

US EPA ARCHIVE DOCUMENT

## APPENDIX A

# SUMMARIES OF STATE GUIDELINES AND REGULATIONS ON REUSE OF INDUSTRIAL BY-PRODUCTS

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\* These states have programs or regulations specifically for the beneficial reuse of foundry sand.

## INTRODUCTION

This appendix contains individual summaries of the regulations and guidelines regarding the reuse of industrial by-products in 18 states. Each summary describes the state's current system for classifying waste, allowable beneficial reuses, sampling and analysis requirements, constituent concentration thresholds, and other requirements. It also lists staff contacts and websites for each state for obtaining additional information.

The criteria used to select the states to for this review of industrial waste recycling/reuse regulations included:

- States with the largest number of foundries (and, thus, of greatest relevance to this effort, since they represent the greatest potential for reuse of foundry sand).
- States with active industrial waste reuse programs (although many more states than those included in this review have active industrial waste programs).
- States that have developed guidance specific to the beneficial reuse of foundry sand or have actively worked with the foundry industry on this issue.

Six of the states reviewed for this effort are in the process of proposing or writing new beneficial reuse guidelines or regulations. The types of changes they are considering illustrate the dynamic nature of the regulatory landscape for beneficial reuse:

**Alabama** is planning on issuing a public notice of proposed changes to the state's beneficial reuse requirements in October 2002. Specific changes under consideration were not available at the time this report was completed.

**Iowa** was revising its reuse regulations (Administrative Code, Section 567, Chapter 108 – Reuse of Solid Waste) at the time of this report's publication. Iowa has proposed more universally approved uses for foundry sand, such as a raw material in concrete products and leachate control drainage material at sanitary landfills. Iowa has proposed changing the leachate

thresholds to 10 times the MCL for drinking water standards, and utilizing the Synthetic Precipitation Leaching Procedure (SPLP) instead of the TCLP. Some siting restrictions pertaining to floodplains, wells and sinkholes are also proposed.

**Maine** has established a workgroup to review the initial screening analysis requirements for reuse, which currently consist of leachate thresholds for 579 contaminants. This workgroup is reconsidering the number of constituents included in the screening analysis, as well as their respective thresholds.

**Massachusetts** is revising its regulations to allow several methods of making beneficial use determinations. The methods include: (1) a comparative analysis of products made with and without beneficial use determination material; (2) the use of suitably analogous regulatory standards from other programs; and (3) a formal risk assessment, when necessary.

**Michigan** formed a workgroup to draft rules related to composting and beneficial use of waste materials in April of 2001. A draft version of these rules will be available for public comment in the fall of 2002.

**Minnesota** is drafting an amendment to its solid waste management rules to streamline and clarify the reuse of solid waste. While foundry sand is not specified in the current draft (July 20, 2001), Minnesota has indicated its intention to list certain uses of foundry sand as "unregulated" in the amendment. Once generators of by-products demonstrate that their material meets requirements specified by the Minnesota Pollution Control Agency, they will be able to engage in any of the pre-determined reuses. Applicants will also be able to seek approval for additional by-products and uses.

STATE PROGRAM AND CONTACT INFORMATION

State	Most Relevant Regulation/Policy	Regulation/Policy Website(s)	Contact Name	Contact Position/Division	Contact Phone	Contact Email
Alabama	Chapter 335-13-4 (Solid Waste Program Regulations)	<a href="http://www.adem.state.al.us/Regulations/regulations.htm">www.adem.state.al.us/Regulations/regulations.htm</a>	Larry Bryant	Chief, Solid Waste Branch	334-271-7771	<a href="mailto:Landmail@adem.state.al.us">Landmail@adem.state.al.us</a>
California	<i>Legislation:</i> California Health and Safety Code, Section 25140-25145 <i>Regulations:</i> Title 14 (non-hazardous waste management), Title 27 (waste disposal on land)	<a href="http://www.ciwmb.ca.gov/Statutes/HltShSaf.htm">www.ciwmb.ca.gov/Statutes/HltShSaf.htm</a> <a href="http://www.ciwmb.ca.gov/Regulations">www.ciwmb.ca.gov/Regulations</a>	Allison Reynolds  Peter Fuller  Peggy Harris	Permitting and Enforcement Division, California Integrated Waste Management Board  Division of Clean Water Programs, State Water Resources Control Board  Hazardous Waste Management, Department of Toxic Substances Control	916-341-6873  916-341-5675  916-324-7663	<a href="mailto:areynold@ciwmb.ca.gov">areynold@ciwmb.ca.gov</a>  <a href="mailto:fullerp@cwpswrcb.ca.gov">fullerp@cwpswrcb.ca.gov</a>  <a href="mailto:pharris@dtsc.ca.gov">pharris@dtsc.ca.gov</a>
Illinois	35 Illinois Administrative Code Part 817 - Requirements for New Steel and Foundry Sand Industry Wastes Landfills	<a href="http://www.ipcb.state.il.us/Title_35/main.htm">www.ipcb.state.il.us/Title_35/main.htm</a>	Ken Smith	Permits Section, Solid Waste Management	217-524-3280	<a href="mailto:EPA4423@epa.state.il.us">EPA4423@epa.state.il.us</a>
Indiana	Foundry Sand Waste Classification Guidelines	<a href="http://www.in.gov/idem/land/pubsforms/guidance.html">www.in.gov/idem/land/pubsforms/guidance.html</a>	Tracy Barnes	Office of Solid & Hazardous Waste Management	317-308-3110	<a href="mailto:Tbarnes@dem.state.in.us">Tbarnes@dem.state.in.us</a>
Iowa	Iowa Administrative Code, Section 567, Chapter 108 (Reuse of Solid Waste)	<a href="http://www.legis.state.ia.us/Rules/2002/iac/gnac/gnac1919/gna1920.pdf">www.legis.state.ia.us/Rules/2002/iac/gnac/gnac1919/gna1920.pdf</a>	Jeff Myrom	Policy & Budget Development, Waste Management Assistance Bureau	515-281-3302	<a href="mailto:Jeff.Myrom@dmr.state.ia.us">Jeff.Myrom@dmr.state.ia.us</a>

PROGRAM AND CONTACT INFORMATION

State	Most Relevant Regulation/Policy	Regulation/Policy Website(s)	Contact Name	Contact Position/Division	Contact Phone	Contact Email
Louisiana	Title 33, Environmental Quality Part VII, Solid Waste, Subpart 1 (Solid Waste Regulations)	www.deq.state.la.us/planning/regs/title33/index.htm	Loni Gaudet	Small Business Assistance	504-736-7701	loni_g@deq.state.la.us
Maine	Chapters 405, 418, and 419 of Maine's Solid Waste Management Rules	www.state.me.us/sos/cec/rcn/ap/a/06/chaps06.htm	Clif Eliason	Bureau of Remediation and Waste Management	207-287-6115	clifton.g.eliason@state.me.us
Massachusetts	310 Code of Massachusetts Regulations 19.060 - (Beneficial Use of Solid Wastes)	www.state.ma.us/dep/bwbp/dswm/files/310cmr19.htm	Sean Griffin	Bureau of Waste Prevention, Business Compliance Division	617-292-5967	sean.griffin@state.ma.us
Michigan	Part 115 Administrative Rules R299	www.michigan.gov/deq/0,1607,7-135-3312_4123-9861--,00.html	Lonnie Lee	Solid Waste Management	517-373-4735	LEELC@michigan.Gov
Minnesota	Minnesota Rules, Chapter 7035: Solid Waste	www.pca.state.mn.us/waste/sw_mnrules.html	Dale Thompson	Solid Waste Permitting	651-296-5897	dale.thompson@pca.state.mn.us
			Dwayne Duncanson	Solid Waste Permitting	651-296-7072	duane.duncanson@pca.state.mn.us
			Pat Burfurt	Solid Waste Permitting	651-296-8745	pat.burfurt@pca.state.mn.us
New York	6 NYCRR Part 360 Solid Waste Management Facilities, Subpart 360-1 General Provisions	www.dec.state.ny.us/website/reg/s/360a.htm	Jeff Schmitt	Beneficial Use Section, Division of Solid and Hazardous Materials	518-457-7337	jeschmit@gw.dec.state.ny.us

PROGRAM AND CONTACT INFORMATION

State	Most Relevant Regulation/Policy	Regulation/Policy Website(s)	Contact Name	Contact Position/Division	Contact Phone	Contact Email
Ohio	DSW Policy 0400.007, Beneficial Use of Nontoxic Bottom Ash, Fly Ash and Foundry Sand, and Other Exempt Waste	<a href="http://www.epa.state.oh.us/other/pgful.html">www.epa.state.oh.us/other/pgful.html</a>	Chris Bowman	Agricultural/Sludge/PTI Unit, Division of Surface Water	614-644-2134	<a href="mailto:chris.bowman@epa.state.oh.us">chris.bowman@epa.state.oh.us</a>
Pennsylvania	Chapter 287 of the Pennsylvania Code, Residual Waste Management - General Provisions	<a href="http://www.pacode.com/secure/data/025/chapter287/chap287toc.html">www.pacode.com/secure/data/025/chapter287/chap287toc.html</a>	Ron Hassinger	Bureau of Land Recycling and Waste Management	717-787-7381	<a href="mailto:rhassinger@state.pa.us">rhassinger@state.pa.us</a>
Rhode Island	Guidelines on Beneficial Use Determinations ("BUDs") for Source Segregated Solid Waste	<a href="http://www.state.ri.us/dem/pubs/regs/index.htm#WM">www.state.ri.us/dem/pubs/regs/index.htm#WM</a>	Chris Shafer	Waste Management Division	401-222-2797 x7511	<a href="mailto:cschafer@dem.state.ri.us">cschafer@dem.state.ri.us</a>
Tennessee	Beneficial Use of Nontoxic Spent Foundry Sand - Policy	<a href="http://www.state.tn.us/environment/swm/SWPPolicyManual.pdf">www.state.tn.us/environment/swm/SWPPolicyManual.pdf</a>	Mike Apple Jeff Norman	Division of Solid and Hazardous Waste Management	615-532-0780	<a href="mailto:mapple@mail.state.tn.us">mapple@mail.state.tn.us</a> <a href="mailto:jnorman@mail.state.tn.us">jnorman@mail.state.tn.us</a>
Texas	Environmental Guide for Texas Foundries 30 Texas Administrative Code, Chapter 335, Subchapter R	<a href="http://www.tceq.state.tx.us/admin/topdoc/rg/387.pdf">www.tceq.state.tx.us/admin/topdoc/rg/387.pdf</a> <a href="http://www.tceq.state.tx.us/oprd/rules/pdflib/335r.pdf">www.tceq.state.tx.us/oprd/rules/pdflib/335r.pdf</a>	Technical Analysis Team	Industrial and Hazardous Waste Permits Section	512-239-6412	None
West Virginia	Spent Foundry Sand Beneficial Use Guidelines	<a href="http://www.nrce.wvu.edu/iof/FOUNDRY.PDF">www.nrce.wvu.edu/iof/FOUNDRY.PDF</a>	Sudhir Patel	Office of Waste Management	304-558-6350 x265	<a href="mailto:spatel@dep.state.wv.us">spatel@dep.state.wv.us</a>
Wisconsin	Chapter NR 538, Wisconsin Administrative Code, Beneficial Use of Industrial Byproducts	<a href="http://www.dnr.state.wi.us/org/a/wm/information/wiacss.htm">http://www.dnr.state.wi.us/org/a/wm/information/wiacss.htm</a>	Paul Koziar	Bureau of Solid and Hazardous Waste Management	608-267-9388	<a href="mailto:Koziar@dnr.state.wi.us">Koziar@dnr.state.wi.us</a>



**ALABAMA**

The Alabama Department of Environmental Management (DEM) specifies requirements for the reuse of foundry sand through its "*Requirements for Management and Disposal of Special Waste.*"<sup>1</sup> Foundry waste that exhibits less than 50 percent of each of the toxicity characteristic levels for metals, as defined by EPA's TCLP, may be managed in a variety of activities. If the waste does not meet that requirement, it can be managed at an approved recycle/reuse facility or at a landfill unit approved for the disposal of foundry waste.<sup>2</sup>

**Waste Classification System**

The DEM has a single-tiered waste classification system. All material must meet one set of leachate guidelines equivalent to 50 percent of the RCRA hazardous waste thresholds for metals.

