



# Foundry Sand Reuse in Michigan

Best Practices & Regulatory Compliance

---

**Abrasive Removal Services (ARS)**

Kelley, Iowa

Phone: (515) 720-7081 | Email: [team@abrasiveremovalservices.com](mailto:team@abrasiveremovalservices.com)

## Table of Contents

1. Michigan - Foundry Sand Recycling and Reuse (Cover)
2. Table of Contents
3. Key Concepts and Definitions
4. Regulatory Guidelines
5. Reuse Applications and Michigan Examples
6. Environmental and Technical Considerations
7. Funding, Grants, and Incentives
8. Active Participants in Michigan
9. Success Story Highlights
10. Clear Business Case Summary
11. Risk Management Overview
12. Step-by-Step Workflow for Foundries
13. Real Cost Savings Example
15. General FAQ & Landfill-Specific FAQ
16. References

## 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 Michigan, 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 and public works projects more affordable.

# 4. Regulatory Guidelines

## Michigan EGLE Regulations

The Michigan Department of Environment, Great Lakes, and Energy (EGLE) manages beneficial reuse through its Beneficial Use By-Product framework established under Public Act 178 of 2014 and Part 115 of the Natural Resources and Environmental Protection Act (NREPA). Under Michigan regulations, foundry sand from ferrous or non-ferrous aluminum foundries is recognized as a Beneficial Use By-Product, allowing for reuse without solid waste permit requirements when specific conditions are met.

**Approved beneficial uses for spent foundry sand include:**

- Beneficial Use 1: Aggregate, road material, or building material when bonded or encapsulated by cement, lime, or asphalt
- Beneficial Use 2: Construction fill, road base, and soil blending for non-land-applied uses
- Beneficial Use 3: Materials for treating wastewater or sludge, stabilizing hazardous substances, or serving as landfill construction material
- Beneficial Use 4: Alternative daily cover material at licensed landfills under approved operational plans
- Beneficial Use 5: Soil mixtures combining foundry sand with organic material to manufacture horticultural or engineered soils

**Key regulatory points:**

- Foundry sand must be tested and documented to demonstrate non-hazardous status under TCLP protocols.
- Ferrous and aluminum foundry sands qualify for beneficial use designations under Michigan regulations.
- Non-ferrous sands (such as brass or bronze foundries) containing elevated lead require case-by-case review and may require stabilization or treatment before reuse.
- For land application of foundry sand as a fertilizer, soil conditioner, or amendment, the Michigan Department of Agriculture and Rural Development (MDARD) administers regulatory oversight.
- Under Michigan Administrative Code R 299.4429, alternative daily cover materials (including approved foundry sand) may be used at Type II landfills if operators submit an operational plan demonstrating that the material controls disease vectors, fires, odors, blowing litter, and scavenging without threatening human health or the environment.

Beneficial Use Exemption: Foundry sand qualifying as a beneficial use by-product is exempt from solid waste permitting when used according to EGLE-recognized beneficial uses, significantly streamlining the regulatory pathway compared to other states.

**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 states like Michigan's EGLE.

### Local Ordinances

Most cities and counties in Michigan defer to Michigan EGLE's beneficial use framework regarding foundry sand reuse. However, local jurisdictions may impose additional zoning requirements or land use restrictions, particularly for projects near sensitive areas such as wetlands, floodplains, or residential zones.

For large-volume projects or land application uses, local consultation with county or municipal planning departments is recommended to ensure alignment with local land use policies. When a project complies with EGLE's beneficial use guidelines, additional local permitting is typically not required.

## 5. Reuse Applications and Michigan Examples

Beneficial reuse of foundry sand in Michigan takes multiple forms depending on material properties, project goals, and EGLE approvals. Field applications and potential uses have been documented in construction, landfill operations, and soil manufacturing.

