



Beneficial Reuse of Foundry Sand in Indiana



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To: Foundry Sand User/Interested Party
From: Blake Jeffery, Executive Director
Re: **“Beneficial Reuse of Foundry Sand” Booklet**

Enclosed please find the latest INCMA publication, “Beneficial Reuse of Foundry Sand.” The booklet was originally paid for by a grant from the Indiana Department of Environmental Management and provides a comprehensive compilation of Indiana policy on use and storage of foundry sand. The booklet also includes a list of organizational contacts and Internet resources on the subject. Given the booklet is available at no cost to those interested, we are hoping to disseminate it broadly throughout the state.

Special thanks to our sponsors for their financial support and especially to Guinn Doyle, Barnes & Thornburg who made this 2013 revision possible.

Please feel free to contact me at 317-974-1830 or INCMAoffice@ameritech.net if you would like more copies or have any suggestions for individuals or groups who can assist us in getting the booklet out to those who have or may need foundry sand. Thank you.

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Beneficial Reuse of Foundry Sand

Who has it, who needs it and how can it be used?

Introduction/Contents

Every day in Indiana, hundreds of tons of foundry sand are disposed of in our landfills. This sand offers almost no difference in chemical composition compared to raw mined sand but because it is coming from an industrial process it has been passed by as the valuable resource that it is. The money that can be saved in projects requiring sand and the environmental benefits that can be gained, all through foundry sand reuse, are lost. This booklet is intended to guide those who can benefit from foundry sand reuse, both suppliers and users, by outlining what beneficial reuse of foundry sand offers, how Indiana regulators view the sand, and where to find additional resources to help individuals take advantage of the resource.

Beneficial Reuse Benefits and Challenges

Benefits of Beneficial Reuse Landfill Diversion

Every year 6-10 million cubic yards of foundry byproducts are placed in landfills. And even though the US is working hard to reduce the overall amount of waste that is landfilled, available landfill space is a scarce and increasingly expensive resource. It is imperative that the remaining landfill capacity of the US is maximized. Beneficial reuse of foundry byproducts can make significant contributions towards meeting this important national goal.

National/State Impact

While foundries are located in all fifty states, Indiana is the second largest foundry state in production with approximately 120 foundries in Indiana. Indiana foundries employ nearly 15,000 employees with a payroll of \$550 million.

Industry Benefits

Industry can save \$100-250 million in disposal costs. Until the 1970's the US foundry industry enjoyed long periods of health and expansion. Since that time, however, increasing pressures from cheap labor in foreign-based foundries combined with increasing environmental regulatory costs here at home (not required in most developing countries) have put many US foundries in financially precarious straits. Beneficial reuse can help to regain part of that margin of success lost over the past thirty years.

User Benefits

Foundry aggregates (sand and slag) are cost-effective local supply sources. National supplies of high-grade virgin aggregates are becoming more and more scarce and expensive. A clear consensus is emerging amongst key policymakers in government, industry, academia, and environmental groups, that a key element in ensuring the long-term environmental and economic health of the nation is the reduction of reliance upon virgin non-renewable raw materials. A material as simple as sand is just such a resource. Every year, many millions of tons of sand are mined from sand and gravel pits across the nation for the construction of roads, buildings and other necessary products of life. As the demands for these products grow, supplies of the raw materials to fuel these most basic industries diminish and become more expensive. The substitution of foundry byproducts for these raw materials is an ideal fit for "closing the loop" between waste and raw materials.

Small Business Benefits

Two-thirds of U.S. foundries are small businesses -- with less than 100 employees. INCMA, the American Foundry Society, and other foundry groups promote recycling market development by delivering the staff and technical resources that small businesses lack.

Common Industry Challenges & Opportunities

Data Collection & Dissemination

Create an effective, centralized data collection/dissemination system for foundry byproduct reuse. Indiana leads the nation in its development of a foundry sand database located at www.incma.org and is part of a larger effort to create a midwestern database through the FIRST organization.

