Foundry Sand Reuse in Missouri

Best Practices & Regulatory Compliance

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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 Iowa, 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 at landfills
- Mixing into manufactured soils for landscaping

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 Regulatory Guidelines

4. Regulatory Guidelines

Missouri DNR Regulations

The Missouri Department of Natural Resources (DNR) may grant a Beneficial Use Exemption for spent foundry sand under 10 CSR 80-2.020(9)(B), allowing sand that would otherwise require placement in a permitted landfill to be used in non-landfill applications. Exemptions are determined on a site- and project-specific basis; there is no blanket approval for any category of foundry sand.

Under the Beneficial Use Exemption process, applicants must submit a letter to the DNR Waste Management Program containing:

- A detailed description of the proposed reuse project, including location, quantities, and schedule.

- Documentation of the source(s) of the spent foundry sand.
- A full chemical and physical characterization of the sand (e.g., TCLP results for heavy metals, grain-size distribution, binder residuals).
- A description of all engineering controls and monitoring measures to prevent pollution, public nuisance, or health hazards.

Commonly Approved Uses

Although each request is evaluated case-by-case, spent foundry sand has been approved for applications such as:

- Structural fill and site grading
- Road subbase and embankment material
- Flowable fill (controlled low–strength material)
- Raw material in construction products (e.g., concrete admixture, asphalt aggregate)
- Emergency uses (e.g., temporary flood-control sandbags)

Key Regulatory Points

- No federal or state solid waste permit is required if the DNR grants a Beneficial Use Exemption.
- Sand must not exhibit hazardous characteristics; TCLP or equivalent leach testing is required.
- Non-ferrous sands (e.g., brass or bronze foundry sand) often require more stringent analysis due to potential heavy-metal content and are not presumptively approved.
- Unlisted uses or sands failing to meet DNR characterization criteria must be justified with additional site-specific data.

Landfill Fee Exemption

Missouri does not have a statutory landfill-surcharge credit specifically for beneficial reuse of foundry sand. Any reduction in disposal fees must be negotiated with local landfill operators or derived from a DNR-approved exemption that removes the requirement for landfill placement.

If information on certain points (e.g., state fee exemptions) is unavailable, applicants should contact the DNR Waste Management Program for guidance.

Federal EPA Guidelines

At the national level, the U.S. EPA encourages the reuse of spent foundry sands from iron, steel, and aluminum foundries. EPA's major documents include:

- Risk Assessment for Spent Foundry Sands in Soil-Related Applications (2014)
- Sustainable Materials Management Program resources.

EPA concluded that silica-based sands from iron, steel, and aluminum foundries can be safely reused in soil blends, construction materials, and road bases.

EPA does not federally regulate beneficial reuse of non-hazardous foundry sands but defers regulatory authority to the states.

Local Ordinances

Most cities and counties in Missouri defer to Missouri DNR's framework regarding foundry sand reuse through the Beneficial Use Exemption process.

Some municipalities may require additional notifications or approvals for larger volume projects, especially for uses near sensitive areas like wetlands or floodplains. Local flood damage reduction ordinances may apply to foundry sand projects within certain floodplains, requiring verification that projects do not raise flood heights.

However, if a reuse project complies with Missouri's Beneficial Use Exemption requirements, local additional permitting is typically not required beyond standard construction or development permits.

Note: Information on specific municipal ordinances addressing foundry sand reuse in Missouri is limited. Applicants should consult with local authorities for project-specific requirements.

5. Reuse Applications and Missouri Examples

Beneficial reuse of foundry sand in Missouri takes multiple forms depending on material properties, project goals, and DNR Beneficial Use Exemption approvals.