### Common Beneficial Reuses

| Reuse Application            | Description                                                                                                            | Michigan Status and Examples                                                                                                                                                                                                                                                      |
|------------------------------|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Road Base & Fill             | Substitute for sand/aggregate in road subbase, embankments, and structural fill. Provides bulk and drainage.           | Permitted under Michigan's Beneficial Use 2 framework. Michigan construction contractors and local public works departments can incorporate foundry sand for road subgrades and structural embankments when material meets quality specifications.                                |
| Cement & Concrete Production | Raw feedstock in Portland cement kilns (replaces virgin silica) or as fine aggregate in concrete and masonry products. | Potential for Michigan cement operations. Regional facilities (such as Holcim in nearby states) accept foundry sand. Michigan cement and ready-mix concrete producers may evaluate foundry sand integration pending material characterization and testing.                        |
| Landfill Uses                | Daily cover (usually sand-soil mix), interim cover, or drainage layer material in liners and leachate systems.         | Approved under Michigan's Beneficial Use 4 framework. Type II landfills can use foundry sand as alternative daily cover if an operational plan is submitted to EGLE demonstrating performance standards. Several Michigan landfills have potential capacity for this application. |
| Soil Amendment               | Blend into topsoil, manufactured soil, or potting media to improve drainage. Typically limited to                      | Permitted under Michigan's Beneficial Use 5 framework with oversight from the Michigan Department of Agriculture and Rural Development (MDARD) for land-applied uses. Commercial soil                                                                                             |

| Reuse Application            | Description                                                                  | Michigan Status and Examples                                                                                                                                                     |
|------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              | ferrous/aluminum sands with low contaminants.                                | manufacturers in Michigan may incorporate foundry sand.                                                                                                                          |
| <b>Sandblasting Abrasive</b> | Dry, granular sand used for surface blasting/cleaning in lieu of mined sand. | Allowed under Michigan regulations when free of lead and appropriately sized. Industrial cleaning and fabrication shops may use clean spent core sand for equipment maintenance. |

## Michigan Examples in Action

- **Potential Cement Production:** Holcim's operations in nearby Mason City, Iowa process approximately 75,000 tons/year of foundry sand. Michigan cement facilities have similar capacity and could establish comparable programs.
- **Landfill Daily Cover:** Multiple Michigan landfills licensed by EGLE have the potential to implement foundry sand daily cover programs under approved operational plans, saving on native soil procurement costs.
- **Soil Manufacturing:** Michigan's horticultural and landscape industries could benefit from foundry sand blending under MDARD oversight, particularly in manufactured soil applications for erosion control and site remediation.
- **Road Construction:** County engineers and public works departments across Michigan (coordinated through the County Road Association of Michigan) may incorporate foundry sand in road construction projects pending material characterization and approval.
- **Industrial Fill:** Manufacturing facilities and industrial park developers in Michigan have opportunities to use foundry sand for site preparation, embankment fill, and pad construction.

## 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 Michigan EGLE 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                                                                                                  |
|---------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>Lead (Pb)</b>          | Brass/bronze alloys                | Key concern; must not exceed TCLP leaching limit (5.0 mg/L).                                           |
| <b>Chromium (Cr)</b>      | Stainless steel alloys, pigments   | Usually low and stable in ferrous foundries; not a major issue.                                        |
| <b>Phenols / Cresols</b>  | Phenolic resins (binder breakdown) | Organic compounds typically present in very low concentrations.                                        |
| <b>PAHs</b>               | Burnt sea coal or resin residues   | Detected at very low levels; below environmental risk thresholds.                                      |
| <b>Dust / Free Silica</b> | Physical hazard from dry sand      | Requires dust suppression measures during handling to protect workers.                                 |
| <b>pH / Salinity</b>      | 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 Michigan 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 Michigan Reuse: All sands used in landfill cover, road base, concrete, etc., must pass TCLP and have supporting documentation per EGLE beneficial use requirements.

## 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

### State-Level Incentives

#### Michigan Solid Waste Management District Grants:

- Michigan's 20 solid waste management districts receive state funding to award grants to municipalities, businesses, and nonprofits for waste reduction and recycling projects.
- Districts allocate approximately \$2.1-2.2 million in quarterly funding from the Solid Waste Management Fund (funded by landfill tonnage fees).
- Foundry sand reuse projects, including equipment and logistics initiatives, may qualify for competitive funding.
- Typically requires a 25% cash match from applicants.

#### Michigan EGLE Beneficial Use Program:

- Provides free regulatory support and technical guidance for beneficial use projects.
- No direct funding, but eliminates costs associated with solid waste permitting and approval for qualifying reuse projects.
- Streamlined approval pathway reduces administrative burden compared to standard waste management permitting.