National Standards & Specifications

Establish, where appropriate, national standards and specifications for foundry byproduct reuse, and educate foundries and users on technical and performance standards.

NOTE: On May 19, 2000 US EPA issued a Recovered Materials Advisory Notice for Purchasing Agents of the federal government that recommended using flowable fill containing ferrous foundry sands.

Partnerships

Develop technology transfer partnerships with national public and private sector partners that support and encourage foundry byproduct reuse.

Strategies

Publicize examples of effective byproduct reuse strategies, highlighting technical, economic and implementation data.

Leveraging

Leverage past investments by the American Foundry Society (AFS), individual companies, state associations, and agencies into a national infrastructure encouraging foundry byproduct reuse & recycling.

Indiana/National Beneficial Reuse Resources

Indiana Cast Metals Association
317/974-1830
www.incma.org

Indiana Foundry Sand Database
www.incma.org

Indiana Dept. of Environmental Management (IDEM)
800/451-6027

Office of Land Quality Permit Guide
<http://www.in.gov/idem/5904.htm>

Indiana Economic Development Corporation
800/463-8081

Clean Manufacturing Technology Institute (CMTI)
765/463-4749
www.ecn.purdue.edu/CMTI/

Association of Indiana Solid Waste Management Districts (AISWMD)
317/371-2788

American Foundry Society
847/824-0181
www.afsinc.org

AFS FIRST (Sand Recycling Initiative)
847/824-0181
www.afsinc.org/government

US Environmental Protection Agency
www.epa.gov



Reuse in Indiana

This booklet presents the nonrule policy documents that implement the Indiana statute governing the reuse of foundry sand. The statute and the nonrule policy documents describes the uses of foundry sand that meets the Type III waste criteria which do not require a permit. The reader needs to remember that a nonrule policy document does not have the force law. If there is a conflict between a statute or rule and a nonrule policy document, the statute or rule controls.

Second, Indiana's statute on the use of foundry sand only addresses uses of foundry sand that meets the Type III criteria under 329 IAC 10-9. In order to qualify for use under the guidance documents, foundry sand must be adequately demonstrated to meet Type III criteria under 329 IAC 10-9. This means it must have been determined to be solid (i.e., non-hazardous) waste in accordance with waste determination procedures found in 329 IAC 10-7.1 and it must have received from IDEM a waste classification establishing that contaminant levels are below the concentration limits for Type III restricted waste under 329 IAC 10-9-4(b)(2). Three (3) samples with level III analytical data quality ("ADQ") must be used for initial testing of the foundry sand. Subsequent testing requirements may be reduced or waived if consistency in chemical composition of the foundry sand waste stream is demonstrated. Information concerning level III ADQ may be found in "Solid Waste Program Analytical Data Deliverable Requirements: A Guidance Document" nonrule policy document, OSHWM General ID#0038-01-SW. Guidance on waste determination and classification is available from IDEM. [The current guidance on analytical testing is found in Guidance to the Performance and Presentation of Analytical Chemistry Data (NPD Waste-0032) and Solid and Hazardous Waste Program Analytical Data Deliverable Requirements: Supplemental Guidance, March 2009.]

Therefore, the first step in any plan to reuse foundry sand is to make sure that it meets the Type III waste criteria. Even if the foundry sand does not meet the Type III waste criteria, it may be able to be reused with IDEM approval under 392 IAC 10-3-1.

Finally, two (2) of the three (3) nonrule policy documents were developed which input from the Foundry Sand Task Force. The three nonrule policy documents discussed in this booklet were developed in 1998 and 2000. The text of the nonrule policy documents set out in this booklet have been revised to consolidate some repetitive statements, update citations to statutes and rules, provide citations to current guidance documents, and update contact information.