**Allowable Beneficial Uses**

Alabama's permitting guidelines do not specify allowable beneficial uses. Instead, they prohibit the reuse of foundry sand in four geographic areas: floodplains, wetlands, residential zones, and areas less than five feet above the uppermost aquifer. Foundry waste from multiple foundries may be mixed and reused at one location, provided adequate documentation and recordkeeping is maintained for each foundry.

**Constituent Concentration Thresholds**

<b>Exhibit A-1</b>	
<b>Alabama's Leachate Thresholds for Reuse of Foundry Sand (in mg/L)</b>	
Arsenic	2.5
Barium	50.0
Cadmium	0.5
Chromium	2.5
Lead	2.5
Mercury	0.1
Selenium	0.5
Silver	2.5

<sup>1</sup> Alabama DEM, Land Division – Solid Waste Program. Chapter 335-13-4.26 (3), Disposal requirements for foundry wastes.

<sup>2</sup> Alabama is planning on issuing a public notice in October 2002 of proposed changes to the state's beneficial reuse requirements. Specific changes under consideration were not available at the time this report was completed.

### **Sampling and Testing Requirements**

The state requires generators to certify their waste on a quarterly basis at a minimum, or whenever the process changes in such a manner that would significantly alter the test results. A Solid/Hazardous Waste Determination Form must be completed and submitted to the Alabama DEM, along with the TCLP analysis for metals meeting the thresholds described above in Exhibit A-1. For the form, the foundry must name the generator and describe the waste generating process, the physical state, and whether the sand will be used as fill material. Additionally, the Water Division of Alabama DEM must be contacted to obtain any necessary General Stormwater and/or NPDES permits at reuse sites.

### **Other Requirements**

Each foundry must maintain records at its facility regarding the reuse of foundry sand. These records include a description of the site and its location within a specific township and range, and the volume of foundry sand managed at each location.

## CALIFORNIA

California does not have a formal system in place to address beneficial reuse activities. Depending on the project, a proposed reuse activity involving foundry sand will require individual review by a combination of the California Integrated Waste Management Board (CIWMB), the Department of Toxic Substances Control (DTSC), the State Water Resources Control Board (SWRCB), the Regional Water Quality Control Board (RWQCB), and the local health or enforcement agency.

### **Waste Classification System**

DTSC, which generally regulates hazardous and potentially hazardous wastes, may first need to review leachate testing and waste composition data to grant a waiver from hazardous waste regulations or reclassify the waste as non-hazardous "designated industrial waste." Similarly, the water boards and CIWMB may review leachate data and whole effluent toxicity data to determine if the waste is an "inert waste," which is subject to fewer regulatory requirements than other waste categories.

### **Allowable Beneficial Reuses**

California regulations address the recycling/reuse of RCRA wastes and additional materials classified by the State as hazardous wastes ("non-RCRA hazardous wastes"), and outline provisions for reusing these wastes as a material in manufacturing. However, these provisions focus on testing to confirm the waste's composition and establishing that recycling/reuse is viable (e.g., the market for the material exists, the reuse does not constitute disposal, the material will not require processing or significant storage prior to reuse).<sup>3</sup> Additional standards exist for composting facilities using organic wastes, but there are no regulations for composting or land application of materials containing other solid wastes.

### **Constituent Concentration Thresholds**

The only thresholds explicitly referred to by California environmental agencies are the RCRA toxicity characteristic leachate thresholds to determine if a waste is hazardous or non-hazardous.

### **Sampling and Testing Requirements**

Leachate testing is required to evaluate all industrial wastes. Depending on the waste classification sought by the applicant, additional testing is also required, including, at a minimum, whole effluent toxicity.

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<sup>3</sup> California Health and Safety Code, Section 25143, as viewed on <http://www.leginfo.ca.gov/cgi-bin/waisgate?WAISdocID=73322119133+10+0+0&WAISaction=retrieve> on May 17, 2002.

## Other Requirements

Additional requirements depend on the proposed type of reuse. If the reuse will include soil operations or composting, then the State and Regional Water Boards must review the project in addition to the CIWMB, and each of these agencies can establish other requirements including public notification, siting limitations, additional testing, volume restrictions, special handling and storage requirements, etc. If the waste will be reused as a raw material in manufacturing, no Water Board review is required and the CIWMB is likely to establish less stringent requirements. In fact, the CIWMB has established a "Tiered Regulatory Structure" to provide a level of regulatory oversight commensurate with the impacts associated with a solid waste handling or disposal activity. An applicant can petition the CIWMB to reclassify the reuse project as a non-permit activity requiring less regulatory review.<sup>4</sup>

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<sup>4</sup> Solid Waste Permitting and Enforcement Regulations - Title 14 California Code of Regulations, Division 7, Chapter 5, Article 3. May 17, 2002.

## ILLINOIS

Illinois Environmental Protection Agency (IEPA) maintains a beneficial reuse system for ferrous foundry (SIC 331 and SIC 332, except SIC3313) wastes and wastes from foundry processes at business operations whose primary SIC Code is not included within 332. Once a generator determines that the leachate from a foundry sand meets the standards for a "beneficially usable" waste using the TCLP, the generator may pursue any reuse alternative that will not adversely affect human health or the environment, without notifying IEPA.<sup>5</sup> This streamlined approach does not apply to "beneficially usable" foundry sand used in land reclamation. If used foundry sand does not meet the beneficial reuse standards, a facility must file a "Petition for an Adjusted Standard" with the Illinois Pollution Control Board, which triggers a review of the proposed beneficial reuse project.

### **Waste Classification System**

IEPA regulations define four classifications for foundry wastes: beneficially usable waste, potentially usable waste, low risk waste, and chemical waste. All beneficial reuse types are potentially allowable for "beneficially usable" wastes, whereas wastes in the other three classes must be landfilled, unless the generator files a "Petition for an Adjusted Standard."

### **Allowable Beneficial Reuses**

IEPA does not provide a comprehensive list of acceptable beneficial uses. As long as the proposed reuse meets all other applicable requirements, "beneficially reusable" wastes can be used in any application that does not create a threat to human health or the environment. If the generator proposes land reclamation for the beneficial reuse, the applicant must also demonstrate that the use will not cause an exceedance of the applicable Illinois ground-water quality standards.<sup>6</sup>

### **Constituent Concentration Thresholds**

The Illinois Administrative Code establishes maximum allowable leaching concentrations (MALCs) to determine whether a waste is "beneficially usable." Twenty-five of the parameter limits are based on federal National Primary Drinking Water Standards, and another seven are based on federal National Secondary Drinking Water Standards.<sup>7</sup> Illinois allows exceedances of

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<sup>5</sup> Standards for the management of beneficially usable foundry wastes are found in 35 Illinois Administrative Code Part 817, *Requirements for New Steel and Foundry Sand Industry Wastes Landfills*.

<sup>6</sup> 35 Illinois Administrative Code Part 620, *Groundwater Quality*. Specific applicable standards are found in Part 620 Subpart C, *Nondegradation Provisions for Appropriate Groundwaters*, and Subpart D, *Groundwater Quality Standards*.

<sup>7</sup> Illinois standards are based on federal Primary and Secondary DWS but are not updated by reference to the federal standards. As a result, although some federal standards have become more stringent since Illinois' standards were established, Illinois' standards have not been revised. The constituents for which this discrepancy exists are: total trihalomethanes, manganese, copper, iron, sulfates, and total dissolved solids (TDS).

limits based on secondary standards, provided the applicant can show the limit increase will not result in an exceedance of the state's ground-water quality standards.

MALCs based on Primary Drinking Water Standards (in mg/L):

- Arsenic - 0.05
- Barium - 2.0
- Cadmium - 0.005
- Chromium - 0.1
- Lead - 0.0075
- Nitrate - 10.0
- Selenium - 0.05
- Fluoride - 4.0
- Benzene - 0.005
- Carbon Tetrachloride - 0.005
- 1,2-Dichloroethane - 0.005
- 1,1-Dichloroethylene - 0.007
- cis-1,2-Dichloroethylene - 0.07
- trans-1,2-Dichloroethylene - 0.1
- 1,2-Dichloropropane - 0.005
- Ethylbenzene - 0.7
- Monochlorobenzene - 0.1
- Styrene - 0.1
- Tetrachloroethylene - 0.005
- Toluene - 1.0
- 1,1,1-Trichloroethane - 0.2
- Trichloroethylene - 0.005
- Trihalomethanes (total) - 0.1
- Vinyl Chloride - 0.002
- Xylenes (total) - 10.0

MALCs based on Secondary Drinking Water Standards (in mg/L):

- Chloride - 250.0
- Manganese - 0.15
- Copper - 5.0
- Iron - 5.0
- Sulfates - 400.0
- Zinc - 5.0
- TDS - 1,200

### **Sampling and Testing Requirements**

A representative sample of leachate extracted by TCLP using deionized water (ASTM Method D3987-85) from each waste stream must be used to characterize the expected constituents and concentrations of the leachate. Facilities must obtain representative samples of waste streams to be tested using ASTM Method D2234-76. Actual samples of leachate from an existing solid waste disposal unit or beneficial use site may be used if: (1) the waste in the existing unit is similar to the waste to be used or disposed; (2) the conditions under which the leachate was formed are similar to those expected to be encountered; and (3) leachate is sampled so as to be representative of undiluted and unattenuated leachate emanating from the unit.

The generator must test all individual waste streams annually. Additional testing is required if there is a change in raw materials resulting in a change in the waste's classification, the manufacturing process, or the waste's leachate characteristics, or if a new process is added that may generate a new waste material.

### **Other Requirements**

The generator must submit to IEPA a certification containing the following information for each new recipient of the beneficially usable waste and for each new use location: (1) a detailed description of the process generating the material and the proposed use; (2) a demonstration that the proposed use will not cause an exceedance of any standards and will not adversely affect human health or the environment; (3) a physical description and analysis of the waste stream; (4) the results of leachate testing; and (5) any available ground-water monitoring data.

## INDIANA

Indiana Department of Environmental Management (IDEM) has draft guidance for foundry waste classification<sup>8</sup> and two additional documents on the storage and use of foundry sands.<sup>9</sup> These documents, in combination with Indiana regulations (329 Indiana Administrative Code (IAC) Chapter 10), establish requirements for the reuse of "spent" foundry sands.

### **Waste Classification System**

Indiana classifies beneficially reusable foundry sand into four categories and defines appropriate uses for each category. Land application and use as a soil amendment are limited to wastes meeting the most stringent standards. Generally, applicants must use the TCLP for waste analyses.

Indiana's classification system guides the beneficial reuse of foundry sand and other industrial by-products based on increasingly stringent concentration thresholds. Type I materials meet the least stringent thresholds, while Type IV materials meet the most stringent thresholds. Consequently, facilities with Type IV by-products have the greatest number of reuse options available to them. IDEM assigns a classification level to a waste based on a hazardous waste determination, which is followed by a waste characterization. Each relies on a representative sampling and testing program.

### **Allowable Beneficial Reuses**

Type I waste can only be disposed of in a Type I landfill. Waste Types II, III, and IV can be used as daily cover at a landfill. In addition, Type III and Type IV can be used as:

- capped embankments;
- protective cover for landfill leachate collection systems;
- ground and site barriers;
- structural fill base;
- a raw material in other manufacturing processes; and
- in land application and soil amendments.

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<sup>8</sup> *Foundry Waste Classification Guidelines*, undated draft prepared by the Indiana Office of Solid and Hazardous Waste Management. IDEM has since removed the draft guidelines from its web site, and has not yet issued a final document.

<sup>9</sup> *Storage of Type III Foundry Sands Prior to Legitimate Use*, January 10, 2000, and *Use of Foundry Sand in Land Application and as a Soil Amendment*, February 22, 2000, both issued by the Office of Land Quality.



Land application and use as a soil amendment are limited by:

- annual and lifetime application rates (dry tons per acre) based on numerical toxicity factors;
- federal regulations limiting the application of waste materials with cadmium;
- ceiling concentration limits for 10 constituents in the foundry sand (listed in 329 IAC 6.1-4-9(a)); and
- cumulative pollutant loading rates (listed in 327 IAC 6.1-4-9(b)).