#### Property Tax Incentives:

- Michigan allows exemptions for pollution control equipment and recycling machinery under state tax law.
- Sand reclamation units, screening equipment, and mixing machinery used for foundry sand processing may qualify for property tax exemption if certified as pollution control facilities.

#### Michigan Department of Agriculture and Rural Development (MDARD) Oversight:

- For land-applied foundry sand (Beneficial Use 5), MDARD provides regulatory framework that may facilitate market development for soil amendment products.

## 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:

- Michigan counties and municipalities may offer mini-grants or project cost-sharing for green construction and waste diversion projects.
- Example: County public works departments may help subsidize trucking costs if foundry sand is used in local road construction.

### Public-Private Collaborations:

- Landfills may waive tipping fees for sand.
- Construction contractors may provide free transport in exchange for discounted material.
- Informal partnerships often unlock major savings without formal grant applications.

## Summary Table: Key Funding and Incentive Programs

| Program/Incentive                      | Type         | Key Details                                      | Impact for Foundry Sand Reuse                      |
|----------------------------------------|--------------|--------------------------------------------------|----------------------------------------------------|
| <b>Solid Waste Management District</b> | State Grants | Competitive funding for waste diversion projects | Can fund equipment, logistics, pilot projects, and |

| Program/Incentive                       | Type                      | Key Details                                                                                                  | Impact for Foundry Sand Reuse                                                                                        |
|-----------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Grants</b>                           |                           | administered through Michigan's 20 districts. Typically requires 25% cash match.                             | feasibility studies for foundry sand reuse initiatives.                                                              |
| <b>EGL E Beneficial Use Program</b>     | Regulatory Support        | Free technical assistance and streamlined approval pathway for beneficial use by-products.                   | Eliminates permitting costs and accelerates project approval, reducing time-to-market for reuse partnerships.        |
| <b>Property Tax Exemption</b>           | Tax Incentive             | Exemption for pollution control and recycling equipment certified by state.                                  | Reduces capital investment costs for sand processing, screening, and reclamation infrastructure.                     |
| <b>MDARD Land Application Framework</b> | Regulatory/Market Support | MDARD oversight of foundry sand land application facilitates market development for soil amendment products. | Supports commercialization of foundry sand in horticultural and landscaping applications.                            |
| <b>EPA/Federal Grants</b>               | Research/Demonstration    | Grants from EPA, FHWA, or other federal agencies for innovative reuse pilots.                                | Can co-fund Michigan projects that demonstrate foundry sand reuse in construction, soil blending, or infrastructure. |

## 8. Active Participants in Michigan

### Foundries (Generators of Spent Sand)

Milson Foundry (Madison Heights, MI)

- Ferrous foundry producing grey iron and ductile iron castings.
- Member of Foundry Association of Michigan.
- Candidate for beneficial reuse programs.

Pioneer Foundry (Jackson, MI)

- Iron foundry with regional market presence.

- Generates consistent spent sand streams from casting operations.

#### Modern Aluminum Castings Co., Inc. (Michigan operations)

- Aluminum and iron castings manufacturer since 1919.
- Serves automotive, HVAC, appliance, and industrial markets.
- Non-ferrous sand generation from aluminum casting.

#### State Line Foundries (Michigan operations)

- Grey iron and ductile iron casting specialist.
- Operates ISO 9001 quality systems.
- Regional presence in Michigan area.

#### Foundry Association of Michigan Members

- Multiple member foundries including Betz Industries, Brembo, Cadillac Castings Inc., CWC Textron, Eagle Alloy Inc., EJ, and Great Lakes Castings LLC.
- Members represent ferrous and non-ferrous casting operations across Michigan.

## End Users (Consumers of Foundry Sand)

#### Michigan Landfills

- Type II and Type III landfills licensed by EGLE across Michigan.
- Multiple facilities have capacity to implement foundry sand daily cover programs under approved operational plans.
- Can reduce native soil procurement costs through beneficial use agreements.

#### Michigan Cement and Concrete Operations

- Ready-mix concrete suppliers throughout Michigan may evaluate foundry sand integration.
- Potential for cement kiln co-processing in region (Holcim and other regional producers).

#### Michigan Construction Industry

- Road builders, general contractors, and site development companies across Michigan.
- County and local road authorities (through County Road Association of Michigan).
- Industrial park developers and site preparation contractors.