Use of Foundry Sands in Accordance with IC 13-19-3-7

Identification Number: WASTE-0028-NPD

Date Originally Adopted: April 22, 1998

Dates Revised: None

Other Policies Repealed or Amended: None

Brief Description of Subject Matter: The following guidance is offered so that Type III foundry sands may be legitimately used in a manner that complies with state regulations and is protective of the environment. Storage of foundry sand is discussed in other guidance.

Citations Affected: 329 IAC 10-9; IC 13-19-3-7.

Each of the various uses permitted by IC 13-19-3-7 are discussed below. Information may be obtained from the Indiana Cast Metals Association regarding current availability of foundry sands for use under IC 13-19-3-7. Data on amount of foundry sand previously used with the type of use may also be available. Please contact the the Indiana Cast Metals Association at 317/974-1830.

Daily Cover at Landfill

Use of foundry sand for daily cover is allowed

under the statute if done in accordance with the applicable permit issued to the landfill. Daily cover is used to control fires, disease vectors, odors, scavenging, and blowing litter at the landfill. Indiana Solid Waste Rule, 329 IAC 10, allows the use of materials, other than soil, for the purpose of a daily cover if the alternative material or facility design provides a level of environmental protection equal to that provided by soil.

Approval to use foundry sand that has been classified by OLQ as Type II, III or IV, per 329 IAC 10-9-4, as an alternative daily cover is granted by modification of a municipal solid waste landfill's (MSWLF) operating permit. A list of landfills having permit approval to use foundry sand may be obtained by calling 317/233-2711. Please note that permit conditions, which allow the use of foundry sand may vary between the landfills permitted to use foundry sand. MSWLF's not currently approved to use foundry sand must obtain a permit modification prior to any use of foundry sand as an alternative daily cover.

If the MSWLF does not have prior approval, the MSWLF must apply for a modification to their permit.

Protective Cover for Landfill Leachate Collection System

329 IAC 10-17-11 allows the use of foundry sand as the protective cover material located above the drainage layer of a MSWLF's liner system. The drainage layer is typically a granular or geosynthetic material located above the MSWLF's geomembrane liner whose function is to direct leachate to a collection sump for removal from the landfill.

Use of foundry sand as protective cover material must be done in accordance with 329 IAC 10-17-11 and 329 IAC 10-17-12. A permit modification may be required to use foundry sand if the MSWLF's operating permit requires the use of a specific material as protective cover. For further

information please contact the Office of Land Quality Engineering Section at 317/232-8840.

Capped Embankments

The term "capped embankment", as used in IC 13-19-3-7(3), means an embankment supporting a roadway or other structure, whose side slopes are covered with soil suitable for the growth of normal, healthy vegetation, such as: sandy loam, sandy clay loam, clay loam, clay or other suitable material free from clods, debris and stones. The soil should be at least one foot thick and should prevent erosion. If the soil will not support vegetation, then six inches of topsoil should be added to the cover soil. Top soil should consist of loose friable soil, free of refuse, stumps, large roots, rocks over 2 inches in diameter, brush, weeds or other materials detrimental to the proper development of vegetative growth.

Embankments may be constructed with "weep holes" to allow for the relief of built-up pore water pressure. The use of weep holes during construction will not violate the requirement for capping.

Ground and Site Barriers (under 10,000 cubic yards)

Capped embankments for ground and sight barriers are long, low, narrow structures constructed of foundry sand above the existing ground surface. These structures do not support roadways or other structures and are capped over their entire surface area as described in the "Capped Embankment" section above. Sharp objects should be removed from foundry sand that is used for ground and sight barriers and properly disposed. Foundry sand may however contain trace amounts of metallics.

Please note that IC 13-19-3-7(2) limits construction of ground and site barriers to less than 10,000 cubic yards. Use of foundry sand in a larger ground and site barrier can only be done with IDEM approval under 329 IAC 10-3-1.