**Constituent Concentration Thresholds**

Exhibit A-2				
Indiana's Waste Classification Thresholds (in mg/L)				
Parameter	Type I	Type II	Type III	Type IV
Arsenic	5.0	1.3	0.50	0.05
Barium	100	25	10	1.0
Cadmium	1.0	0.25	0.10	0.01
Chromium	5.0	1.3	0.50	0.05
Lead	5.0	1.3	0.50	0.05
Mercury	0.2	0.05	0.02	0.002
Selenium	1.0	0.25	0.10	0.01
Silver	5.0	1.3	0.50	0.05

**Sampling and Testing Requirements**

Before obtaining a waste classification, a facility must first perform a "waste determination" to establish that the waste is non-hazardous and does not contain PCBs or other wastes regulated by the Toxic Substances Control Act (TSCA) or the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). If a generator's knowledge is insufficient or inconclusive for the waste determination, the generator must perform an analysis in accordance with 329 IAC 10-7.1-4(a). Each waste stream must be tested separately, and testing must use TCLP extraction procedures. In specific cases, totals testing for metals may be acceptable in lieu of TCLP testing.<sup>10</sup> A minimum of three sample sets are required for waste determination and classification purposes. However, testing is not required for any constituents not introduced or created during the foundry manufacturing process.

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<sup>10</sup> Totals testing may be accepted only when the 90 percent single-tailed, upper confidence limits derived from Student-T analysis for all observed constituent levels are below 20 times the TCLP regulatory threshold for each constituent.

Once the waste determination is completed, the generator must prepare a sampling and analysis plan (SAP) prior to sample collection and testing for the waste classification. IDEM uses Chapters 1 and 9 of EPA's *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, during its waste determination and classification evaluations.

To use the waste as a land amendment, the end user must document the total heavy metals loading that occurs with its product and must retain these records on site, but is not required to submit this documentation to IDEM.

Once a facility obtains its waste classification, it may use the waste material for any of the approved uses for that category, until the classification expires. The standard duration for a classification is two years for new permits and five years for renewals that show no significant change. No reporting of amounts or types of reuse, or further analysis of end materials, is required.

### **Other Requirements**

- IDEM may require additional testing (for additional constituents or additional samples) for waste classification.
- Foundry sand may not be stored or applied on land within areas of karst topography, in wetlands, in critical habitats of endangered species, or in floodways unless special arrangements are made to prevent environmental damage to these areas.
- Foundry sand may not be stored or applied on land in a manner that would create fugitive dust or particulate matter, or violate state or federal surface-water or ground-water quality standards.
- Exemptions and additional uses may be obtained by petitioning IDEM.

## IOWA

Iowa establishes requirements for the beneficial reuse of foundry sand in its Administrative Code.<sup>11</sup> Chapter 108 applies exclusively to coal combustion residue and "used foundry sand," which Iowa defines as "residuals from the foundry industry which are derived from molding, core-making, and casting cleaning processes that primarily contain either individually or in combination sand, olivine, or clay and which by specified leach test are acceptable for reuse." Once spent sand is determined to meet certain thresholds, it can be reused without a solid waste permit in any of several uses listed in the regulations.

### Waste Classification System

Iowa Department of Natural Resources (DNR) regulations and guidance on the beneficial use of foundry sand do not include a waste classification system. Used foundry sands meeting the concentration criteria can be beneficially reused in any of the uses discussed in the regulations. A foundry may petition Iowa DNR for the reuse of sand not meeting the requirements (i.e., concentration levels or proposed reuse applications) established in Chapter 108.

### Allowable Beneficial Uses

Used foundry sand is exempt from a solid waste permit under specific conditions as described in Chapter 108 of the Iowa Administrative Code. Additionally, certain uses are considered to be beneficial use as a "commercial material" and do not require either a solid waste permit or authorization. These two categories of foundry sand reuse are described in the Code as: (1) *beneficial uses for which no permit is required* and (2) *uses for which no authorization is required*.

- ***Beneficial Uses for Which No Permit Is Required.*** Foundry sand may be used for the following beneficial purposes without a solid waste permit, in accordance with a foundry sand management plan (described below under Other Requirements):
  - daily cover at a landfill;
  - road ballast;
  - construction/architectural fill;

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<sup>11</sup> Iowa Administrative Code, Section 567, Chapter 108 - *Reuse of Solid Waste* - was being revised at the time of this report's publication. Iowa has proposed more universally approved uses for foundry sand, such as a raw material in concrete products and leachate control drainage material at sanitary landfills. Iowa has proposed changing the leachate thresholds to 10 times the MCL for drinking water standards, and utilizing the Synthetic Precipitation Leaching Procedure (SPLP) instead of the TCLP. Some siting restrictions pertaining to floodplains, wells and sinkholes are also proposed.

- dike or levee construction, repair, or maintenance; and
- fill base for roads, road shoulders, parking lots, and any other similar use.

For use in levees, or any other beneficial reuse application not specified by Iowa regulations, the foundry must send prior written notification to Iowa DNR, which in turn has 30 days to respond. The use will be deemed appropriate if DNR does not issue a response.

- ***Uses for Which No Authorization Is Required.*** Foundry sand may be used for the following purposes without authorization, since these forms qualify as "commercial material":
  - raw material constituent for flowable fill (low-strength concrete material), or concrete, asphalt, and any other similar use where the used foundry sand is encapsulated while providing all or a portion of the aggregate and critical constituents necessary for production of the final product; and
  - production feedstock.

### **Constituent Concentration Thresholds**

Iowa DNR established thresholds equivalent to 90 percent of federal RCRA TCLP leachate concentration limits found in 40 CFR 261.24. Any spent foundry sand possessing leachate concentrations less than or equal to these criteria (presented in Exhibit A-3, below) is considered acceptable for reuse. Also, the spent sand must be evaluated for pH using EPA Method 9045 and must possess a pH greater than or equal to 5.0 and less than or equal to 10.0 for reuse.

### **Sampling and Testing Requirements**

A representative sample of leachate must be extracted by TCLP for classification of the spent foundry sand for beneficial reuse. The pH must be analyzed using EPA Method 9045. Quarterly sampling is required during the first year of each foundry sand beneficial reuse effort to establish a baseline, after which sampling must be conducted annually. In addition, current accumulations of used foundry sand may be made available for reuse and incorporated in the foundry sand management plan, provided that representative samples are taken to ensure compliance.

Exhibit A-3	
Iowa Thresholds for Beneficial Reuse	
Constituent	Threshold ( in mg/L)
Arsenic	4.50
Barium	90.0
Benzene	0.45
Cadmium	0.90
Carbon Tetrachloride	0.45
Chlordane	0.027
Chlorobenzene	90.0
Chloroform	5.40
Chromium	4.50
o-Cresol*	180.0
m-Cresol*	180.0
p-Cresol*	180.0
Total Cresols*	180.0
2,4-D	9.0
1,4-Dichlorobenzene	6.75
1,2-Dichloroethane	0.45
1,1-Dichloroethylene	0.63
2,4-Dinitrotoluene	0.117
Endrin	0.018
Heptachlor (and its epoxide)	0.007
Hexachlorobenzene	0.09
Hexachlorobutadiene	0.45
Hexachloroethane	2.70
Lead	4.50
Lindane	0.36
Mercury	0.18
Methoxychlor	9.0
Methyl Ethyl Ketone	180.0
Nitrobenzene	1.80
Pentachlorophenol	90.0
Pyridine	4.50
Selenium	0.90
Silver	4.50
Tetrachloroethylene	0.63
Toxaphene	0.45
Trichloroethylene	0.45
2,4,5-Trichlorophenol	360.0
2,4,6-Trichlorophenol	1.80
2,4,5-TP (Silvex)	0.90
Vinyl Chloride	0.18
*If o-, m-, and p-cresols cannot be individually measured, the regulatory level for total cresols is used.	

### Other Requirements

Beneficial use of spent foundry sand does not require a permit. However, it does require the development of a foundry sand management plan, which must include the following information:

- Description of a compliance assurance and sampling procedure to ensure that only foundry sands acceptable for reuse are accumulated and used. The defined sampling program must include, at a minimum, quarterly sampling for the first year, as a baseline, followed by annual sand sampling thereafter.
- Identification of storage site management controls for dust, stormwater runoff, and public access.
- An annual summary of how the spent sand was used. The annual report must be completed by March 1 of the following year and must be kept on site for at least five years, although the foundry need not submit it to Iowa DNR.

## LOUISIANA

Louisiana's beneficial use program requires the issuance of a permit by the Department of Environmental Quality (DEQ).<sup>12</sup> The solid waste regulation addresses the beneficial use of solid waste in applications to land and does not necessarily restrict the type of solid waste that may be considered or the sources of industrial solid wastes. In general, the permit application requires that the solid waste meet standards on maximum allowable lifetime metals loading. For beneficial uses that involve application of solid waste to lands used for "food-chain" crops or "animal feed" crops, the solid waste must meet additional standards and testing (e.g., TCLP, pH, PCBs). Once issued a beneficial use permit, facilities must meet annual reporting and record-keeping requirements.

### Waste Classification System

Louisiana loosely defines wastes by their general source (i.e., commercial, industrial, residential), and the state's solid waste regulations outline a classification system that identifies the types of facilities authorized for handling solid waste:

- **Type I.** A facility used for disposing of industrial solid wastes.
- **Type I-A.** A facility used for processing industrial solid waste (e.g., transfer station, incinerator waste-handling facility, shredder, baler, or compactor).
- **Type II.** A facility used for disposing of residential or commercial solid waste.
- **Type II-A.** A facility used for processing residential, infectious, or commercial solid waste (e.g., transfer station, incinerator waste-handling facility, shredder, baler, autoclave, or compactor).
- **Type III.** A facility used for disposing or processing of construction/demolition debris or wood waste, composting organic waste to produce a usable material, or separating recyclable wastes (a separation facility). Residential, commercial, or industrial solid waste must not be disposed of at a Type III facility.

In general, beneficial use facilities and permit holders are subject to solid waste regulations (i.e., LAC 33, VII Chapters 1, 3, 5, 7, and 9). A person must obtain a permit before solid waste may be "discharged, applied, incorporated, injected, or deposited onto or into the land for the purpose of beneficial use." The permit does not necessarily have to be held by the solid waste generator.

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<sup>12</sup> Title 33, Environmental Quality Part VII, Solid Waste, Subpart 1. Solid Waste Regulations, April 2002.

DEQ may issue a single permit for multiple beneficial use locations, provided: (1) the permit application provides information on each location; (2) each location meets the relevant standards; and (3) the same solid wastes stream (from a single generation site) is disposed of at all locations.

**Allowable Beneficial Reuses**

The state’s solid waste regulations define "beneficial use" as a "use of waste material for some profitable purpose (e.g., using sludge as a soil amendment). Avoidance of processing or disposal cost alone does not constitute beneficial use." More specifically, Chapter 11, "Beneficial Use Facilities," discusses requirements for beneficial use of solid waste with respect to general land applications as well as application to "food-chain cropland" and "land used for animal feed only." The rule defines "food-chain crops" as "crops grown for human consumption; tobacco; and crops grown to feed animals that are consumed by humans" and "animal feed" as "any crop, such as pasture crops, forage, and grain grown for consumption by animals."

**Constituent Concentration Thresholds**

All beneficial use facilities must meet the operational standards with respect to the maximum allowable lifetime metals loading rates (lbs./acre) in Exhibit A-4 for land application uses:

<b>Exhibit A-4</b>			
<b>Louisiana’s Maximum Allowable Lifetime Metals Loading (lbs./acre) Based on Exchange Capacity</b>			
	Soil Cation-Exchange Capacity, (meq/100g):		
	<5	5-15	>15
Lead	500	1,000	2,000
Zinc	250	500	1,000
Copper	125	250	500
Nickel	125	250	500
Cadmium	5	10	20
"Meq": milli-equivalent.			

Other metals not listed in Exhibit A-4 may be subject to restrictions based upon the metal content of the waste.

Application to food-chain cropland and to land used for animal feed must meet the following additional requirements:

- **Food-chain cropland.** The requirements are: (1) the pH of the solid waste and soil mixture must be maintained at or above 6.5; and (2) the application of cadmium from the waste may not exceed 0.5 lb. per acre.