Note: Information on specific large-scale Missouri foundry sand reuse projects is limited in available published sources. The following table presents typical applications supported by foundry sand reuse research and practices documented in other states:

Reuse Application	Description	Missouri Context/Status
Road Base & Fill	Substitute for sand/aggregate in road subbase, embankments, and structural fill. Provides bulk and drainage.	Allowed under Missouri DNR's Beneficial Use Exemption (case-by-case approval required). Research shows foundry sand can effectively replace natural aggregate in road construction applications.
Cement & Concrete Production	Raw feedstock in Portland cement kilns (replaces virgin silica) or as fine aggregate in concrete and masonry products.	Missouri has cement plants that could potentially utilize foundry sand. Research shows foundry sand can replace up to 20-30% of natural aggregate in concrete mix without loss of strength.

Reuse Application	Description	Missouri Context/Status
Landfill Uses	Daily cover (usually sand-soil mix), interim cover, or drainage layer material in liners and leachate systems.	Potential application under Missouri's Alternative Daily Cover allowances. Would require site-specific evaluation and DNR approval.
Soil Amendment	Blend into topsoil, manufactured soil, or potting media to improve drainage. Typically limited to ferrous/aluminum sands with low contaminants.	Supported by EPA studies (safe at up to 50% sand content). Not widely documented in Missouri; potential growth area subject to DNR case-by-case approval.
Sandblasting Abrasive	Dry, granular sand used for surface blasting/cleaning in lieu of mined sand.	Missouri has active abrasive blasting companies. Clean spent foundry sand must be free of lead and properly sized for this application. Subject to DNR approval.
Other Innovative Uses	Construction fill, flowable fill (controlled low-strength material), and other experimental uses.	Exploratory uses would require individual DNR Beneficial Use Exemption applications with supporting environmental and engineering data.

Note: Specific Missouri foundry sand usage statistics, volumes, and company examples are not readily available in public sources. Applicants should contact the Missouri DNR Waste Management Program for current approved uses and precedent projects in the state.

Missouri Examples in Action

Cement Kiln Reuse

Missouri has cement manufacturing facilities that could potentially utilize spent foundry sand as raw material feedstock. Research demonstrates that foundry sand can effectively replace virgin silica in Portland cement kilns, saving natural resources and reducing emissions. However, specific Missouri cement plant foundry sand usage data is not available in public sources.

Road Construction Fill

Foundry sands could be approved for use in Missouri highway and road construction projects as structural fill under Missouri Department of Transportation specifications. Such projects would require individual Beneficial Use Exemption approvals demonstrating the sand meets engineering and environmental requirements for road base applications.

Landfill Daily Cover

Missouri landfills could potentially accept foundry sand as Alternative Daily Cover (ADC) material under state waste management regulations. This application would provide cost savings for both foundries and landfill operators while conserving native soils. Each landfill would require specific DNR approval for foundry sand use.

Potential Soil Amendments

EPA studies demonstrate that blending foundry sand into topsoil can improve drainage properties without heavy metal uptake by plants when used appropriately. This application in Missouri would require case-by-case DNR evaluation and approval under the Beneficial Use Exemption process.

Sandblasting and Niche Uses

Clean spent core sands could potentially be diverted for industrial sandblasting applications in Missouri, substituting for commercial blasting media. Missouri has active abrasive blasting companies that could utilize properly characterized foundry sand, subject to DNR approval.

Note: Interested parties should contact the Missouri DNR Waste Management Program for information on current approved foundry sand beneficial use projects in the state and guidance on the exemption application process.

6. Environmental and Technical Considerations

Beneficial reuse of foundry sand requires careful understanding of material composition, contaminant risks, and environmental testing protocols to ensure safe and responsible 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.
- Low in contaminants.
- EPA and Iowa DNR consider these the safest and most preferred for reuse.

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

- Similar base sand but potential contamination from metal alloys.
- Brass/Bronze sands often contain elevated lead, requiring more stringent testing or stabilization before reuse.

Specialty Sands:

- Some foundries use olivine sands or other media; not covered under EPA’s standard risk assessment for reuse.
- May alter soil pH or chemistry.