Structural Fill Base Capped by Clay, Asphalt, or Concrete

This category lists the following uses:

- (A) Roads
- (B) Road shoulders
- (C) Parking lots
- (D) Floor slabs
- (E) Utility trenches
- (F) Bridge abutments
- (G) Tanks and vaults
- (H) Construction or architectural fill
- (I) Other similar uses

Item A, Roads; item C, Parking Lots; and item D, Floor Slabs must be constructed of either of the following two materials: concrete or asphalt.

Sub-base or base for roadways or parking lots and associated utility backfills: Foundry sands may be used as a sub-base or base under State, County or Municipal roadways or parking lots and the utilities contained within them. The base shall be considered as the area lying within typical roadway boundaries where soil or aggregate is used from the bottom of the pavement down.

Item E, Utility Trenches do not need to be located within the boundaries of a roadway, parking lot or floor slab to use foundry sand as a bedding material and backfill material. However any utility trench not located within the boundary of a roadway, parking lot or floor slab must be covered with a soil suitable for the growth of normal, healthy vegetation, such as: sandy loam, sandy clay loam, clay loam, clay or other suitable material free from clods, debris and stones. The depth of the soil cover should be in accordance with generally accepted engineering practices. In the absence of applicable provisions, it is recommended the cover be a minimum of six (6) inches.

Item G, Tanks and Vaults means that abandoned tanks and vaults may be filled with foundry sand or that tanks and vaults may be placed on compacted foundry sand and backfilled with

compacted foundry sand.

Item H, Construction or Architectural Fill does not include the use of foundry sand for land reclamation purposes.

[Note that this NPD does not reference that the term structural fill is defined at 329 IAC 10-2-183 and according to IDEM, to qualify as structural fill foundry sand must be placed in lifts and compacted to a specific density per design specification or by a CQA/CQC document.]

Foundry sand may not remain uncovered when it is used for items A through I - it must be covered with either soil, asphalt or concrete. Soil used as a cover should comply with the requirements identified in Item E, Utility Trenches.

Use as a Raw Material

This category includes the following uses:

- (A) Flowable fill
- (B) Concrete
- (C) Asphalt
- (D) Brick
- (E) Block
- (F) Portland cement
- (G) Glass
- (H) Roofing materials
- (I) Rock wool
- (J) Plastics
- (K) Fiberglass
- (L) Mineral wool
- (M) Lightweight aggregate
- (N) Paint
- (O) Plaster
- (P) Other similar products

Since all of the above products are commonly used and understood by individuals in their respective industry, no definitions are offered for those products. However, the last item, "Other similar products", does deserve further discussion. Although not specifically listed in this category, use at another foundry in the manufacturing process is allowed. Any

other product manufactured must be similar to one of the other products listed. In order to be considered a similar product, it must be chemically and physically similar to at least one product specifically mentioned above. If a product is not specifically mentioned above or not similar to another product mentioned above, then IDEM approval is required prior to use.

Since every site is unique, some factors or situations concerning the use of type III foundry sands may not be addressed in this guidance document. A written approval from IDEM may be necessary for uses not specified in this guidance. Please note that approval from local government or other state or federal agencies may also be necessary. If you need additional information, or have any questions or concerns, please contact staff in the Industrial Waste Section, Office of Land Quality at 317-232-3111. The IDEM toll-free number is 1-800-451-6027.

Foundry sands that meet the Type IV criteria specified in 329 IAC 10-9-4 are excluded from the provisions of Indiana's Solid Waste Rule (329 IAC 10-3-4). Therefore, foundry sands classified as Type IV may also be acceptable for the uses specified in this guidance.

Title: Use of Foundry Sand in Land Application and as a Soil Amendment

Identification Number: WASTE-0040-NPD

Date Originally Adopted: April 20, 2000

Dates Revised: None

Other Policies Repealed or Amended: none

Brief Description of Subject Matter: Uses of type III foundry sand in land application operations and as a soil amendment that are allowed without a permit as authorized by Senate Enrolled Act 495, and that are in compliance with state law and protective of the environment. Citations Affected: IC 13-11-2-114.2; IC 13-19-3-7; PL 30-1999, SEC. 5 (noncode)

Policy Statement

Introduction

IC 13-19-3-7(4) allows two uses for foundry sand

without requiring a permit: in a land application operation and as a soil amendment.