#### Horticultural and Soil Manufacturing

- Commercial soil blending operations in Michigan may utilize foundry sand in manufactured soil products.

- Landscape contractors and erosion control specialists.

#### Academic and Research Institutions

- University of Michigan and Michigan State University may support research pilots on foundry sand beneficial use.
- Potential for soil science and civil engineering research projects.

### Supporting Programs and Agencies

#### Michigan EGLE (Department of Environment, Great Lakes, and Energy) -- Materials Management Division

- Oversees Beneficial Use By-Product program and beneficial use determinations.
- Provides regulatory guidance and technical assistance for foundry sand reuse.
- Administers beneficial use approvals and alternative daily cover operational plans for landfills.
- Manages Solid Waste Management District grant allocation.

#### Michigan Department of Agriculture and Rural Development (MDARD)

- Regulates land application of foundry sand used as fertilizer, soil conditioner, or soil amendment.
- Provides oversight for Beneficial Use 5 soil manufacturing applications.
- Supports commercialization of foundry sand in horticultural products.

#### Foundry Association of Michigan

- Provides technical resources, training, and best practice guidance to member foundries.
- Promotes beneficial reuse as sustainability best practice.
- Facilitates industry networking and information sharing.

#### American Foundry Society (AFS) -- Great Lakes Chapter

- Offers technical manuals, case studies, and environmental compliance resources.
- Michigan members share insights on successful sand reclamation and reuse programs.
- Collaborates with universities and agencies to promote sustainable casting practices.

#### County Road Association of Michigan

- Represents local road authorities and engineers.
- Provides guidance on acceptable materials for road construction.
- Facilitates adoption of foundry sand in road projects.

#### Michigan Waste Exchange and Recycling Networks

- Connects material generators with end-users (similar services available through regional networks).
- Provides matchmaking assistance for beneficial use partnerships.

## Key Collaboration Insights

- Michigan foundries provide consistent, tested sand streams suitable for reuse across multiple applications.
- Landfills and cement operations represent high-volume end-use outlets when supported by EGLE beneficial use approvals.
- Construction contractors, road authorities, and soil manufacturers create project-specific demand for foundry sand.
- EGLE, MDARD, and Foundry Association of Michigan provide the regulatory framework, technical support, and industry coordination to enable reuse programs.
- University research and AFS technical resources validate performance and support market development.

Michigan has strong foundational elements for a successful foundry sand beneficial reuse program. Proactive coordination among foundries, regulators, end-users, and researchers can unlock significant environmental and economic gains.

## 9. Success Story Highlights

### Success Story 1: Nearby Regional Cement Partnership (Mason City, IA)

While located outside Michigan, the Holcim Geocycle facility in Mason City, Iowa demonstrates a proven model for Michigan cement operations:

- Accepts approximately 75,000 tons/year of spent foundry sand from regional foundries.
- Saves virgin sand mining and reduces environmental impact in cement production.
- Establishes viability of foundry sand integration in cement manufacturing.
- Michigan cement facilities (Holcim Clarksville and others) have similar capacity and could replicate this model.

### Success Story 2: Michigan Landfill Pilot Potential

While specific documented pilot projects are limited, Michigan's Beneficial Use 4 framework and multiple licensed landfills create readiness for implementation:

- EGLE's operational plan approval process provides clear pathway for daily cover programs.
- Type II landfills can reduce native soil usage and operating costs through foundry sand alternative cover.

- Demonstration projects in Michigan would validate environmental safety and operational feasibility.

### Success Story 3: Foundry Association and Industry Momentum

The Foundry Association of Michigan represents diverse casting operations that are primed for reuse:

- Member foundries include significant ferrous and non-ferrous operations.
- Growing national emphasis on foundry sand beneficial reuse is driving industry interest in Michigan.
- Voluntary participation in beneficial use programs offers competitive advantage and sustainability credentials.

## 10. Clear Business Case Summary

### Why Foundries Should Reuse Sand:

- Save \$30--\$50 per ton vs. landfill disposal costs.
- Avoid environmental liability.
- Improve sustainability reporting for customers and regulators.

### Why Contractors Should Reuse Sand:

- Get free or discounted sand for construction fill.
- Improve project bids by lowering material costs.

### Why Landfills Should Accept Foundry Sand:

- Secure free cover material.
- Reduce operating costs.
- Increase daily cover efficiency.

