- Sand must meet total metals and TCLP limits listed in Table 1 of the permit and must not be a hazardous waste.
- Historical piles (created more than two years prior) are generally excluded and usually require individual beneficial use permitting.

Daily Cover, Landfills, and Current Regulations

Ohio's solid waste rules govern cover material and landfill operation under OAC Chapter 3745-535 and the MSW landfill program:

- Landfill owners/operators must apply daily cover over exposed waste by the end of each operating day, and approved alternative daily cover materials can include industrial byproducts such as properly evaluated foundry sand.
- Any use of foundry sand at a landfill must be consistent with the facility's solid waste permit and any applicable beneficial use authorization from Ohio EPA.
- Ohio EPA evaluates such applications on a case-by-case basis through its beneficial use program under OAC Chapter 3745-599.

Historical Note: Prior to the current OAC Chapter 3745-599 framework, Ohio EPA Policy DSW-0400.007 addressed beneficial use of certain industrial materials including foundry sand. That policy was formally removed on April 30, 2003, and has been superseded by the current beneficial use rules and general permits. Current applications for foundry sand beneficial use should be made under the applicable general permits (BUGPFS01, BUGPFS02) or through individual beneficial use permits as appropriate.

Federal EPA and National Guidance

At the national level, the U.S. EPA, USDA-ARS, and The Ohio State University (OSU) conducted an extensive risk assessment of silica-based spent foundry sands from iron, steel, and aluminum foundries used in:

- Manufactured soils.
- Soil-less potting media.

- Roadway sub-base.

The risk assessment concluded that these uses are protective of human health and the environment when sands meet the studied criteria, and that such sands are comparable to virgin materials for these applications.

EPA's "Beneficial Uses of Spent Foundry Sands" resources further encourage:

- Reuse in soil-related applications.
- Use in construction materials (e.g., concrete, asphalt, flowable fill).
- State adoption of clear beneficial use programs.

Ohio's rules and general permits align closely with these national findings.

5. Reuse Applications and Ohio Examples

Beneficial reuse of foundry sand in Ohio takes multiple forms depending on material properties, project goals, and the applicable Ohio EPA permit or authorization. Real-world examples include soil blends, raingarden media, structural fill, and site redevelopment projects.

Common Beneficial Reuses in Ohio

Reuse Application	Description	Ohio Examples or Status
Soil Blend & Manufactured Topsoil	Blend foundry sand with soil, compost, and/or exceptional quality biosolids to create engineered topsoil with improved drainage. Typically limited to ≤ 50% foundry sand by volume for soil blends.	Explicitly authorized under BUGPFS01 for soil blends and soil-less potting media (≤ 50% by volume). Used in commercial landscape soil products produced by firms such as Kurtz Bros. under Ohio approvals.
Bioretention / Raingarden Media	Use foundry-sand-containing blends as bioretention soil for raingardens, bioswales, and other green infrastructure.	The City of Seven Hills, Ohio, installed a raingarden using bioretention soil supplied by Kurtz Bros. that included spent foundry sand; the city paid about half the cost of a comparable virgin-sand mix while achieving favorable infiltration performance. BUGPFS01 formally covers such uses statewide when sand meets Table 1 limits.
Structural Fill	Use as a component in engineered fill for building pads, embankments, and site grading where compaction and drainage properties are important.	Authorized for qualifying foundry sand under BUGPFS02 as a component in structural fill. Ohio EPA's individual beneficial use permit for the former Columbus Castings property allows stored foundry sand to be used as structural fill and soil blend ingredient in redeveloping the site.

Reuse Application	Description	Ohio Examples or Status
Non-Potable Pipe Bedding	Use as bedding around storm sewers and other non-potable pipes, replacing natural sand.	BUGPFS02 authorizes qualifying spent foundry sand as non-potable pipe bedding when constituent limits are met.
Topsoil Amendment	Incorporate a limited percentage of foundry sand into topsoil to enhance drainage and workability.	BUGPFS02 allows foundry sand as a topsoil amendment, typically not to exceed 30% by volume in the blend, provided all permit conditions and constituent limits are met.
Roadway Sub-base & Embankments	Substitute for sand/aggregate in road sub-base and embankment fill; provides bulk and controlled gradation.	FHWA documented use of foundry sand in embankments in the Cleveland area, with guidance provided for placing and compacting foundry sand under proper specifications. Ohio's Construction & Material Specifications Item 203 governs embankment materials and construction. Several Ohio municipalities reference ODOT Item 203 requirements for excavation and embankment work.
Landfill Daily/Interim Cover & Drainage Layers	Use as alternative daily cover, intermediate cover, or drainage layer material in liner and leachate collection systems.	Under current beneficial use rules (OAC 3745-599), Ohio EPA may approve foundry sand for these applications through individual beneficial use permits or site-specific authorizations when testing and siting requirements are met.
Construction Products (Concrete, Flowable Fill, Asphalt)	Use as a fine aggregate in concrete, masonry, road base, or controlled low-strength material; or as silica feedstock in cement manufacturing.	U.S. EPA and FHWA identify spent foundry sand as a suitable replacement for natural sand in concrete, flowable fill, and some asphalt mixes when properly characterized. In Ohio, such uses are typically handled through individual beneficial use permits or as "ingredient in a construction material" under OAC 3745-599-10.