Foundry sand that meets Type III criteria under 329 IAC 10-9 may be used in accordance with this guidance document without obtaining a permit in land application or as a soil amendment if the land application or soil amendment does not include the operation of a landfill and if the foundry sand or the product using foundry sand as a soil amendment is demonstrated to contain acceptable levels of metals in accordance with this policy.

Uses of Type III foundry sand in land application or as a soil amendment not authorized by this guidance document may, nonetheless, be approved by IDEM as research and demonstration projects under the requirements set forth in 327 IAC 6.1-4-19. The analytical data submitted must be of the same quality required by this guidance document. If the ceiling concentration limits, annual or lifetime land application rates, soil amendment product concentration limits, or other applicable contaminant limits established in this guidance document are exceeded, the submission must include a rationale for exceeding the limits. If a research or demonstration project proposes using Type III foundry sand as a soil amendment, it need not name a location or owner of property upon which the soil amendment product will be used, but must indicate the type and amount of other materials used to make the soil amendment product.

Definitions

The following terms are defined for the purposes of this guidance document only:

Floodway. "Floodway," as set forth in IC 14-8-2-102, means the channel of a river or stream and the parts of the flood plain adjoining the channel that are reasonably required to efficiently carry and discharge the flood water or flood flow of a river or stream. Please consult the Indiana

Department of Natural Resources for information concerning the floodway boundary for specific streams or rivers.

Food crop. "Food crop" means any crop or crops grown for:

- (1) human consumption; or
- (2) consumption by animals whose products are consumed by humans.

Food crops include fruits, vegetables, seeds, grains, and tobacco.

Foundry sand. "Foundry sand" means used or spent core or molding sands. The term does not include the following:

- (1) refractory;
- (2) slag;
- (3) grinding dust or sludge;
- (4) equipment or vehicle maintenance waste;
- (5) baghouse dust, except for waste solely from molding sand handling systems; scrubber sludge;
- (7) shot blast dust;
- (8) unused cores;
- (9) metal scrap;
- (10) pattern shop waste; and
- (11) solvents.

Land application. "Land application," means the direct surface and/or subsurface application of type III foundry sand in-situ to soil, which sand is evenly applied on or evenly incorporated into the land in accordance with generally accepted agricultural or horticultural practices. Foundry sand used in land application is "land applied."

Soil amendment. "Soil amendment" means type III foundry sand that has been mixed with one (1) or more other materials to form a product, which product could then be sold, re-mixed, applied to the land, or otherwise used as soil or a soil substitute in accordance with generally accepted agricultural or horticultural practices. The term excludes type III foundry sand that has been mixed with any amount of:

- (1) solid waste, as that term is defined by

IC 13-11-2-205(a), that is not type III foundry sand;

- (2) hazardous waste, as that term is defined by IC 13-11-2-99;
- (3) a hazardous substance, as that term is defined by IC 13-11-2-98; or
- (4) petroleum, as that term is defined by IC 13-11-2-160.

Total metals analysis. "Total metals analysis" means analysis of type III foundry sand using the latest edition of "Test Methods For Evaluating Solid Waste: Physical/Chemical Methods" EPA recommended analytical methods (SW-846, as amended) or other valid analytical methods deemed acceptable by IDEM.

Type III foundry sand. "Type III foundry sand" means foundry sand that has received a waste classification from IDEM of either type III or type IV criteria under 329 IAC 10-9.

IDEM Policy on Land Application/ Soil Amendment

Type III foundry sand that satisfies IDEM's ceiling concentration limits of metals of concern may be used in land application but it must be limited to annual and lifetime application rates (dry tons per acre). Type III foundry sand may only be used in land application if it has been demonstrated to not exceed ceiling concentration limits listed in 327 IAC 6.1-4-9(a). For convenience, those ceiling concentration limits are reprinted below as Table A.