- **Land used for animal feed.** The requirements are: (1) a waste-soil mixture must have a pH of 6.5 or greater at the time of the solid waste application or when the crop is planted (whichever occurs later); (2) this pH must be maintained while the food-chain crop is grown, and crops that require a lower pH will be considered on a site-specific basis; (3) the facility must submit an operating plan that demonstrates how the animal feed will be distributed to preclude human consumption and describes measures to safeguard against possible health hazards from entry of cadmium or other heavy metals into the food chain; and (4) concentrations of polychlorinated biphenyls (PCBs) in the solid waste must be less than 10 mg/kg.

### **Sampling and Testing Requirements**

The applicant must conduct a detailed analysis of waste, including pH, phosphorus, nitrogen, potassium, sodium, calcium, magnesium, sodium adsorption ratio, and total metals.

### **Other Requirements**

A permit application for beneficial use requires:

- Third-party certification that the proposed activity is a legitimate beneficial use of solid waste. Qualified, independent third parties include the following state agencies: Cooperative Extension Service, Department of Agriculture, and Department of Transportation and Development.
- Completion of the beneficial use application, Part I Form, describing the proposed use; proof of public notice regarding the permit's application; a letter from the state Resource Recovery and Development Authority stating that the operation conforms to the applicable statewide plan; and an Area Master Plan showing the location of major drainage systems, drainage flow patterns, the 100-year floodplain, and other pertinent information.
- Supplemental information, such as beneficial use location characteristics and environmental characteristics (e.g., list of designated wetlands, wildlife management areas, and other sensitive ecologic areas within 1,000 feet of the facility perimeter) and facility geology (e.g., general description of soils).

Once issued a permit, beneficial use facilities must comply with various standards, such as buffer zones, monitoring of incoming wastes, and application restrictions determined by surface hydrology. In addition, beneficial use facilities must submit annual reports and maintain all records specified in the application (e.g., semiannual soil waste mixtures tests and analyses, test parameters).

## MAINE

Chapter 418 of Maine's Solid Waste Management Rules establishes the rules for the "beneficial use of 'secondary materials,'" exemptions, and general standards for beneficial use. A facility pursuing beneficial use projects must collect TCLP and totals analytical data and compare the results with screening standards for 579 constituents of concern.<sup>13</sup> Ultimately, beneficial use projects are evaluated by the Maine Department of Environmental Protection (DEP) on the basis of the risk they pose to human health and the environment.<sup>14</sup>

### Waste Classification System

Maine defines "secondary materials" as "solid waste, separated from other solid wastes, that may be suitable for beneficial use." Most foundry sand probably would be considered by Maine to be secondary material, but some foundry sand may qualify as "special waste," which Maine defines as "any solid waste generated by sources other than household and typical commercial establishments that exists in such an unusual quantity or in such a chemical or physical state...that may disrupt or impair effective waste management or threaten the public health, human safety or the environment and requires special handling, transportation and disposal procedures."

Even for a special waste, a facility may petition for a variance from the waste classification, followed by an application for a beneficial use license. When a processing, industrial, or manufacturing facility is licensed to beneficially use a secondary material for fuel or raw material substitution, the generator supplying the secondary material to that licensed facility is not required to obtain a beneficial use license. For all other reuses, the generator must apply for approval, and in some cases the end user must obtain a license as well.

Prior to a pre-application meeting, the applicant must submit supporting documentation for the beneficial use proposal that (1) demonstrates the secondary waste is non-hazardous and (2) includes a description of the secondary material and its proposed use; the physical, chemical, and, where appropriate, biological characteristics of the secondary material; results of analytical testing that reflect all constituents that may reasonably be thought to be present and that may pose a risk to human health or the environment; the quantities, by weight and/or volume, of the secondary material; a description of any risk management techniques being considered; and, if it is known that a risk assessment is necessary, a description of the proposed protocol for conducting the risk assessment.

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<sup>13</sup> Maine has established a workgroup to review the initial screening analysis requirements. The workgroup is reconsidering the number of constituents to include in the screening analysis, as well as their respective screening thresholds.

<sup>14</sup> Standards for the management of beneficially usable foundry wastes are found in Chapters 405, 418, and 419 of Maine's Solid Waste Management Rules.

### **Allowable Beneficial Reuses**

Beneficial uses of secondary materials regulated by Chapter 418 include, but are not limited to, use in an industrial or manufacturing process, use as construction fill, and use as fuel. Residual material proposed for agronomic use is subject to Chapter 419, *Agronomic Utilization of Residuals*, of DEP's rules. Maine DEP may grant temporary approval for a pilot project or experimental project on a case-by-case basis.

### **Constituent Concentration Thresholds**

The beneficial use of the secondary material must not result in a greater risk than that posed by current construction practices and materials, or in an aggregate risk to a highly exposed individual under the proposed use or all future planned uses exceeding an Incremental Lifetime Cancer Risk of  $5 \times 10^{-6}$  and a Hazard Index of 0.5. Facilities must meet screening standards for 579 contaminants to be considered as meeting the risk standard for those constituents. If analysis demonstrates that the secondary material contains levels of the constituents in excess of screening standards, then the applicant must demonstrate through a risk assessment and/or through risk management techniques that the beneficial use of the waste does not pose a significant threat to public health or an unreasonable threat to the natural environment.

### **Sampling and Testing Requirements**

The applicant must submit a waste characterization sampling and analytical work plan, and TCLP analysis and totals analysis are required for all beneficial reuse applications. Any statistical analyses performed must be done in accordance with the requirements of EPA's *Test Methods for Evaluating Solid Waste*, SW-846, 4th edition, Volume II, Chapter 9. For land application or use as a soil amendment, each type of land application triggers a different set of requirements (buffer zones near water resources, annual loading rates, total loading rates).

### **Other Requirements**

General standards for beneficial reuse include:

- If intended to be used as a raw material substitute in manufacturing, the beneficially used secondary material must perform as an acceptable substitute for the material it is replacing.
- If the secondary material is intended to be beneficially used as a product, it must meet or exceed the applicable generally accepted product specifications and standards for that product.
- The beneficial use will not pollute any waters of the state, contaminate the ambient air, constitute a hazard to health or welfare, or create a nuisance.

- A beneficial reuse may not be located in, on, or over any protected natural resource or be located adjacent to, and operated in such a manner that material or soil may be washed into, any protected natural resource.
- For ongoing beneficial uses, the licensee must submit an annual report containing a summary of activity during the past year, the sources of the secondary material received, and results of any waste characterization.
- The licensee must submit Maine DEP's standard form, *Application for Beneficial Use of Solid Waste*.

## MASSACHUSETTS

The reuse of foundry sand in Massachusetts is governed by state solid waste management regulations. A working draft of new reuse guidelines is currently under consideration.

### **Waste Classification**

Reuse applications are classified by the volume of material that is being reused. For uses requiring more than 20 tons of material for a single project, a separate application form is used.

### **Allowable Beneficial Reuses**

Massachusetts does not define "allowable reuse activities." The reuse applicant must describe how the "proposed utilization will result in a viable and beneficial substitution of a discarded material for a commercial product or commodity" and demonstrate that the proposed handling, storage, use, and end products "will not adversely affect the public health, safety or the environment."<sup>15</sup> The local board of health comments on the application, and the Department of Environmental Protection (DEP) then makes a final determination as to whether the material will be handled in such a way that it will not become solid waste, whether the sand can be "feasibly processed and put to beneficial use" as specified in the application, and whether the proposed project can be completed in compliance with appropriate rules and regulations in such a way that will not cause an adverse impact.

### **Sampling and Testing Requirements**

Sampling and testing requirements are not specified in the current Massachusetts regulations. With the application for reuse, a chemical and physical characterization of the potential reuse material, as well as identification of its quantity, quality, and source must be submitted. The chemical tests consist of pH, reactivity, TCLP testing, total metals, volatile organic compounds (VOC), and identification of any other appropriate constituents. For physical properties, size, density, percent solids, and liquid content must be specified. There is no set frequency for recharacterization, unless one is specified in DEP's approval of an application.

### **Draft Beneficial Use Regulation Revisions**

The Business Compliance Division of DEP is redesigning the state industrial by-product reuse regulations (or "beneficial use of secondary materials," as named by the potential regulation). Under these revisions, the secondary material must meet or exceed all standards either for the raw material it is replacing or for the product it will become. Either a risk assessment must be performed or risk management techniques must be in place. The applicant may be required to inform all property owners of the existence and location of secondary

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<sup>15</sup> 310 CMR 19.060 *Beneficial Use of Solid Wastes*, August 4, 2000.

material on their property. The risk assessments may be based on the Incremental Lifetime Cancer Risk due to the material, the Hazard Index, or applicable or suitably analogous health standards. These could include one or more of the following state standards: Drinking Water Quality Standards, Air Quality Standards, Contingency Plan Standards, or Surface Water Quality Standards. The permittee must keep records of ongoing beneficial reuse activities, including amounts, sources, and the results of any required testing specified in the permit.

The proposed regulations also enable DEP to issue generic beneficial reuse determinations, which would allow any person or entity to engage in the reuse activity, given adherence to the requirements and conditions of the specified policy.

## MICHIGAN

Michigan's Solid Waste Management Act outlines a process for designating wastes as inert material or low-hazard industrial waste, thereby allowing beneficial reuse.<sup>16</sup> Designation as either type of waste involves petitioning the Michigan Department of Environmental Quality (DEQ). The petitioner must provide a description of the beneficial use and demonstrate that the waste does not contain constituent concentrations exceeding primary or secondary drinking-water standards. Once the waste classification is granted, the petitioner must conduct annual tests and submit the results to DEQ.

### Waste Classification System

A facility may petition the director of DEQ to designate solid waste as inert material, compostable material, or low-hazard industrial waste, thereby qualifying it for reuse. Compostable material classification is not relevant to spent foundry sand, and significant crossover exists between inert material and low-hazard industrial waste.

- **Inert material.**<sup>17</sup> Facilities may petition to designate solid waste as inert material appropriate for general reuse, for reuse at a specific location, or for specific reuse instead of virgin material. Inert materials range from rock and excavated soil to chipped tires and low-hazard industrial waste (i.e., low-hazard industrial waste used as aggregate, road, or building material, ultimately stabilized or bonded by cement, limes, or asphalt).
- **Low-hazard industrial waste.**<sup>18</sup> Solid waste may be determined to be low-hazard industrial waste if: (1) it is a by-product of a production process from primary metals or fabricated metal industries (i.e., standard industrial classification (SIC) Code 33 or 34), and (2) the waste meets leaching requirements.

### Allowable Beneficial Reuse

The rules for solid waste management specify standards and requirements for the following general categories of reuse:

- nondetrimental material managed for agricultural or silvicultural use;
- inert materials appropriate for general reuse;

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<sup>16</sup> Part 115 Administrative Rules R 299.4118.

<sup>17</sup> See: (i) R 299.4114, Inert Material; (ii) R 299.4115 Criteria for designating inert materials appropriate for general reuse; (iii) R 299.4116 Criteria for designating inert materials appropriate for reuse at a specific location; and (iv) R 299.4117 Criteria for designating inert materials specific reuse instead of virgin material.

<sup>18</sup> See R 299.4122, Criteria for designating low-hazard industrial waste.

- inert materials appropriate for reuse at a specific location;
- inert materials appropriate for specific reuse instead of virgin material; and
- industrial waste classified as low-hazard industrial waste appropriate for general reuse.

### **Constituent Concentration Thresholds**

The suite of relevant constituents and their thresholds varies, depending upon the type of reuse (e.g., agricultural use, substitute for virgin material). Solid waste designated as inert material appropriate for general reuse, use at a specific location, or a specific reuse instead of virgin material must meet a different set of constituents of concern and standards, depending on the waste classification. Because each combination of waste classification and reuse category will have its own set of requirements, the discussion from this point forward focuses on the criteria for the designation of low-hazard industrial waste originating from primary metals or fabricated metal industries (SIC codes 33 or 34).