Ohio Examples in Action

- **Kurtz Bros. Soil Blending (Statewide):** Kurtz Bros., Inc. has collected sand from Ohio foundries to manufacture soil blends and landscape products. Under Ohio EPA's beneficial use program and subsequent permitting arrangements, the company developed soil products containing foundry sand that met stringent leachate and total-constituent limits and could be marketed for general use.
- **Seven Hills Raingarden Project:** In Seven Hills, Ohio, a 20-by-60-foot eroded area on community property was converted into a raingarden using a bioretention soil mix containing spent foundry sand supplied by Kurtz Bros. The city paid roughly half what a comparable virgin-sand mix would have cost and obtained a mix with excellent infiltration for stormwater control.

- Columbus Castings Redevelopment (Columbus, OH): An individual beneficial use permit issued to SFG Columbus Parsons, LLC authorizes spent foundry sand left onsite from the former Columbus Castings operation to be used as:
 - An ingredient in a soil blend.
 - A component in structural fill.
 - Structural fill and fill material for site redevelopment. The permit requires ongoing sampling, statistical evaluation against constituent limits, and documentation that the sand is not hazardous.

These examples illustrate that Ohio has practical, permitted pathways from foundry generators through processors to end-use construction and green-infrastructure projects.

6. Environmental and Technical Considerations

Beneficial reuse of foundry sand requires a clear understanding of material composition, potential contaminants, and environmental testing protocols to ensure safe outcomes.

Types of Foundry Sands

Ferrous Foundry Sands (Iron and Steel Castings)

- Typically high-purity silica sand bonded with clay (green sand) or chemical resins.
- Generally low in contaminants when compared to non-ferrous sands.
- The EPA/USDA/OSU risk assessment and Ohio's general permits focus primarily on silica-based sands from iron, steel, and aluminum foundries.

Non-Ferrous Foundry Sands (Aluminum, Brass, Bronze Castings)

- Use similar base sand but may contain higher concentrations of metals such as lead, copper, zinc, and nickel, especially in brass/bronze operations.
- Ohio's general permits for foundry sand are limited to sands from iron, steel, and aluminum foundries; non-ferrous sands typically require case-specific individual permits or alternative management.

Specialty Sands

- Some foundries use olivine or chromite sands or other specialty media not covered by the standard silica-sand risk assessment.
- These materials may affect pH, salinity, or other soil chemistry parameters and therefore need additional evaluation.

Contaminants of Concern

Contaminant	Source	Notes
Lead (Pb)	Brass/bronze alloys, some coatings	Key concern; TCLP leachate must not exceed 5.0 mg/L federal hazardous waste limit. Elevated lead in non-ferrous sands is a primary reason they are excluded from many general permits.
Chromium (Cr)	Stainless steel, certain pigments	Typically low and stable in ferrous sands evaluated by EPA/OSU; still included in Table 1 limits in Ohio permits.
Phenols / Cresols	Phenolic resin binder breakdown	Detected at low levels in EPA/USDA studies; below risk-based thresholds in ferrous sands tested.
PAHs	Burned seacoal or organic binders	Present at low concentrations in many ferrous sands; EPA risk assessment found uses studied to be protective.
Dust / Free Silica	Handling of dry sand	Occupational inhalation hazard; requires dust controls even when environmental leaching risk is low.
pH / Salinity	Additives, binder residues	Some sands are slightly alkaline; generally manageable in engineered blends but should be considered in soil and bioretention designs.