Contaminants of Concern

Contaminant	Source	Notes
Lead (Pb)	Brass/bronze alloys	Key concern; must not exceed TCLP leaching limit (5.0 mg/L).
Chromium (Cr)	Stainless steel alloys, pigments	Usually low and stable in ferrous foundries; not a major issue.
Phenols / Cresols	Phenolic resins (binder breakdown)	Organic compounds typically present in very low concentrations.
PAHs	Burnt sea coal or resin residues	Detected at very low levels; below environmental risk thresholds.
Dust / Free Silica	Physical hazard from dry sand	Requires dust suppression measures during handling to protect workers.
pH / Salinity	Binders, chemical additives	Some foundry sands have slightly alkaline pH, generally not problematic unless used directly in soils.

Importance of TCLP Testing

The Toxicity Characteristic Leaching Procedure (TCLP) is the industry-standard EPA test to determine whether foundry sand poses a leaching hazard to groundwater.

- Simulates landfill leachate conditions using an acetic acid solution.
- Measures 8 key metals (Lead, Arsenic, Cadmium, Chromium, etc.).
- Passing TCLP = Sand is classified as non-hazardous.
- Ferrous foundry sands in Iowa typically pass TCLP easily.

If foundry sand fails TCLP (e.g., high lead from brass castings):

- It must be managed as hazardous waste, not reused without treatment.

Key for Missouri Reuse:

All sands used in landfill cover, road base, concrete, etc., must pass TCLP and have supporting documentation as required by Missouri DNR's Beneficial Use Exemption process.

Environmental Behavior of Foundry Sand

- Heavy metals in ferrous sands are generally immobilized in the sand matrix.
- Organics (e.g., phenols, PAHs) are below actionable risk levels according to EPA risk assessments.
- Field studies show low leachability and no significant uptake into plants when used in soil amendments.

Conclusion: For properly characterized ferrous foundry sands, environmental risks are minimal — supporting broad beneficial reuse.

7. Funding, Grants, and Incentives

Information on foundry sand-specific funding programs, grants, and incentives in Missouri is not available in public sources. However, the following general programs may be applicable:

State-Level Financial Assistance

Solid Waste Management District Grants: Missouri's 20 solid waste management districts receive state funding to award grants to local governments, businesses, schools, and individuals for waste reduction, reuse, recycling, and composting projects. Districts receive approximately $2.1-2.2 million in quarterly allocations from the Solid Waste Management Fund, funded by landfill tonnage fees. A 25% cash match may be required depending on the district.

General Waste and Recycling Financial Assistance: The Missouri Department of Natural Resources offers several waste-related grants and financial assistance programs to help develop recycling markets and support community-based waste reduction projects. These programs focus on removing materials from the waste stream for beneficial reuse.

Tax Exemptions

Manufacturing Equipment Exemptions: Missouri provides sales tax exemptions for machinery, equipment, and materials used in manufacturing under Section 144.054, RSMo. This could potentially apply to foundry sand processing or reclamation equipment, though specific applicability to foundry sand beneficial use projects is not documented.

Pollution Control Equipment: Missouri exempts machinery, equipment, and devices used solely for preventing, abating, or monitoring water and air pollution from sales tax under Section 144.030.2(15) and (16), RSMo.

Landfill Fee Structure

No Specific Foundry Sand Exemption: Missouri does not appear to have a statutory landfill surcharge exemption specifically for foundry sand used as beneficial cover, unlike some other states. Cost savings would need to be negotiated directly with landfill operators or achieved through DNR-approved exemptions from landfill placement requirements.

Note: Foundries and potential sand users should contact their local solid waste management district and the Missouri DNR Waste Management Program for information on available funding opportunities that might apply to foundry sand beneficial use projects.

Federal-Level Opportunities

EPA Sustainable Materials Management Grants:

- Periodically available grants supporting innovative reuse/recycling projects.
- Can fund pilot projects, outreach campaigns, or infrastructure improvements related to foundry sand.

Federal Infrastructure and Recycling Funding (Infrastructure Investment and Jobs Act):

- Some grant programs are open to states and municipalities improving recycling or circular economy initiatives.
- Foundry sand reuse aligns with goals of waste reduction and sustainable construction.