For wastes classified as low-hazard industrial wastes, Michigan has established leachate thresholds for the following constituents: metals, halogenated volatile organics, nonhalogenated volatile organics, aromatic volatile organics, phenolic compounds, and formaldehyde.<sup>19</sup> The thresholds for metals, in mg/L, include:<sup>20</sup>

- |                   |                                |
|-------------------|--------------------------------|
| • Arsenic - 0.5   | • Manganese - 0.50             |
| • Barium - 10.0   | • Mercury (inorganic) - 0.02   |
| • Cadmium - 0.10  | • Nickel (soluble salts) - 1.0 |
| • Chromium - 0.50 | • Selenium - 0.10              |
| • Copper - 10.0   | • Silver - 0.50                |
| • Lead - 0.50     | • Zinc - 50.0                  |

For uses where the wastes may present an inhalation or direct contact hazard, the petitioner must provide the total concentration of each of the following chemical constituents:

- hazardous constituents listed in 40 CFR Part 258, Appendix II;
- constituents that have primary or secondary drinking-water standards (established under 40 CFR Parts 141 and 143), including total chloride, total nitrogen, total iron, total manganese, and total sulfates;
- total molybdenum and total sodium; and

<sup>19</sup> Metals listed in Table 101; halogenated volatile organics listed in Table 102; nonhalogenated volatile organics listed in Table 103; aromatic volatile organics listed in Table 104; phenolic compounds listed in Table 105, formaldehyde, 10 mg/l.

<sup>20</sup> See R 299.4123, Table 101; threshold values for inorganic constituents.



- any indicator parameters that may be useful in establishing a ground-water monitoring program for the waste.

### **Sampling and Testing Requirements**

The petition for reuse requires a description of the techniques used to sample and analyze waste. DEQ requires that the sampling and analysis be conducted in a manner consistent with EPA's *Test Methods for Evaluating Solid Waste*, SW-846, 3rd edition. To be representative of the waste, DEQ requires a minimum of four samples be collected.

For constituents that are present in the material at potential levels of concern, their leaching potential must be determined using any of the following tests: (1) toxicity characteristic leaching procedure (TCLP), EPA method 1311; (2) synthetic precipitation leaching procedure (SPLP), EPA method 1312; or (3) other test methods that are approved by DEQ and more accurately simulate conditions at the site. If a hazardous substance is reported present in a sample at concentrations above the waste classification criteria, a facility may demonstrate that the data are not statistically significant.<sup>21</sup>

Approved materials classified through this process must be re-tested at least annually, with test results submitted to DEQ. The director has the discretion to specify more frequent testing if the characteristics of the material vary significantly.

### **Other Requirements**

The petition to classify waste involves completing DEQ's application form, which requires a general description of the material to be classified, including: (1) a description of the process used to produce the material; (2) a schematic of the process and list of raw materials; (3) maximum and average amounts of materials generated monthly and annually; (4) documentation that the material is not hazardous waste; and (5) a description of the proposed use or disposal method for the material.

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<sup>21</sup> Acceptable testing methods are specified in R 299.4908.

## MINNESOTA

Minnesota currently engages in a case-by-case approval process for the reuse of industrial by-products. No specific regulations are currently in place to manage the requirements of the reuse process. A waste use rule has been proposed and will have pre-approved uses and an approval process for those that are not pre-approved. Foundry sand is not listed in the currently available draft of the rule (July 20, 2001), but the Solid Waste Utilization Advisory Group will consider adding certain foundry sand uses to the pre-approved list after experience is gained with successful projects under the case-by-case approval process.

### **Waste Classification**

Industrial by-products may be reused on a case-by-case basis.

### **Allowable Beneficial Reuses**

No particular uses are specified in the Minnesota Solid Waste guidelines. However, on a case-by-case basis, foundry sand has been approved for reuse in asphalt.

### **Sampling and Testing Requirements**

Current regulations do not specify sampling and testing requirements. However, under the proposed regulations, a sampling plan will be required that describes the appropriate chemical and physical characterization of the material.

### **Draft Beneficial Use Regulation Revisions**

The Minnesota Pollution Control Agency (MPCA) is drafting an amendment to the solid waste rules to streamline and clarify the use of solid waste. While foundry sand is not specified in the current draft (July 20, 2001), MPCA has indicated its intention to include certain uses of foundry sand. Once generators of by-products demonstrate that their material meets requirements specified by MPCA, they may engage in any of the pre-determined reuse activities. Additional by-products and uses may also be approved by a petition to the MPCA.

The material must be non-hazardous, and for materials and uses not on the pre-approved list, the material must be a "suitable substitute for an analogous material or a necessary ingredient in a new product,"<sup>22</sup> and it must be demonstrated through a solid waste control plan that the reuse activity will not adversely impact human health or the environment. The applicant for a case-by-case determination must also present a distribution and marketing plan that details

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<sup>22</sup> MPCA draft guidelines on the Utilization of Solid Waste. Solid Waste Utilization Advisory Group. <http://www.pca.state.mn.us/waste/pubs/swrules-draftpolicy-0701.pdf>. Dated July 20, 2001. MPCA hopes to finalize the rule by December 2003.

the handling, transport, and economic feasibility of the proposed reuse. If the reuse project is approved, the applicant will be required to submit an annual report describing the project.

## NEW YORK

In 6 NYCRR Part 360 *Solid Waste Management Facilities*, the term "beneficial use" refers to materials that "before being beneficially used (as determined by the department), were solid waste." Part 360 authorizes the New York Department of Environmental Conservation (DEC) to make beneficial use determinations (BUDs) of industrial solid waste.<sup>23</sup> The regulation identifies 16 materials that are not considered solid waste when used in specified applications; spent foundry sand is not listed among those materials. The state may grant BUDs on a case-by-case basis, and has done so for foundry sand. A BUD is an exemption from regulation, not a permit, and is not subject to State Environmental Quality Review procedures, which include public notice and comment periods.

### **Waste Classification System**

Part 360-1.15(b) (*Solid Waste Cessation*) identifies 16 materials that prior to the rule were considered solid waste; foundry sand is not listed. Examples of materials that are pre-determined as non-waste qualifying for beneficial use include uncontaminated newspaper, tire chips, uncontaminated soil excavated as part of a construction project, and non-hazardous petroleum contaminated soil. DEC also grants BUDs on a case-by-case basis.

### **Allowable Beneficial Reuses**

For each identified material, Section 360-1.15(b) specifies acceptable beneficial use(s). For example, tire chips are not considered waste when used as an aggregate for road base materials, and uncontaminated soil excavated as part of a construction project may be used as fill material in place of soil native to the site of disposition. Because foundry sand is not listed, DEC must grant project-specific BUDs for reuses involving foundry sand. The following are examples of applications where DEC has granted a BUD for foundry sand, designating foundry sand as a non-waste and appropriate for reuse:<sup>24</sup>

- aggregate (i.e., asphalt, concrete, flowable fill, asphalt-hot-mix, black top);
- base (sub) and fill;
- cement (source of silica);
- landfill cover (daily); and
- landfill contour grading fill.

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<sup>23</sup> 6 NYCRR Part 360 Solid Waste Management Facilities, Title 6 of the Official Compilation of Codes, Rules, and Regulations, revised November 24, 1999.

<sup>24</sup> "Granted Beneficial Use Determinations," March 6, 2002, <http://www.dec.state.ny.us/website/dshm/redrecy/bud.htm>.

### Constituent Concentration Thresholds

To obtain a beneficial use determination, an applicant must prove that the waste is not hazardous and that the reuse will not create a threat to or damage human health or the environment. Part 360 does not specify constituents of concern or threshold concentrations. It simply defines "solid waste" as all waste "other than low-level radioactive waste...and other than hazardous waste as defined in Part 371...." To define hazardous waste, New York uses the toxicity characteristic thresholds established by EPA in 40 CFR Part 261 and prescribes TCLP as the testing method. The toxicity characteristic (TC) threshold levels for metals, in mg/L, include:<sup>25</sup>

- Arsenic- 5.0
- Barium- 100.0
- Benzene- 0.50
- Cadmium- 1.0
- Lead- 5.0
- Mercury- 0.20
- Selenium- 1.0
- Silver- 5.0

### Sampling and Testing Requirements

Part 360-1.15 (*Beneficial Use*) does not specify a testing methodology for confirming the composition of solid wastes. Section 360-1.3 (*References*) identifies EPA's reference document, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, SW-846).<sup>26</sup> This document provides guidance on:

- conducting leachate testing, i.e., TCLP and SPLP; and
- developing sampling plans that ensure test samples are representative of the material.

### Other Requirements

Petitions for case-specific BUDs must include the following:

- A description of the waste and its proposed use. This includes a description of the waste's chemical and physical characteristics under review; demonstration that there is a market for the proposed product (e.g., contract to purchase the

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<sup>25</sup> 6 NYCRR 371.3(e), Table 1, Maximum Concentration of Contaminants for the Toxicity Characteristic.

<sup>26</sup> Section 360-1.3, References, also identifies the following EPA reference documents: (i) *Methods for Chemical Analysis of Water and Wastes* (EPA-600/4-79-020), and (ii) *A Procedure for Estimating Monofilled Solid Waste Leachate Composition*, Technical Resource Document, EPA publication SW-924.

- proposed product or to have the solid waste used in the manner proposed); and a description of the proposed product (e.g., demonstration that the proposed product complies with industry standards and specifications).
- Demonstration that the management of the solid waste will not adversely affect human health and safety, the environment, and natural resources.
  - A solid waste control plan, including: (1) procedures for periodic testing of the solid waste and proposed product to ensure the product's composition has not changed significantly; (2) disposition of any solid waste that may result from the manufacture of the product into which the solid waste will be incorporated; (3) description of the type of storage (e.g., tank, pile) and the maximum anticipated inventory of the solid waste under review (not to exceed 90 days) before being used; and (4) procedures for run-on and runoff control of the storage areas for the solid waste.
  - For material proposed for incorporation into a manufacturing process, the material must not require decontamination or special handling/processing before incorporation (i.e., to minimize loss of material or to provide adequate protection of public health and safety, the environment, and natural resources).

When granting a BUD, the DEC determines the precise point at which the material ceases to be solid waste. The petitioner may request that this change in classification occur elsewhere. DEC may revoke any BUD if it finds that the basis for the determination was incorrect, that it is no longer valid, or that there has been a violation of the conditions attached to the determination.

## OHIO

Ohio EPA's beneficial reuse program classifies combinations of reuse and concentration levels into four categories, each of which triggers a distinct set of recordkeeping and reporting requirements. Concentration levels are determined by TCLP testing. In addition, the Division of Surface Water developed a guidance document for the beneficial reuse of spent foundry sands and other wastes.<sup>27</sup>

### Waste Classification System

Each of Ohio's four categories represents combinations of beneficial uses and concentration thresholds that are similarly protective. Ohio EPA allows the most flexibility under Category 1 and the least flexibility under Category 4:

- **Category 1** uses do not require Ohio EPA review or notification and include the largest number of beneficial reuse types;
- **Category 2** uses do not require prior review but trigger "isolation distance" restrictions, and the facility generating the waste must submit an annual report describing each beneficial reuse project, the type and estimated volume of waste used, and leachate test results;
- **Category 3** uses require 30-day prior notification to Ohio EPA and trigger "isolation distance" restrictions; and
- **Category 4** uses, including those not listed in the guidance document, require 60-day prior notification and Ohio EPA consent.

### Allowable Beneficial Reuses

Depending on the concentration thresholds met by each waste, potential beneficial uses of spent foundry sand (and other wastes) include:

- raw material in manufacturing another product;
- stabilization/solidification of other waste (for disposal);
- in-composting process (not post-composting additive);
- anti-skid agent/road surface preparation material;
- soil blending ingredient;

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<sup>27</sup> DSW Policy 0400.007, *Beneficial Use of Nontoxic Bottom Ash, Fly Ash and Foundry Sand, and Other Exempt Waste*, November 11, 1994.

- daily landfill cover;
- structural fill;
- pipe bedding;
- sub-base or final cover for roads/parking lots;
- generator give-away programs;
- filling empty borrow pits; and
- land application.

### **Constituent Concentration Thresholds**

To be eligible for beneficial reuse, leachate from a waste must at a minimum meet "non-toxic" thresholds, which under Ohio regulations are generally equivalent to 30 times the levels of Ohio's Drinking Water Standards (DWS) for arsenic, barium, cadmium, chromium, lead, mercury, and selenium. The numerical non-toxic criteria, in mg/L, include:

- Arsenic - 1.5
- Barium - 60.0
- Cadmium - 0.15
- Chromium - 3.0
- Lead - 1.5
- Mercury - 0.06
- Selenium - 1.0<sup>28</sup>

Also, foundry sand leachate must not exceed the following thresholds, in mg/L, for the spent foundry sand to be non-toxic:

- Cyanide - 0.6
- Fluoride - 12.0
- Phenol - 10.5

Within the definition of "non-toxic waste," additional thresholds exist (20 times DWS, 10 times DWS, 5 times DWS, and DWS) to provide varying levels of beneficial reuse flexibility.