## 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.
- Beneficial Use Status: Ensure your foundry sand qualifies under Michigan's Beneficial Use 1-5 framework. Contact EGLE for verification or site-specific guidance if needed.
- Insurance: Verify liability coverage, and ensure your insurer understands your beneficial reuse activities.

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 Michigan EGLE non-hazardous thresholds.
- Document:
  - Save all lab results, including full reports and summary sheets.
- Partner:
  - Contact ARS to match your material to a reuse project (landfill, cement, construction).
- Agreement:
  - Sign a beneficial reuse agreement or memo of understanding.
- Ship:
  - Begin shipping sand as needed.
  - 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 ARS 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. Michigan EGLE and U.S. EPA endorse reuse for approved applications like roads, landfill cover, and construction fill under the state's beneficial use framework.

### **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 (Beneficial Use 5), additional oversight by Michigan MDARD and environmental assurances are required.

### **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 per Michigan EGLE beneficial use designations.

## Landfill-Specific FAQ

### **Q: Does foundry sand affect landfill leachate or groundwater?**

A: No. Studies by EPA, USDA, and Michigan EGLE 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. Michigan EGLE regulations (R 299.4429) approve foundry sand as alternative daily cover material at Type II landfills if operators submit and receive approval for an operational plan demonstrating performance standards.

### **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 simple load logs and daily cover documentation. ARS can provide templates. EGLE may request documentation of alternative cover material use during inspections.

**Q: What if sand chemistry changes?**

A: Periodic re-testing is recommended, especially if the foundry changes alloy or binder systems. Notify EGLE if chemistry changes significantly, as approval may need to be revisited.

## 16. References

- Michigan Department of Environment, Great Lakes, and Energy (EGLE) - Beneficial Use Program
- <https://www.michigan.gov/egle/about/organization/materials-management>
- Michigan Natural Resources and Environmental Protection Act (NREPA) - Part 115
- Solid Waste Management regulations administered by EGLE
- Michigan Public Act 178 of 2014 (HB 5400, HB 5401, HB 5402)
- Beneficial use by-product statutory authority
- Michigan Administrative Code R 299.4429
- Type II landfill operation; daily and interim cover material
- Michigan Department of Agriculture and Rural Development (MDARD) - Land Application Programs
- Oversight of foundry sand use as fertilizer, soil conditioner, soil amendment
- EPA - Beneficial Uses of Spent Foundry Sands
- <https://www.epa.gov/smm/beneficial-uses-spent-foundry-sands>
- EPA - Risk Assessment of Spent Foundry Sands in Soil-Related Applications (2014)
- <https://www.epa.gov/sites/default/files/2015-09/documents/foundrysandfinalriskassessment.pdf>
- Federal Highway Administration (FHWA) - Foundry Sand Facts for Civil Engineers
- Foundry Sand Facts for Civil Engineers (FHWA)
- EPA - Foundry Sand Reuse Toolkit
- EPA Toolkit for Developing Beneficial Reuse Programs for Foundry Sand (archived)
- American Foundry Society (AFS) - Beneficial Reuse Guides and Case Studies
- American Foundry Society Reuse Resources
- Foundry Association of Michigan

- Michigan foundry industry organization and member resources
- Michigan Waste Exchange and Recycling Networks
- Industrial by-product matchmaking services
- EPA Archives - Beneficial Reuse of Foundry Sand PDF
- EPA Archive - Foundry Sand Beneficial Reuse PDF
- USDA Agricultural Research Service (ARS) Contributions
- Referenced in EPA risk assessments and soil-related environmental studies
- ScienceDirect Research - Waste Foundry Sand Leachate Characteristics
- Waste Foundry Sand: Leachate Study - ScienceDirect
- MDPI Research on Environmental Aspects of Foundry Sand Reuse
- Reuse or Disposal of Waste Foundry Sand: MDPI Research Article
- EPA - Sustainable Materials Management Program (SMM) Overview
- <https://www.epa.gov/smm>
- Federal Infrastructure and Jobs Act (IIJA) Recycling Grants
- Infrastructure Investment and Jobs Act - Recycling Grants
- County Road Association of Michigan
- Local road authority standards and coordination
- Geocycle Mason City Case Study (Holcim/Grede partnership)
- Regional example of foundry sand reuse in cement production