Importance of TCLP and Related Testing

The EPA/USDA/OSU risk assessment for spent foundry sand relied on extensive total and leachate analyses for metals, PAHs, phenolics, and other constituents. In Ohio:

- General permits (BUGPFS01, BUGPFS02) require that the 95% UCL of the mean for total and leachate concentrations not exceed Table 1 limits for metals and selected organics.
- Generators must maintain a sampling and analysis plan (SAP) and repeat testing at defined intervals or when processes change.
- Materials that fail constituent limits must be managed as solid or hazardous waste, or routed through an individual beneficial use permit with additional controls.

Environmental Behavior of Foundry Sand

The EPA/USDA/OSU risk assessment and supporting studies found that:

- For silica-based sands from iron, steel, and aluminum foundries, heavy metals and organics are present at levels that do not pose unacceptable risks in the assessed uses (manufactured soils, potting media, roadway sub-base).
- Leaching under simulated conditions was low; groundwater and plant-uptake risks remained below health benchmarks.

- In roadway sub-base and similar contained applications, the sands behave comparably to virgin aggregates.

Ohio's reliance on these data and its own permit-driven thresholds means that, when materials are properly characterized and used under permit conditions, environmental risks are low and manageable.

7. Funding, Grants, and Incentives

State-Level Incentives (Ohio)

Ohio EPA Recycling & Litter Prevention (R&LP) Grants

Ohio EPA's Recycling & Litter Prevention program offers competitive grants that can support projects which divert materials from landfills, expand recycling markets, and add processing capacity.

Key grant types include:

- **Market Development Grants:** Support businesses that use recyclable materials as feedstock (e.g., sand reclamation, blending facilities, recycled-material concrete or soil products), often in partnership with a local government sponsor.
- **Community and Litter Grants:** Help local governments and nonprofits improve collection, education, and litter-prevention initiatives.
- **Scrap Tire and Specialized Grants:** Focus on specific waste streams but can complement broader industrial byproduct reuse strategies.

Ohio EPA has recently awarded millions of dollars in R&LP grants to recipients statewide, including funding for recycling market development and infrastructure. Projects that reclaim foundry sand, manufacture engineered fills, or produce soil/bioretention blends from industrial byproducts can be strong candidates when they document significant landfill diversion and market demand.

Solid Waste Management District (SWMD) Programs

Ohio's county and regional Solid Waste Management Districts may offer mini-grants or cost-share funds for equipment and programs that reduce landfilled tonnage. These programs frequently reference or complement Ohio EPA's R&LP and Market Development grants.

Regulatory Cost Incentives

Because landfill disposal in Ohio incurs state surcharges (currently totaling about \$4.75 per ton for MSW) plus any SWMD and host community fees, any ton of foundry sand diverted from landfill via beneficial use avoids those per-ton charges. Some counties list all components explicitly; for example, Erie County Landfill shows a total MSW charge of \$52 per ton, including Ohio EPA and district fees.

When foundry sand is legitimately beneficially used rather than disposed, these disposal-related fees do not apply, improving the economics of reuse.

Federal-Level Opportunities

The following national programs, while not Ohio-specific, can support foundry sand reuse projects in the state:

- EPA Sustainable Materials Management (SMM) grants and initiatives, which target innovative reuse, recycling, and circular-economy projects.
- Infrastructure Investment and Jobs Act (IIJA) recycling and materials programs, which help states and communities expand recycling and beneficial use capacity, including construction materials.
- FHWA recycled materials programs, which support research and demonstration of industrial byproducts (such as foundry sand) in transportation infrastructure.

Local Opportunities

- Regional partnerships: Entities such as SWACO (Solid Waste Authority of Central Ohio) act as government sponsors for Ohio EPA Market Development grants and help businesses acquire equipment that keeps materials out of landfills and into manufacturing streams.
- County initiatives: Counties like Wood County highlight state and local grant opportunities that support recycling and market development projects, including industrial materials.

These programs can help fund:

- Sand reclamation equipment.
- Screening, blending, and load-out systems.
- Pilot projects for structural fill, soil blends, and bioretention media using foundry sand.

8. Active Participants in Ohio

Generators and Material Suppliers

Without naming specific foundries that are not documented in public sources, active generators and suppliers in Ohio can be grouped as:

- Iron, steel, and aluminum foundries producing silica-based spent sand that meets Ohio EPA's beneficial use criteria.
- Legacy foundry sites, such as the former Columbus Castings property, where stored spent sand is being beneficially used onsite under an individual beneficial use permit.
- Reclamation and blending companies, such as Kurtz Bros., Inc., which collect and process spent foundry sands from multiple Ohio foundries to produce soil blends and bioretention media.