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<sup>28</sup> The threshold for selenium is 20 times the Ohio DWS.



### **Sampling and Testing Requirements**

Generally, the applicant must create three different composite samples from 6 to 12 discrete samples and apply the TCLP or modified TCLP (EPA Method 1311, ASTM D3987-85) to obtain an extract that can be analyzed for the following parameters: acidity, alkalinity, aluminum, arsenic, barium, cadmium, chlorides, chromium, copper, cyanide, fluoride, iron, lead, manganese, mercury, pH, phenol, selenium, specific conductance, sulfates, total dissolved solids, vanadium, and zinc. Ohio EPA requires three initial test results for each parameter, one for each of the three composite samples. If the beneficial use is in Category 3 or 4, the results must be submitted to Ohio EPA with the proposal. If the waste has been characterized in the previous 12 months and no changes have been made, those results may be used. Alternatively, the applicant may use the statistical procedure set forth in EPA's *Test Methods for Evaluating Solid Wastes*, SW-486, to evaluate a larger database that is representative of the material (e.g., monthly analysis from the preceding 12 months).

Annual tests must be performed on the waste materials, although the applicant generally does not need to submit the test results to Ohio EPA. The applicant must analyze the waste product whenever there is a change in the production process or raw materials. Any result that exceeds the non-toxic criteria must be reported immediately.

### **Other Requirements**

Beneficial reuse of a waste covered by Ohio's policy document does not require a permit from Ohio EPA if the intended use complies with all the provisions in the policy document. However, the following general requirements apply to beneficial use projects:

- The generating facility should first explore and implement all feasible alternatives to reduce the volume and toxicity of wastes, as well as on-site recycling or recovery;
- The use cannot create a nuisance condition;
- Storage piles at the site or facility where the material will be used or stored prior to use cannot create a nuisance condition and are subject to erosion control practices;
- Waste may not be used, without a permit, in projects that would include placing the waste in a stream bed, wetland, leach field, or well, unless the waste is fully contained in a manufactured product.

## PENNSYLVANIA

The Pennsylvania Department of Environmental Protection (DEP) issues general permits for combinations of residual waste processing and beneficial use on a regional or statewide basis.<sup>29</sup> Once a general permit exists, beneficial reuse is self-implementing. A facility interested in the beneficial reuse of a particular waste is not required to obtain an individual permit. Instead, the facility must apply for coverage under an existing general permit and be able to demonstrate compliance with all applicable requirements in the general permit.

### Waste Classification System

General permits authorize combinations of residual waste processing and beneficial use on either a regional or a statewide basis. General permits apply to all beneficial reuse combinations that meet specific criteria and are not limited to individual facilities. Once a general permit has been issued, any facility intending to beneficially reuse residual waste may do so without applying for or obtaining an individual permit, provided the facility meets all requirements. Either DEP or an outside applicant may initiate the process for the issuance of a general permit.

A general permit application must include a physical and chemical description and analysis of the residual waste, a demonstration that the waste is non-hazardous, a description of how the waste was generated, a description of the proposed use, and a demonstration that the waste is capable of performing the desired functions in the intended use.

### Allowable Beneficial Reuses

An applicant may propose any combination of residual waste processing and beneficial reuse for a general permit. To date, the DEP has issued three general permits relevant to the foundry industry:

- "Beneficial use of waste molding sand from gray and ductile iron foundries for use as pipe bedding," where the waste sand was generated in a no-bake molding process (Permit WMGR016). This applies to foundries in SIC Code 3321.
- "Beneficial use of waste foundry sand for use as a roadway construction material or as a component or ingredient in the manufacturing of concrete or asphalt products" (Permit WMGR019). This applies to foundries with SIC Codes 3321, 3322, 3325, 3365, 3369, 3532, 3568, and 3569, and applies only to waste foundry sand used with the following sand binders or binder systems in their mold production processes: phenolic urethanes, phenolic esters, phenolic hotbox, phenolic no-bake, furan no-bake, furan warmbox, furan

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<sup>29</sup> Standards for the management of residual wastes are found in Chapter 287 of the Pennsylvania Code, *Residual Waste Management - General Provisions*.

sulfur dioxide, alkyd urethane, alkyd oil based core oil, and epoxy sulfur dioxide.

- "Beneficial use of waste foundry sand from an aluminum foundry for use as road bed construction material" (Permit WMGR021). This applies to foundries classified as SIC Code 3365.

### **Constituent Concentration Thresholds**

An applicant for a general permit must propose concentration limits for contaminants in the waste and a rationale for those limits. In addition, if the waste is to be used without reclamation as a construction material, soil additive, soil substitute or anti-skid material, or otherwise placed directly onto the land, leachate from the waste can not exceed:

- 25 times the ground-water standards for metals and other cations; or
- the ground-water standards for contaminants other than metals and cations.

As a result, two general permits for similar waste but proposing different beneficial uses could establish two different sets of constituent concentration thresholds.

For pH, ignitability, and reactivity, as well as for each contaminant subject to the hazardous waste toxicity characteristic, the maximum concentration is equal to the value listed in Table 1 of 40 CFR Part 261.

In the three general permits targeting foundry sands, DEP approved a different set of parameters for each permit and, in some cases, different thresholds for the same constituent. Each general permit contains totals and leachate standards, which are presented in Exhibit A-5.

### **Sampling and Testing Requirements**

When submitting a general permit application, the applicant must include a full waste characterization, an evaluation of the potential for the waste to leach into the environment, and a waste sampling plan that ensures an accurate and representative sample used for these analyses. Sampling and testing should use EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, to determine compliance with concentration standards. Applicants may use either the TCLP or the Synthetic Precipitation Leaching Procedure (SPLP) to conduct leachability evaluations on representative samples. The facility must propose a re-analysis frequency and the rationale for the specified frequency.

In the case of General Permit WMGR019, waste foundry sand obtained from storage or disposal stockpiles can be used for beneficial reuse if first analyzed for compliance with the chemical thresholds specified in the permit. Two additional requirements include:

- For inorganic parameters, one grab sample for every 50 tons of waste foundry sand that are excavated. Composite samples from the grab samples must then be formed and analyzed after every 1,000 tons of waste sand excavated.
- For organic parameters, one grab sample must be collected and analyzed for every 1,000 tons of waste sand excavated.

### **Other Requirements**

Other requirements include:

- The applicant must submit an annual report that includes documentation of a recent waste analysis. For each new source of waste, the permittee must submit an analysis of a representative sample of the waste no less than 15 days prior to beneficial use.
- If residual wastes are blended for use, the applicant must demonstrate that each waste results in a beneficial contribution to the use of the mixed waste and that the consistency of the blend will be maintained.
- The applicant must provide written notice to each municipality in which the applicant intends to operate under a general permit.
- The storage, transportation, or use of the waste cannot create a nuisance or be harmful to public health, safety, or the environment.
- The reuse cannot cause ground-water or surface-water degradation.
- The applicant must maintain records on site for 5 years.

Furthermore, the waste cannot be: (1) used as valley fill material, to fill open pits from coal or other fills, or to level an area or bring an area to grade; (2) used within 100 feet of a perennial stream; (3) used in or affecting "an exceptional value wetland"; (4) used within 300 feet of a private or public water source; or (5) used or stored in direct contact with ground water or surface water.

**Exhibit A-5**

**Total and Leachate Levels in Pennsylvania's General Permits for Beneficial Use of Foundry Sands**

Parameter	Molding Sand from Gray and Ductile Iron Foundries for Use as Pipe Bedding (WMGR016)		Foundry Sand for Use in Roadway Construction Material, Concrete or Asphalt (WMGR019)		Waste Sand from an Aluminum Foundry as a Road Bed Construction Material (WMGR021)	
	Total Levels (mg/kg)	Leachate (mg/L)	Total Levels (mg/kg)	Leachate (mg/L)	Total Levels (mg/kg)	Leachate (mg/L)
Aluminum			--	5.0	--	5.0
Antimony			30	0.15	30	0.15
Arsenic	20	1.25	20	1.25	20	1.25
Barium	5000	50.0	5000	50.0	5000	50.0
Beryllium			1.0	0.1	1.0	0.1
Boron	7000	3.15	7000	3.15	7000	3.15
Cadmium	20	0.125	20	0.125	20	0.125
Chromium, Hexavalent	300	0.1	300	--	300	0.1
Chromium, Total	1000	2.5	1000	2.5	1000	2.5
Copper	700	32.5	700	32.5	700	32.5
Total Cyanide			--	0.2		
Fluoride			--	7.5		
Iron	--	7.5	--	7.5	--	7.5
Lead	200	1.25	200	1.25	200	1.25
Manganese	400	1.25	400	1.25	400	1.25
Mercury			20	0.05	20	0.05
Molybdenum			--	4.375	--	4.375
Nickel	200	2.5	200	2.5	200	2.5
pH	5.5 to 9.5	--	5.5 to 9.5	--	5.5 to 9.5	--
Selenium	60	1.0	60	1.0	60	1.25
Silver	400	2.5	400	2.5	400	2.5
Thallium			6.0	0.0125		
Zinc	1000	2.5	1000	125.0	1000	125.0
Benzene			0.8	0.005		
Benzoic Acid			0.57	--		
Ethylbenzene			70	0.7		
Naphthalene			8.0	--		
PHCs (petroleum hydrocarbons)			500	--		
Phenanthrene			80	--		
Phenols (total)			400	21	--	21.0
Resorcinol			0.08	--		
Toluene			100	1.0		
Total Organic Halogens			50.0	--		
1,2,4-Trimethylbenzene			11.0	--		
Xylene (total)			1000	10.0		
Toluene Sulfonic Acid	75	--				

## RHODE ISLAND

The Rhode Island Department of Environmental Management (RIDEM) established guidelines for beneficially reusing source-segregated solid waste in 1999.<sup>30</sup> These guidelines outline RIDEM's approach for evaluating whether specific source-segregated solid waste (i.e., separating the proposed "useful" materials from the wastestream at the point of generation) that were not previously defined as recyclable materials may be reused.<sup>31</sup> The process by which RIDEM reviews a request to reuse a specific source-segregated solid waste is referred to as a "Beneficial Use Determination" (BUD).

### Waste Classification System

To request a BUD for a proposed beneficial use, the applicant must first request a variance from the Solid Waste Regulations. By granting a variance, RIDEM is reclassifying a waste as a reusable source-segregated solid waste. Variances expire after one year unless otherwise directed by RIDEM, and renewal of a variance must be requested at least 60 days before the expiration of the existing variance. Positive BUD reviews result in reuse permits for an initial period of one year, which may be renewed for a period of three years.

### Allowable Beneficial Reuses

RIDEM does not indicate allowable reuses, except to outline additional requirements for land application and manufacturing soil products. All proposed reuses are evaluated on a case-by-case basis.

### Constituent Concentration Thresholds

RIDEM has not developed thresholds specifically for BUDs. For land applications, however, RIDEM will rely on components of the *Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases* - Rule 8.02 (Residential Direct Exposure Criteria) and Rule 8.8.00 (Compost Product Requirements and Distribution) to guide its evaluation.

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<sup>30</sup> RIDEM, "Guidelines on Beneficial Use Determinations ("BUDs") for Source Segregated Solid Waste," December 1999.

<sup>31</sup> Authority for this policy is provided by the *Rules and Regulations for Composting Facilities and Solid Waste Management Facilities*, January 1997; the *Rules and Regulations for Reduction and Recycling of Municipal Solid Waste*, March 1997; and the *Rules and Regulations for Reduction and Recycling of Commercial and Non-Municipal Residential Solid Waste*, September 1996.

### **Sampling and Testing Requirements**

Applicants for reuse projects, typically the end user, must include a characterization plan describing methods for sample collection and analyses, and demonstrating that the characterization will be representative of the waste material. This plan must consider: how the samples will be collected, what types of samples to collect, what type of physical and chemical analyses should be performed, what substances are present in the waste (and what is their variability), and what are the human health and ecological risks associated with beneficially using the solid waste in the manner proposed.