FHWA / DOT Support:

- Federal Highway Administration promotes the use of recycled materials (including foundry sand) in road construction.
- Some research grants and technical support available for projects demonstrating new uses of industrial byproducts in infrastructure.

Local Opportunities

Local Government Partnerships: Some Missouri solid waste management districts and local governments offer mini-grants or project cost-sharing for waste diversion projects. These vary by jurisdiction and typically focus on projects that reduce landfill disposal and develop beneficial use markets.

Public-Private Collaborations: Limited information is available on specific public-private partnerships for foundry sand in Missouri. However, general waste diversion partnerships exist, such as the Kansas City recycling cart program involving The Recycling Partnership and private industry stakeholders.

Summary Table: Key Funding and Incentive Programs

Program/Incentive	Type	Key Details	Impact for Foundry Sand Reuse
Solid Waste District Grants	State/Local Grants	Competitive funding for waste diversion projects. Requires 25% match. Awards up to $100,000.	Could fund equipment, logistics, pilot projects for foundry sand beneficial use.
Energy Block Grants	Federal/State	Up to $2.36 million for energy efficiency projects in cities/counties.	May apply to projects demonstrating energy savings through foundry sand reuse.
DNR Beneficial Use Exemption	Regulatory Relief	Case-by-case exemptions from solid waste regulations.	Eliminates permit requirements and associated costs for approved uses.

Program/Incentive	Type	Key Details	Impact for Foundry Sand Reuse
Local Mini-Grants	Local Government	Small grants from counties/cities for green construction and waste diversion.	Potential support for transportation costs or project development.
EPA/Federal Grants	Research/Demonstration	Federal funding for innovative sustainable materials management pilots.	Can supplement state funding for demonstration projects.

Note: Foundries and potential sand users should contact their local solid waste management district for information on available funding opportunities that might apply to foundry sand beneficial use projects.

8. Active Participants in Missouri

Note: Comprehensive information on Missouri foundries actively participating in spent foundry sand beneficial use programs is not available in public sources. This represents a potential opportunity for Missouri to develop better documentation and tracking of beneficial use activities.

Identified Missouri Foundries (Potential Sand Generators)

While specific beneficial use participation is not documented, Missouri has several foundry operations that likely generate spent foundry sand:

MetalTek International - Carondelet Division (Pevely, MO)

- Large ferrous sand casting facility with over 130 years of operation
- Produces castings up to 18,000 lbs for industrial applications
- Scale of operations suggests significant spent sand generation

Additional Missouri Foundries:

- Multiple foundries are listed as American Foundry Society corporate members in Missouri
- Sand casting operations exist in St. Louis, Kansas City, and other Missouri cities
- Non-ferrous foundries (brass, bronze) also operate in the region

Current Status and Opportunities

Limited Documentation: Missouri lacks publicly available case studies or participant lists for foundry sand beneficial use. This may indicate:

- Limited current beneficial use activity
- Lack of centralized tracking or reporting
- Opportunity for program development and outreach

Potential for Development: Missouri's industrial base and proximity to construction markets suggest strong potential for foundry sand beneficial use programs.

Next Steps for Interested Parties:

- Foundries should contact Missouri DNR Waste Management Program to explore Beneficial Use Exemption opportunities
- Potential end-users (concrete producers, road contractors, landfills) should inquire about available foundry sand sources
- Missouri could benefit from developing a foundry sand beneficial use network and tracking system

Note: The absence of readily available information represents an opportunity for Missouri to enhance its foundry sand beneficial use tracking and promotion efforts.