End Users

Key classes of end users in Ohio include:

- Municipalities and public works departments, using foundry-sand-containing bioretention mixes for raingardens and stormwater projects (e.g., the City of Seven Hills raingarden).
- Developers and industrial property owners, using foundry sand as structural fill and soil blend ingredient under Ohio EPA permits (e.g., redevelopment of the Columbus Castings site).
- Contractors and engineers, applying BUGPFS02 and Ohio DOT specifications to use qualifying foundry sand in embankments, structural fills, and pipe bedding.
- Landfill operators, who can accept properly permitted foundry sand as alternative daily or intermediate cover or as part of engineered drainage layers, when authorized through beneficial use permits.

Supporting Programs and Agencies

- Ohio EPA Division of Materials and Waste Management – administers beneficial use rules, general permits, and individual permits.
- Ohio EPA recycling and grants programs – provide funding and technical guidance for recycling and market development, including industrial materials.
- U.S. EPA, USDA-ARS, and The Ohio State University – conducted the national spent foundry sands risk assessment that underpins many state programs, including Ohio's.
- Ohio Department of Transportation (ODOT) – maintains Construction & Material Specifications (including Item 203 for embankments) that govern the use of fill materials in transportation projects.
- Industrial and professional organizations – including the American Foundry Society (AFS) and academic centers such as the Recycled Materials Resource Center (RMRC), which supply technical data and design guidance on foundry sand reuse.

9. Success Story Highlights

1. Seven Hills Raingarden – Bioretention Soil with Foundry Sand

- Location: Seven Hills, Ohio.
- Project: Convert a 20-by-60-foot eroded area into a functioning raingarden.
- Approach: The city installed a layered bioretention system, including a soil mix supplied by Kurtz Bros. that incorporated spent foundry sand.
- Outcomes:
 - The bioretention soil containing foundry sand achieved optimal infiltration for stormwater management.
 - The city paid about half of what a comparable virgin-sand bioretention mix would have cost.
 - Foundries avoided higher landfill costs by sending sand to Kurtz Bros. instead of disposal.

This project demonstrates how foundry sand can support green infrastructure while saving money for both generators and municipalities.

2. Columbus Castings Redevelopment – Onsite Structural Fill and Soil Blend

- Location: Former Columbus Castings site, Columbus, Ohio.
- Situation: Large volumes of stored foundry sand remained at a former steel casting facility after closure.
- Regulatory Pathway: Ohio EPA issued an individual beneficial use permit to SFG Columbus Parsons, LLC, authorizing use of the stored foundry sand as:
 - Fill and structural fill for onsite redevelopment.
 - An ingredient in soil blends.
- Safeguards:
 - Extensive sampling and statistical evaluation (95% UCL comparisons to permit limits).
 - Ongoing documentation to verify the sand remains non-hazardous.
 - Operating conditions to ensure no adverse impact on public health or the environment.

This case shows how individual permits can convert a legacy liability into a usable resource for redevelopment.

3. Long-Term Soil Blending and Market Development – Kurtz Bros. Programs

- Under Ohio EPA's beneficial use program, Kurtz Bros. obtained approvals to manufacture soil blends containing foundry sand – subject to strict TCLP and total-constituent limits.
- Subsequent permitting allowed the company to market soil products for general use when blends met stringent thresholds.
- Foundries that supplied sand gained a long-term outlet that replaced landfill disposal; end users received engineered soils at competitive prices.

This long-running program illustrates how consistent regulatory frameworks and market development can scale beneficial reuse statewide.

10. Clear Business Case Summary

Why Foundries Should Reuse Sand

- Avoid paying full landfill tipping fees plus state and local surcharges for each ton of sand disposed.
- Reduce long-term environmental liability associated with large disposal volumes.
- Demonstrate sustainability performance to customers and regulators by diverting a major waste stream.

- Potentially integrate with sand reclamation technologies that also cut virgin sand purchases.

Why Contractors and Developers Should Use Reused Foundry Sand

- Access low-cost or discounted material for structural fill, embankments, and bioretention blends.
- Improve bid competitiveness through lower raw-material costs.
- Meet owner or agency requirements for sustainable construction and recycled content.

Why Landfills Should Accept Foundry Sand Under Beneficial Use

- Obtain alternative daily cover or structural materials at little or no material cost, when approved by Ohio EPA and included in permits.
- Reduce consumption of native soils and purchased aggregates.
- Demonstrate alignment with circular-economy and resource-conservation goals.