### **Other Requirements**

Additional requirements include:

- minimizing or eliminating the environmental hazards associated with the proposed recycling of solid waste;
- demonstrating that the reused material is a viable substitute for traditional raw materials;
- demonstrating that the proposed reuse will not adversely impact public health and natural resources, including ground water, surface water, air, or other applicable environmental resources;
- assessing the extent to which an end market exists for the reusable material;
- describing the reuse and the controls that will be in place;
- demonstrating that the proposed reuse is not simply an alternate method of disposal; and
- describing the degree of processing the solid waste material has undergone and the degree of further processing that is required.

In addition, RIDEM may require the applicant to post public notice regarding the proposed BUD and/or hold a public workshop or hearing to allow for public participation.

## TENNESSEE

The Division of Solid Waste Management within the Tennessee Department of Environment and Conservation (DEC) developed a policy for the beneficial reuse of nontoxic spent foundry sand.<sup>32</sup> Each foundry engaging in beneficial reuse projects maintains internal chemical analysis records on its material, indicating the material's non-toxic nature. Certain reuse methods require the submission of a notification to Tennessee DEC. Contaminant thresholds are based on TCLP limits.

### Waste Classification System

TN DEC policy on the beneficial use of spent foundry sand does not establish a waste classification system. All aluminum and ferrous foundry sand that meets the contaminant thresholds listed below may be reused. Reuses are classified according to whether they do or do not require divisional notification.

### Allowable Beneficial Uses

Under Tennessee policy, the following beneficial reuses of "nontoxic" materials do not require divisional notification:

- **Manufacturing Another Product.** Use as a raw material in manufacturing another final product, e.g., grout, cement, flowable fill, lightweight aggregate, concrete block, bricks, asphalt, roofing materials, plastics, paint, glass, fiberglass, ornamental ceramics and other non-land applications. (Soil materials are excluded.)
- **Stabilization/Solidification of Other Wastes (for disposal).** Use as a stabilization/ solidification agent for other wastes to be disposed of at an approved facility.
- **Use in a Composting Process.** Use in a regulated composting process, not including post-composting additive or land application.
- **Daily Cover/Final Cover of Landfills.** Use as a daily or final cover at a solid waste landfill, if all technical specifications are met for this intended use and approved by a permit.
- **Landfill Liner Protective Layer.** Use as a protective layer for landfill liners as part of an approved permit for the landfill.
- **Small Construction Projects.** Projects using no more than 200 tons for any single project and in which the material is stabilized. State waters must not be

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<sup>32</sup> Tennessee DEC. *Beneficial Use of Nontoxic Spent Foundry Sand*. Undated.



affected by the project, and initial documentation of the nontoxic nature of the material must be filed with the Division of Solid Waste Management.

Certain other uses require Division project review, prior to initiation of the activity:

- **Structural Fill.** Various structural fill uses are accepted, provided that the application will be below the final surface grade of the project when completed. Some examples are building-supportive base or foundation; foundation backfill; construction material for road bases, parking lots, and embankments; construction fill material for planned commercial and residential projects; and backfill materials for utility lines.
- **Mines/Strip Mine Projects.** Uses as fill in abandoned or closed mines or strip mine areas where the plans are approved by the Federal Office of Surface Mines and the Tennessee Division of Water Pollution Control, as appropriate.
- **Other Uses.** The Director may approve other uses on an individual basis if they are consistent with this policy and protective of human health and the environment.

### **Constituent Concentration Thresholds**

The leachate thresholds (in ppm) for beneficial use of spent sand, based on results of TCLP analysis, are as follows:

- Barium - 20.00
- Cadmium - 0.05
- Chromium - 1.00
- Copper - 13.00
- Cyanide - 2.00
- Lead - 0.50
- Mercury - 0.02
- Nickel - 1.00
- Phenol - 15.00
- Selenium - 0.5

In addition, total formaldehyde must be less than 300 ppm.

### **Sampling and Testing Requirements**

Foundries must analyze their residual sand every two years for the above contaminants, or whenever process changes occur that may affect the composition of the sand.

## Other Requirements

All projects require certain recordkeeping standards. Each foundry must maintain information on the amount of sand used; the nature, purpose, and location of its projects; records of chemical analysis, updated every two years; and any written approvals that are received from the Division of Solid Waste Management, as applicable.

For projects requiring divisional review, as specified above, foundries and the property owner of the reuse site must submit a notification form to the Division of Solid Waste Management. The major items covered in the form are:

- generator and proposed use of material;
- estimated volume of nontoxic foundry sand to be used;
- proposed silt/runoff control; and
- description of use location, including local land uses, soil types, floodplains, and ground and surface water locations.

## TEXAS

The Texas Commission on Environmental Quality (TCEQ) and the Texas Cast Metals Association (TCMA) worked cooperatively in developing the Beneficial Reuse of Foundry Sand Program in the state of Texas, which educates foundries on how to use sand to its greatest potential. Originally tied to a statewide effort to reduce solid waste going to landfills by 50 percent (the "Clean Texas 2000" program), TCMA first issued guidance on the beneficial reuse of foundry sand.<sup>33</sup> In 2001, TCEQ published *An Environmental Guide for Texas Foundries*, which summarizes Texas' industrial solid waste regulations<sup>34</sup> and contains a chapter devoted to beneficial reuse of foundry sand.<sup>35</sup>

Depending on the particular characteristics of a sand wastestream, foundry sand might qualify as hazardous industrial waste, non-hazardous industrial waste, or "non-waste." TCEQ defines "non-hazardous wastes" as "any industrial waste that is not listed as hazardous and does not have hazardous characteristics." Non-hazardous industrial waste is then categorized into one of three classes.<sup>36</sup> While all classes of solid waste may be beneficially reused in Texas, reuse of hazardous or Class 1 non-hazardous waste may be subject to more restrictions.<sup>37</sup>

### Waste Classification System

Non-hazardous industrial waste is categorized into three classes. Class 1 waste presents the greatest potential for adverse impacts on human health and the environment, while Class 3 waste presents the least potential for adverse impacts.

- **Class 1.** Due to the presence of certain constituents and properties, Class 1 wastes present the greatest potential for adverse impacts on human health and the environment. Class 1 wastes may require special handling.
- **Class 2.** Class 2 waste is any individual waste or combination of wastes that both is not hazardous and poses less risk than Class 1 non-hazardous wastes, but does not meet the thresholds for Class 3 non-hazardous waste. These wastes are often disposed of in permitted municipal landfills.

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<sup>33</sup> Texas Cast Metals Association, Incorporated. *Beneficial Use of Foundry Sand in the State of Texas: A Cooperative Approach*, February 15, 1996.

<sup>34</sup> Texas Administrative Code, Title 30 – Environmental Quality, Part 1 – TCEQ, Chapter 335 – Industrial Solid Waste and Municipal Hazardous Waste (30 TAC 335).

<sup>35</sup> TCEQ. Publication RG-387, *An Environmental Guide for Texas Foundries*, Chapter 5, October 2001.

<sup>36</sup> TCEQ. Publication RG-22, *Guidelines for the Classification and Coding of Industrial and Hazardous Wastes*, April 2000, p. 1.

<sup>37</sup> This summary provides a general outline of the requirements a facility must meet to beneficially reuse foundry sand. These requirements may not apply for solid waste in other situations (e.g., disposal).

- **Class 3.** Class 3 wastes are considered the least threatening to human health and the environment. Class 3 waste is inert and essentially insoluble and includes such materials as brick, glass, plastics, and rubber. If essentially uncontaminated, these wastes are considered nonthreatening and can be accepted at all permitted landfills.

Non-hazardous foundry sand can also qualify as "non-waste" for beneficial reuse if it meets the following eight criteria for "recycling material:"

1. Each constituent in the recycling material must also normally be found in the raw material it is replacing. If not, it must not present an increased risk to human health, the environment, or waters of the state.
2. A legitimate market must exist for the recycling material as well as its products.
3. The recycling material must be managed and protected from loss, just as raw materials, ingredients, or products would be.
4. The quality of a product must not be degraded by replacing raw materials with recycling materials.
5. The recycling materials must be used without processing or changing the properties of the materials; or the recycling materials must be a necessary ingredient in a production process, and they must either meet or exceed the specifications of the raw materials being replaced without treatment or reclamation.
6. The recycling material must not be burned for energy recovery, used to produce a fuel, or be contained in a fuel.
7. The recycling material may be used as a product itself or to produce products as it is generated without treatment or reclamation.
8. During the calendar year (beginning January 1), a foundry must recycle at least 75 percent (by weight or volume) of the recycling material accumulated during the previous year.

#### **Allowable Beneficial Reuses**

Foundry sand that is considered "non-waste" according to 30 TAC 335.1 is immediately eligible for any beneficial reuse; it is not necessary to notify TCEQ about the sand or its use.

Non-hazardous waste (Classes 1, 2, and 3) is also eligible for reuse, but must meet additional requirements (discussed below).<sup>38</sup> According to TCEQ, some uses of foundry sand include:

- cement, brick, and asphalt manufacture;
- concrete – pipe and block, prestress, ready mix, precast, etc.;
- sand-blasting media and non-skid treatments;
- geotechnical fill – structural, drainage, top cover at landfills, liner material systems;
- flowable fill, subgrade fill, road base, etc.;
- paint filler; and
- steel production.

**Constituent Concentration Thresholds**

Leachate from non-hazardous waste must be evaluated for the presence of 135 constituents. Furthermore, for a waste to be a Class 3 waste, it must also be evaluated using a seven-day distilled water leachate test. The results of this test are compared to thresholds for 35 constituents, which are based on federal maximum contaminant levels (MCLs) and total dissolved solids. A subset of constituents and their thresholds for each type of leachate test is presented in Exhibit A-6.

<b>Exhibit A-6</b>		
<b>TEXAS' LEACHATE THRESHOLDS FOR NON-HAZARDOUS WASTE</b>		
<b>EVALUATIONS (in mg/L)</b>		
<b>Constituent*</b>	<b>Maximum Leachable Concentrations to be Considered Non-hazardous</b>	<b>7-Day Distilled Water Leachate Test's MCLs: Class 3 only</b>
Arsenic	1.80	0.05
Barium	100.0	1.0
Benzene	0.50	0.005
Beryllium	0.08	Not listed
Cadmium	0.50	0.005
Chromium	5.0	0.10
Lead	1.50	0.05
Mercury	0.20	0.002
Phenol	2,000	Not listed
Selenium	1.0	0.05
Silver	5.0	0.05
* The list of constituents is not comprehensive.		

<sup>38</sup> If foundry sand that qualifies for Class 2 waste exceeds a total petroleum hydrocarbon threshold of 1,500 ppm, it is suitable for reuse only in asphalt.

### **Sampling and Testing Requirements**

No testing is required for reuse of material that qualifies as non-waste. Non-hazardous waste (all classes) is subject to several testing requirements: (1) leachate testing (e.g., TCLP for metals and other possible toxic constituents); (2) totals analysis for total petroleum hydrocarbons (TPHs); and (3) verification of the absence of polychlorinated biphenyls (PCBs). Generally, sand must be retested when there is a change in the foundry process generating the waste sand.

### **Other Requirements**

Generators of non-waste sand must maintain records on-site documenting the dates the sand was originally produced, when it was sent for reuse, how it is to be used, its composition and characteristics, where it is going for use, and why it is not a waste.

If classified as non-hazardous industrial waste, the sand and its proposed use or activity cannot result in discharges into or adjacent to surface waters, cause a nuisance, or endanger public health or welfare. Notification of the proposed sand use must be provided to TCEQ at least 90 days before the use or activity begins. Re-notification is necessary if the process generating the sand or its planned use changes significantly. Manifesting, annual reports, and waste receipt summaries are required only if TCEQ specifically requests them.

## WEST VIRGINIA

The Office of Waste Management within West Virginia's Division of Environmental Protection (DEP) developed guidance specific to the beneficial use of "spent foundry sand (including molding sand and core sand) generated by metal casting foundries."<sup>39</sup> Beneficial reuse of foundry sand requires a plan approval from DEP. The plan must detail the intended use of the spent sand, set out a sampling and testing plan for the sand (e.g., total metals and TCLP analyses), and demonstrate that the waste and its intended use do not pose a threat to human and environmental welfare (e.g., through meeting threshold concentrations of constituents of concern and meeting isolation distance requirements).