End Users (Consumers of Foundry Sand)

Cement Plants

Holcim (Geocycle) - Clarksville, MO

- Large cement manufacturing facility operated by Holcim/Geocycle LLC
- Historically processed alternative materials as supplemental fuel and raw materials
- Location suggests potential capacity for foundry sand as silica feedstock, though current foundry sand usage is not documented

Additional Missouri Cement Operations

- Missouri has active cement plants that could potentially utilize foundry sand as raw material
- Holcim's Bloomsdale plant represents significant cement production capacity in the state

Landfills (Potential Alternative Daily Cover Users)

Missouri Landfill Operations

- Missouri has numerous permitted municipal solid waste landfills that could potentially use foundry sand as Alternative Daily Cover (ADC)
- Each facility would require individual approval from Missouri DNR for foundry sand use
- No specific landfills are documented as current foundry sand users

Construction Industry

Sand and Gravel Suppliers

- Multiple companies operate in Missouri providing construction materials including:
- Old Monroe Materials (St. Louis region)
- Pontotoc Sand and Stone (Missouri operations)
- Various aggregate suppliers throughout the state
- These companies could potentially incorporate approved foundry sand into their product lines

Road Construction

- Missouri Department of Transportation (MoDOT) oversees highway construction specifications
- Missouri Association of County & City Transportation Officials represents local road authorities
- Current MoDOT specifications do not specifically address foundry sand use

Current Status and Opportunities

Limited Active Participation: Unlike other states with well-documented foundry sand end-user programs, Missouri appears to have limited active beneficial use of foundry sand by end-users.

Potential Market Development: Missouri's construction industry, cement plants, and waste management facilities represent potential markets for foundry sand beneficial use, pending appropriate regulatory approvals and market development efforts.

Note: Interested end-users should contact the Missouri DNR Waste Management Program to explore foundry sand sourcing opportunities and Beneficial Use Exemption requirements for their specific applications.

Supporting Programs and Agencies

Missouri State Agencies

Missouri DNR Waste Management Program

- Oversees Beneficial Use Exemptions for foundry sand reuse
- Provides regulatory guidance for case-by-case beneficial use applications
- No specific foundry sand grant programs documented

Missouri Department of Transportation (MoDOT)

- Develops highway construction specifications that could incorporate foundry sand
- Currently no specific foundry sand provisions in published standards

Academic and Research Support

Missouri University of Science and Technology (Missouri S&T)

- Materials Science and Engineering Department operates foundry research facilities
- Capabilities include green sand casting, centrifugal casting, and metal joining research
- Potential source of foundry sand characterization and beneficial use research

University Research Centers

- Missouri has materials research capabilities that could support foundry sand beneficial use studies
- Limited evidence of active foundry sand research programs

Industry Organizations

American Foundry Society (AFS)

- Provides technical resources, case studies, and best practice guides for foundry sand beneficial use
- Multiple Missouri foundries are corporate members
- Offers waste management guidance and beneficial use manuals

Missouri Manufacturing Organizations

- State has various manufacturing trade associations that could potentially support foundry sand beneficial use initiatives

Current Status and Opportunities

Limited Organized Support: Missouri appears to lack the comprehensive, organized support structure for foundry sand beneficial use found in other states. This includes:

- No dedicated waste exchange or matchmaking services
- Limited documented technical assistance programs
- No specific foundry sand research initiatives

Potential Development Areas: Missouri could benefit from developing:

- A foundry sand beneficial use network similar to programs in other states
- Technical assistance programs for foundries seeking beneficial use partnerships
- Research initiatives at state universities to support beneficial use applications
- Enhanced coordination between foundries, end-users, and regulatory agencies

Key Collaboration Needs: For Missouri to develop successful foundry sand beneficial use programs, enhanced collaboration is needed between:

- Missouri DNR and foundries to streamline beneficial use exemption processes
- Academic institutions and industry to develop supporting research
- Trade associations and regulatory agencies to promote best practices
- Foundries and potential end-users to establish supply chains

Note: The absence of well-documented support programs represents an opportunity for Missouri to develop comprehensive foundry sand beneficial use assistance similar to programs documented in other states.