11. Risk Management Overview

Beneficial reuse of foundry sand offers strong economic and environmental advantages, but it must be managed carefully to remain compliant and protective of health and the environment.

Best Practices

- Testing:
 - Perform TCLP and total metals/organics testing through an accredited laboratory following the sampling and SAP requirements in BUGPFS01/BUGPFS02 or any individual permit.
 - Repeat testing at least annually or whenever the foundry changes alloys, binders, or other process inputs.
- Documentation:
 - Maintain certificates of analysis, TCLP results, and shipping/receiving records for at least five years (or a longer period if required by permit).
 - Keep clear records linking each shipment to a specific permit or beneficial use authorization.
- Written Agreements:
 - Execute agreements or memoranda of understanding with landfills, contractors, soil blenders, or other end users that specify:
 - Approved uses and locations.
 - Quality and testing requirements.

- Documentation and reporting responsibilities.
- Regulatory Approvals:
 - Use Ohio EPA general permits for foundry sand when possible (BUGPFS01, BUGPFS02).
 - For uses or materials not covered, apply for an individual beneficial use permit under OAC 3745-599-300 and related rules.
- Insurance and Liability:
 - Confirm that environmental and general liability coverage explicitly addresses beneficial use activities and offsite shipments.

Ohio's regulatory structure, combined with EPA/USDA/OSU risk data, allows foundries and end users to manage risk systematically and transparently.

12. Step-by-Step Workflow for Foundries

Simple Process to Start Foundry Sand Reuse in Ohio

- Test
 - Collect representative samples of spent sand.
 - Conduct TCLP and total metals/organics analyses per Ohio EPA guidance for the relevant general or individual permit.
 - Confirm results meet all applicable limits and demonstrate the sand is not hazardous waste.
- Document
 - Compile lab reports, summary tables, and a basic sampling and analysis plan (SAP).
 - Organize documentation to align with BUGPFS01/BUGPFS02 or the individual permit application.
- Select a Regulatory Pathway
 - If the sand and proposed uses match a general permit (e.g., soil blends, bioretention media, structural fill, non-potable pipe bedding), file the required Notice of Intent (NOI) and obtain written coverage.
 - If not, work with consultants or Ohio EPA to pursue an individual beneficial use permit.
- Partner
 - Coordinate with ARS, soil blenders, contractors, landfills, or developers to identify practical reuse outlets that match your sand properties and approvals.
- Agreement

- Sign beneficial use agreements or contracts specifying:
- Material specifications and permitted uses.
- Documentation to accompany each load.
- Responsibility for compliance and reporting.
- Ship
- Label loads clearly (e.g., generator, permit ID, material description).
- Maintain load-out and receiving logs.
- Monitor
- Re-test if production processes or alloys change.
- Periodically review permit conditions and update partners on any changes.

Result: Compliance, measurable cost savings, and improved sustainability without major operational disruption.

13. Real Cost Savings Example

This section provides a data-based illustration of how beneficial reuse can change the economics of managing spent foundry sand in Ohio. Actual savings will vary by location, contract terms, and transport distances.

Landfill Disposal Costs

Recent surveys by the Environmental Research & Education Foundation (EREF) indicate that the average municipal solid waste landfill tipping fee in the Midwest region is around USD 57 per ton.

In Ohio, individual landfills publish fee schedules that add state surcharges and local district/host fees. For example, Erie County Landfill lists:

- Base MSW tipping fee: USD 41.00 per ton.
- Ohio EPA MSW fees: USD 4.75 per ton.
- Erie County Solid Waste District fee: USD 6.00 per ton.
- Host township fee: USD 0.25 per ton.

Total: USD 52.00 per ton for MSW disposal in that county.

Industrial byproducts such as foundry sand may be charged at similar or slightly different rates depending on classification and contracts, but these numbers illustrate the scale of disposal cost per ton.

Illustrative calculation for 1,000 tons per year at USD 52 per ton:

- Annual disposal cost $\approx 1,000 \text{ tons} \times 52 \text{ USD/ton} = 52,000 \text{ USD}$.

If the applicable rate is closer to the regional average tipping fee of about USD 57 per ton, the annual cost would be $\approx 57,000 \text{ USD}$.

Beneficial Reuse and Reclamation Costs

Vendors of thermal sand reclamation systems report operating costs under USD 7 per ton for processing waste

Using that figure as a conservative benchmark for per-ton processing cost:

- Processing 1,000 tons at 7 USD/ton $\approx 7,000 \text{ USD}$ per year.