### Waste Classification System

DEP guidance on the beneficial use of spent foundry sand does not establish a waste classification system. Rather, it outlines a process for obtaining permission for use based on information characterizing the waste, its intended use, and a plan for managing the waste once it is used. All material must meet one set of leachate and total metals guidelines.

### Allowable Beneficial Uses

West Virginia guidelines on beneficial use of spent foundry sand do not apply to wastes that are "Hazardous by Characteristic (as described in 40 CFR 261.24) or Listed Hazardous Wastes (described in 40 CFR 261.31, 261.32 and 261.33)." Allowed beneficial uses of spent foundry sand include:

- **Manufacturing Another Product.** Use as a raw material in manufacturing another final product, e.g., grout, cement, concrete, asphalt, roofing materials, plastics, paint, glass, fiberglass, ornamental ceramics, rock wool, mineral wool, brick, plaster, and other similar products.
- **Stabilization/Solidification of Other Wastes.** Use as a stabilization/solidification agent for other wastes to be disposed of at an approved facility.
- **Anti-Skid Agent/Road Surface Preparation Material.** Use as an anti-skid material or road surface preparation material. Use must be consistent with WV Department of Highways or other applicable specifications.
- **Daily Cover of Landfills.** Use as a daily cover at municipal solid waste landfills, if all technical specifications are met for this intended use.

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<sup>39</sup> WV DEP. *Spent Foundry Sand Beneficial Use Guidelines*. Effective date, June 1, 2000.

- **Protective Cover for Landfill Leachate Collection Service.** Use as a protective cover material located above the drainage layer of a municipal solid waste landfill, if all technical specifications are met for this intended use.
- **Structural Fill.** As an engineered use, i.e., as a building or equipment supportive base or foundation. This category does not include valley fills or filling of open pits from coal or industrial mining.
- **Pipe bedding.**
- **Roads and Parking Lots, Capped Embankment, Ground and Site Barriers.** Use as construction material (sub-base) for roads or parking lots; "capped embankment," where an embankment supports a roadway or other structure whose side slopes are covered with soil suitable for the growth of normal vegetation; and "ground and site barriers," i.e., capped embankments for use as ground or site barriers as long, low, narrow structures lying above the existing ground surface. These structures do not support roadways or other structures and are capped with 24 inches of vegetative cover over their entire surface (where applicable). All activities in this category must be performed under the supervision of a professional engineer or the WV Department of Highways.

### Constituent Concentration Thresholds

The leachate thresholds (in mg/L) for beneficial use of spent sand, based on results of TCLP analysis, are as follows:

- Arsenic - 0.05
- Barium - 1.0
- Cadmium - 0.01
- Chromium - 0.05
- Lead - 0.05
- Mercury - 0.002
- Selenium - 0.01
- Silver - 0.05
- Cyanide - 0.6
- Fluoride - 12.0
- Phenol - 10.5

The total metals thresholds (in mg/L) for beneficial use of spent sand include:

- Copper - 1500
- Molybdenum - 18
- Nickel - 200
- Zinc - 2800



### **Sampling and Testing Requirements**

Approved plans for reuse must contain a sampling and analysis plan (SAP). The SAP must be submitted to WV Office of Waste Management, Solid Waste Management Section (SWMS), for review prior to sample collection and testing. The laboratory and facility personnel use the approved SAP as a reference during all phases of sample collection and analysis. The following items are addressed in the SAP:

- sample methods (3 composites for each source, each from 6 to 12 discrete samples);
- toxicity testing and analysis (TCLP or variation thereof);
- total metals testing and analysis (including copper, molybdenum, nickel, and zinc);
- number of samples (three tests on each parameter);
- parameters (i.e., constituents of concern); and
- additional testing for continued beneficial use (i.e., minimum of annual testing) or when the production process or raw materials used in the production process change.

### **Other Requirements**

Beneficial use of spent foundry sand does not require a permit. Reuse does, however, require plan approval from the SWMS.<sup>40</sup> The major plan items are described below:

- chemical and physical description of the waste (i.e., fully characterizing its composition and properties) and description of the manufacturing and production processes that generated the waste (e.g., including information on chemical constituents in all binders, coatings, or other chemicals used in the production process);
- description of the use location, including topography, soil type, floodplains, and ground- and surface-water locations;
- description of the method for processing and/or beneficial use; and
- permanent, written consent from the landowner of the reuse site giving the WV DEP permission to enter the land.

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<sup>40</sup> SWMS provides approval or denial within 30 days upon receipt of a complete application. If an application is denied, SWMS provides reason(s) for denial.

In addition, beneficial use projects must meet general requirements, such as storage, maintenance, and runoff control requirements; isolation distance requirements (varying minimum distance from streams, drinking-water wells, floodplains, public or private water sources, and groundwater); use restrictions (e.g., prohibited from use as a valley fill material, to fill open pits from coal or other fills, or to level an area or bring an area to grade where the construction activity is not completed properly after the placement of the material); and public health and safety concerns.

## WISCONSIN

Wisconsin's beneficial reuse program consists of a five-tiered system based on leachate and totals standards for all non-hazardous industrial by-products.<sup>41</sup> Within the overall program, Wisconsin has created a beneficial reuse characterization process that targets ferrous foundry sand waste. Once generators determine the category for an industrial by-product, they may pursue any of the reuse methods pre-approved for that category. In almost all cases generators must periodically recharacterize beneficially reused wastes, and in all cases they must submit an annual certification.

### Waste Classification System

Wisconsin's waste classification system consists of standards for five categories of industrial by-products and appropriate uses for each category. Category 1 by-products may be reused in any of the 12 methods allowed by Wisconsin Department of Natural Resources (DNR), while Category 5 by-products are limited to four methods.

- **Category 1** includes by-products that meet the most stringent leachate and total elemental standards.
- **Category 2** includes by-products that meet leachate and totals standards that are generally less stringent than the Category 1 standards by an order of magnitude. In addition, Category 2 has standards for fewer constituents than Category 1.
- **Category 3** includes by-products that meet the same leachate standards as Category 2, but do not need to meet the Category 2 totals standards.
- **Category 4** includes by-products that meet leachate standards that are less stringent than the Category 2 and 3 standards by a factor of two to five. In addition, Category 4 has standards for fewer constituents than Categories 2 and 3.
- **Category 5** includes by-products that are non-hazardous but do not meet any of the standards for Categories 1 through 4.

Within its beneficial reuse regulations Wisconsin makes specific provisions for ferrous foundry excess system sand, ferrous foundry slag, and coal ash. Only a subset of the constituents included in Wisconsin's general beneficial reuse regulations are applicable when characterizing each of these specific waste types. Non-ferrous foundry sands must receive specific department approval under the general beneficial reuse regulations.

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<sup>41</sup> Chapter NR 538, Wisconsin Administrative Code, December 1997, *Beneficial Use of Industrial Byproducts*; and Publ-WA-822-98, April 1998, *Guidance for the Beneficial Use of Industrial Byproducts*.

### **Allowable Beneficial Reuses**

Wisconsin allows 12 methods of beneficial reuse, most of which are suitable for spent foundry sands, but does not allow landspreading. The Wisconsin DNR can be petitioned to allow additional reuses not specified in the regulations. The 12 types of reuse specified in the regulations are listed below (the categories that qualify for each reuse are listed in parentheses):

- raw material for manufacturing a product (1-5);
- waste stabilization/solidification (1-5);
- supplemental fuel source/energy recovery (1-5);
- landfill daily cover/internal structures (1-5);
- confined geotechnical fill, including commercial, industrial or institutional building sub-base; paved lot base, sub-base, and subgrade fill; paved roadway base, sub-base and subgrade fill; tank, vault, or tunnel abandonment; utility trench backfill; bridge abutment backfill; and slabjacking material (1-4);
- encapsulated transportation facility embankment (1-4);
- capped transportation facility embankment (1-3);
- unconfined geotechnical fill (1-3);
- unbonded surface course (1-2);
- bonded surface course (1-2);
- decorative stone (1-2);
- cold-weather road abrasive (1-2); and
- general beneficial use in accordance with Chapter NR 538 (1-2).

### **Constituent Concentration Thresholds**

An industrial by-product must meet leachate standards to qualify for any of the categories, and for Categories 1 and 2, it must also meet total elemental standards. The standards for ferrous foundry sand for all categories, are presented in Exhibit A-7.

**Exhibit A-7**

**Wisconsin's Waste Characterization Standards for Ferrous Foundry Sands**

Parameter	Category 1		Category 2	Categories 2 and 3	Category 4
	Total Elemental (mg/kg)	Leachate (mg/L)	Total Elemental (mg/kg)	Leachate Standard (mg/L)	Leachate Standard (mg/L)
Aluminum		1.5		15	
Antimony	6.3	0.0012		0.012	
Arsenic	0.042	0.005	21	0.05	
Barium		0.4		4.0	10
Beryllium	0.014	0.0004	7	0.004	
Cadmium		0.0005		0.005	0.025
Chromium, Hex.	14.5				
Chromium, total		0.010		0.10	
Copper		0.130			
Total Cyanide		0.040			
Fluoride		0.8		8.0	
Iron		0.15		1.5	3
Lead		0.0015		0.015	0.075
Manganese		0.025		0.25	
Mercury		0.0002		0.002	0.01
Nickel		0.020			
Phenol		1.2		12	
Selenium		0.010		0.10	
Sulfate		125			
Thallium	1.3	0.0004			
Zinc		2.5			
Acenaphthene	900		x		
Acenaphthylene	8.8		x		
Anthracene	5000		x		
Benz(a)anthracene	0.088		44		
Benzo(a)pyrene	0.0088		4.4		
Benzo(b)fluoranthene	0.088		44		
Benzo(ghi)perylene	0.88		x		
Benzo(k)fluoranthene	0.88		x		
Chrysene	8.8		x		
Dibenz(ah)anthracene	0.0088		4.4		
Fluoranthene	600		x		
Fluorene	600		x		
Indeno(123-	0.088		44		
1-methyl naphthalene	8.8		x		
2-methyl naphthalene	8.8		x		
Naphthalene	600		x		
Phenanthrene	0.88		x		
Pyrene	500		x		
Total Polyaromatic Hydrocarbons - PAHs			100		

## **Sampling and Testing Requirements**

All sampling and analysis must be performed using EPA's *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, and the sample collection and testing should be representative of the waste. A composite sample may need to be collected from several locations or over a specific time period, and the sampling technique must be adequately documented.

The most recent TCLP leachate test and total elemental analysis are applicable for Categories 1 and 2. For Categories 3 and 4 only the TCLP test applies. A by-product qualifies as Category 5 by simply not being a hazardous waste.

If the reuse material is used or stored in quantities that exceed 1,000 cubic yards per year over the previous authorization period, the applicant must recharacterize beneficially reused wastes based on a schedule contingent upon the waste category. Specifically, the required recharacterization frequency is: Category 1 - every year; Category 2 - once every 2 years; Category 3 - once every 3 years; Category 4 - once every 5 years; and Category 5 - only when there is a change in the process that generates the industrial by-product.

## **Other Requirements**

Other requirements include the following:

- Applicants must submit initial and annual certifications that document how the waste was generated, past and future beneficial methods, the most recent characterization testing results, any problems encountered during the previous year, and any environmental monitoring data collected during the past year at the beneficial reuse location.
- Beneficial reuse cannot create nuisance conditions at the reuse location or at storage locations.
- Public notice and public participation requirements, depending on the volume of waste to be reused.
- For certain projects (confined or unconfined geotechnical fill and bonded or unbonded surface course) that will contain by-product volumes over set thresholds, written notification must be submitted to the Wisconsin DNR prior to initiating the project. For large transportation facility embankment projects (greater than 100,000 cubic yards), Wisconsin DNR concurrence must be obtained prior to initiating the project.
- Monitoring of leachate volumes is required for the fully encapsulated or capped transportation facility embankment uses, with chemical analysis of the leachate required if the volume exceeds certain thresholds.

- The beneficial reuse of industrial by-products is prohibited under various performance standards if any of the following will occur: (1) a significant adverse impact on wetlands; (2) a significant adverse impact on critical habitat areas; (3) a detrimental effect on any surface water; (4) a detrimental effect on ground water; (5) an excessive accumulation of explosive gases; or (6) the emissions of any hazardous air contaminant exceeding state limitations.