10. Clear Business Case Summary

Why Foundries Should Reuse Sand:

- Cost Savings: Avoid landfill disposal fees which can range from $30–$50 per ton or more
- Regulatory Benefits: Reduce environmental liability and compliance costs associated with waste disposal
- Sustainability Advantages: Improve sustainability reporting and corporate environmental responsibility metrics for customers and regulators
- Resource Recovery: Convert waste disposal cost into potential revenue stream through beneficial use partnerships

Why Contractors Should Reuse Sand:

- Material Cost Reduction: Access free or significantly discounted sand for construction fill, potentially saving thousands on material costs per project
- Competitive Advantage: Lower material costs can improve project bid competitiveness and profit margins
- Supply Security: Establish reliable supply relationships with local foundries for consistent material availability
- Environmental Benefits: Support circular economy practices and reduce demand for virgin aggregate materials

Why Landfills Should Accept Foundry Sand:

- Free Cover Material: Secure alternative daily cover material at no cost, replacing expensive purchased cover materials
- Operating Cost Reduction: Lower overall landfill operating expenses through reduced cover material procurement

- Operational Efficiency: Foundry sand can provide superior daily cover performance compared to some traditional materials
- Regulatory Compliance: Meet alternative daily cover requirements while supporting beneficial use objectives

Why Missouri Should Promote Foundry Sand Beneficial Use:

- Economic Development: Keep disposal costs and material revenues within the state economy
- Environmental Protection: Reduce landfill volume requirements and virgin material extraction
- Resource Conservation: Support circular economy principles and sustainable materials management
- Regulatory Efficiency: Streamline beneficial use processes to support both environmental protection and economic development

Note: Actual cost savings and benefits will vary based on local market conditions, transportation costs, material specifications, and regulatory requirements. Interested parties should conduct site-specific economic analyses for their particular circumstances.

11. Risk Management Overview

Beneficial reuse of foundry sand carries significant economic and environmental benefits, but participants must manage risk carefully to ensure compliance and protect their businesses.

Best Practices

- Testing: All sand must pass a current TCLP test (recommended updated annually or if process changes).
- Documentation: Keep certificates of analysis (CoA), TCLP results, and shipping records for at least five years.
- Written Agreements: Always establish written contracts with receiving facilities (landfills, cement plants, contractors) outlining responsibilities and confirming approved uses.
- Site-Specific Approvals: All foundry sand beneficial uses in Missouri require individual DNR Beneficial Use Exemption approvals. No universal approvals exist.
- Insurance: Verify liability coverage, and ensure your insurer understands your beneficial reuse activities.
- Professional Support: Environmental consultants can assist participants in setting up compliance systems, testing protocols, and document templates to minimize legal risk.

ARS Support: ARS can assist participants in setting up compliance systems, testing protocols, and document templates to minimize legal risk.

12. Step-by-Step Workflow for Foundries

Simple Process to Start Foundry Sand Reuse:

- Test:
- Conduct TCLP testing on representative sand samples through an accredited laboratory.
- Confirm results meet Missouri DNR non-hazardous thresholds.
- Document:
- Save all lab results, including full reports and summary sheets.
- Partner:
- Contact Missouri DNR Waste Management Program to identify potential reuse partners (landfills, cement plants, construction contractors).
- Apply:
- Submit Beneficial Use Exemption application to Missouri DNR for your specific reuse project.
- Agreement:
- Sign a beneficial reuse agreement or memo of understanding with the receiving facility.
- Ship:
- Begin shipping sand as needed after receiving DNR approval.
- Label loads clearly and maintain load-out logs.
- Monitor:
- If your production process changes (e.g., alloy change, new binder), re-test your sand.
- Maintain communication with Missouri DNR and receiving partners.

Result: Compliance, savings, and sustainability without added operational headaches.

13. Real Cost Savings Example

Why Reuse Makes Financial Sense:

- Landfill Disposal Costs:
- Disposal fee: ~$70-$150/ton

- Landfill surcharge: +$4.25/ton
- Total = ~$74.25-$154.25/ton to landfill
- Beneficial Reuse Costs:
- Transportation only: ~$10-$75/ton (varies by distance)

Savings Calculation:

If your foundry produces 1,000 tons/year:

Landfill cost: 1,000 tons x $49.25 = $49,250

Reuse transport cost (avg $15/ton): 1,000 tons x $15 = $15,000

Total annual savings = ~$34,250

Multiply this by 5–10 years and the impact becomes massive.