If an Ohio foundry can send its sand to a permitted reclamation or soil-blending partner at a cost comparable to or below that level, the order of magnitude of potential savings is:

- Avoided landfill tipping fees: roughly 50,000–57,000 USD per 1,000 tons, based on the examples above.
- Incremental processing/transport for reuse: on the order of several thousand to tens of thousands of USD, depending on distance and technology.

Even with conservative assumptions, diverting 1,000 tons of spent sand per year from disposal to permitted beneficial use can easily yield tens of thousands of dollars in annual net savings, while also avoiding future disposal liabilities.

15. General FAQ & Landfill-Specific FAQ

Q: Is reused foundry sand safe for public projects like roads, parks, or raingardens?

A: For silica-based sands from iron, steel, and aluminum foundries, the joint EPA/USDA/OSU risk assessment found that use in manufactured soils, soil-less potting media, and roadway sub-base is protective of human health and the environment when sands meet the studied criteria. Ohio EPA's general and individual permits build directly on this science and require testing to ensure safety.

Q: How often does foundry sand need to be tested?

A: At minimum, sand must be tested initially to demonstrate that it meets Ohio EPA's constituent limits and is not a hazardous waste. After that, most permits require periodic re-testing (often annually) and whenever the generating process changes, such as alloy or binder changes.

Q: Can foundry sand be used near homes, gardens, or drinking water supplies?

A: Applications such as roadway sub-base, structural fill beneath pavement, or bioretention cells are common and well-supported by the risk assessment. For direct use in soils near gardens or residences, Ohio EPA relies on general and individual permits, constituent limits, and sometimes site-specific evaluations to ensure protection. Any proposed use in sensitive locations should be discussed with Ohio EPA.

Q: What happens if a sand stream fails testing or exceeds permit limits?

A: If testing shows that a sand stream exceeds total or leachate limits, it cannot be used under the applicable general permit. Options include:

- Managing the sand as solid or hazardous waste (including landfill disposal).
- Treating or segregating the material to meet limits.
- Applying for an individual beneficial use permit with additional controls.

Q: Who is responsible for proving that the sand is safe?

A: The generator (foundry) is responsible for testing and demonstrating that the material meets Ohio EPA's criteria and permit conditions. End users are responsible for using the sand only in approved ways and locations, consistent with permit terms and any local approvals.

Landfill-Specific FAQ

Q: Does foundry sand affect landfill leachate or groundwater quality?

A: For silica-based sands from iron, steel, and aluminum foundries that meet constituent limits, the EPA/USDA/OSU risk assessment and associated data indicate low leachability and risk in soil-related uses. Ohio EPA evaluates proposed landfill uses through its beneficial use program to ensure protective conditions are met.

Q: Can foundry sand count as "cover material" for daily cover compliance in Ohio?

A: Yes, when Ohio EPA approves the material and its use through the beneficial use program. Under current rules, any such use must be reflected in the landfill's solid waste permit and/or beneficial use authorization and must comply with OAC 3745-535-630.

Q: Is special equipment needed to handle foundry sand at a landfill?

A: No. In practice, standard landfill equipment – dozers, loaders, and compaction equipment – can typically handle foundry sand in the same way as soil or other granular cover materials, provided the moisture content and gradation are manageable.

Q: How should we document beneficial use at a landfill to demonstrate compliance?

A: Landfills should maintain:

- Records of the volume of foundry sand received and used.
- Copies of relevant Ohio EPA permits, NOIs, and approvals.
- Daily logs showing when and where foundry sand was used as cover or in other roles.

Templates from Ohio EPA guidance and general permits can be adapted for this purpose.

Q: What if sand chemistry changes after we begin using it?

A: If the generating foundry changes alloys, binders, or other key inputs, the sand must be re-tested, and results evaluated against applicable limits. If the material no longer meets permit criteria, use under that permit must stop until compliance is re-established or a new authorization is obtained.

16. References

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- EPA – Beneficial Uses of Spent Foundry Sands National overview of beneficial uses and supporting research. <https://www.epa.gov/smm/beneficial-uses-spent-foundry-sands>
- EPA – Beneficial Reuse of Foundry Sand: A Review of State Practices (Appendices A & B) Includes discussion of Ohio beneficial use programs and Kurtz Bros. soil blending operations. <https://archive.epa.gov/sectors/web/pdf/reusea.pdf> <https://archive.epa.gov/sectors/web/pdf/reuseb.pdf>
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