15. General FAQ & Landfill-Specific FAQ

Q: Is reused foundry sand safe for public use projects like roads or parks?
A: Yes, provided the sand passes environmental testing (like TCLP), silica-based foundry sand from iron, steel, and aluminum foundries has been proven safe for reuse in infrastructure projects. Missouri DNR and U.S. EPA endorse reuse for approved applications like roads, landfill cover, and construction fill.

Q: How often does foundry sand need to be tested?
A: Sand must be tested initially to prove non-hazardous status. After that, testing frequency depends on process consistency. Most foundries re-test yearly or if they change raw materials or binder systems.

Q: Can reused foundry sand be used near homes, gardens, or drinking water supplies?
A: Applications like road base and landfill cover are common and safe. For use in soils near gardens or homes, additional case-by-case approvals and environmental assurances may be needed through Missouri DNR's Beneficial Use Exemption process (especially for soil amendments).

Q: What happens if a reused sand load fails testing after reuse starts?
A: If post-use monitoring detects hazards (extremely rare with properly approved sand), remediation or removal would be required. This is why initial proper testing and documentation are critical.

Q: Who is responsible for proving the sand is safe - the foundry or the user?
A: The foundry (generator) is responsible for testing and certifying that the sand meets regulatory requirements. The end user must ensure they use the sand only in approved ways under Missouri DNR's Beneficial Use Exemption conditions.

Landfill-Specific FAQ

Q: Does foundry sand affect landfill leachate or groundwater?
A: No. Studies by EPA, USDA, and other state environmental agencies confirm that properly tested ferrous foundry sand does not contribute hazardous leachate or groundwater issues.

Q: Is foundry sand considered "cover material" for daily cover compliance?
A: Yes, if approved under Missouri DNR's Beneficial Use Exemption process. Foundry sand (mixed appropriately with soil) can qualify as Alternative Daily Cover.

Q: Do we need special equipment to handle foundry sand?
A: No. Standard landfill spreading equipment (dozers, loaders) can handle foundry sand easily.

Q: How do we document use to maintain regulatory compliance?
A: Maintain detailed load logs, daily cover documentation, and copies of Missouri DNR Beneficial Use Exemption approvals. Environmental consultants can provide documentation templates.

Q: What if sand chemistry changes?
A: Periodic re-testing is recommended, especially if the foundry changes alloy or binder systems. Any significant changes may require updated Missouri DNR approvals.

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- Missouri Revised Statutes. Section 144.054, RSMo - Sales Tax Exemptions for Manufacturing Equipment
- Missouri Revised Statutes. Section 144.030.2(15) and (16), RSMo - Sales Tax Exemptions for Pollution Control Equipment

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Academic and Research Sources

- University research on foundry sand characterization and beneficial use applications from Missouri University of Science and Technology Materials Science and Engineering Department

Additional Federal Resources

- Federal Highway Administration. (1995). Foundry Sand - Material Description. Retrieved from https://www.fhwa.dot.gov/publications/research/infrastructure/pavements/97148/027.cfm
- U.S. Department of Agriculture Agricultural Research Service contributions to EPA foundry sand risk assessment studies

Transportation and Construction Standards

- Missouri Department of Transportation (MoDOT) construction specifications and standards
- Missouri Association of County & City Transportation Officials (MACTO). Retrieved from https://macto.org

Contact Information for Additional Resources

- Missouri DNR Waste Management Program: Contact for Beneficial Use Exemption applications and guidance
- Local Solid Waste Management Districts: Contact for funding opportunities and local waste diversion programs
- American Foundry Society: Industry technical resources and best practices
- Environmental Consultants: Professional services for regulatory compliance and risk management

Note: Some sources represent general references to programs and regulations. Specific documents, contact information, and current program details should be verified directly with the respective agencies and organizations for the most up-to-date information.

9. Success Story Highlights