The values given in the tables in the guidance do not match the values in the tables in 327 IAC 6.1-4-9 and the values in rule are the ones that apply, not those in the guidance document. Persons contemplating land application should call 317-232-3111 to obtain assistance in determining the land application requirements.

To calculate the lifetime application rate, IDEM has developed a formula based on numerical

toxicity factors for each of several metals of concern. These numerical toxicity factors are found in Table B of this document, below. To use this formula, a foundry or other person seeking to land apply type III foundry sand must perform a total metals analysis that obtains concentrations (mg/kg) of each metal of concern. A maximum application rate is generated for each metal by dividing the IDEM-supplied numerical toxicity factor by the foundry-supplied concentration (mg/kg) of the metal in the foundry sand. This quotient is the maximum application rate in dry tons of type III foundry sand per acre for that metal. The overall lifetime application rate is the smallest of the maximum application rates calculated for the metals of concern. Type III foundry sand may not be land applied in excess of this amount over the lifetime of the receiving site. The end user or landowner must be cautioned not to exceed the lifetime application rate.

In addition to the lifetime application rate, federal regulations concerning the use of materials containing cadmium limit the annual application rate of this metal. (See 40 CFR § 257.3-5). The annual numerical toxicity factor for cadmium is 223. Therefore, the maximum annual application rate, in dry tons per acre per year, is calculated by dividing the number 223 by the concentration of cadmium found in the total metals analysis. Type III foundry sand may not be land applied in excess of this amount in any year at the receiving site. The end user or landowner must be cautioned not to exceed this yearly application rate.

Soil Amendment

Type III foundry sand may also be used as a soil amendment if it is mixed with another product that is not a solid waste, hazardous waste, hazardous substance, or petroleum. Total metals analysis must be performed on either the type III foundry sand used as a soil amendment or on the product using type III foundry sand as a soil amendment. The total metals analysis of either

the type III foundry sand or the product using type III foundry sand as a soil amendment must be demonstrated to not exceed soil amendment product concentration limits in Table C, below.

Additionally, federal regulations concerning the use of materials containing cadmium further limit the allowable concentration of cadmium in certain circumstances. (See 40 CFR § 257.3-5). If the cadmium concentration in the soil amendment exceeds 2 mg/kg on a dry weight basis, end users must be cautioned to adjust soil pH to 6.5 or higher when using the soil amendment for food crops.

Tables

TABLE A

Ceiling Concentration Limits for
Type III Foundry Sand to be Land Applied

Type III Foundry Sand Land Application Ceiling
Metal of Concern Concentration Limit (mg/kg)

arsenic	75
cadmium	85
chromium	3,000
copper	4,300
lead	840
mercury	57
molybdenum	75
nickel	420
selenium	100
zinc	7,500

TABLE B

Maximum Lifetime Land Application
Numerical Toxicity Factors and Formula

Type III Foundry Sand

Maximum Lifetime Land Application

Metal of Concern Numerical Toxicity Factor

arsenic	18,500
cadmium	2,250*
chromium	1,338,500
copper	669,500
lead	134,000
mercury	7,500

nickel	187,500
selenium	44,500
zinc	1,249,500

*Please note the federally imposed annual application limit for cadmium, described above in the “land application” section.

The lifetime application rate for the type III foundry sand is the smallest of the calculated metal specific lifetime application rates.

TABLE C
Soil Amendment Product Concentration Limits

Type III Foundry Sand Soil Amendment Product Concentration	
Metal of Concern Limit (mg/kg dry weight basis)	
arsenic	41
cadmium	39*
chromium	2000
copper	750
lead	300
mercury	17
molybdenum	75
nickel	210
selenium	100
zinc	1,400

*Please note the federally imposed pH limit for soils to which cadmium-bearing material is applied, described above in the “soil amendment” section.

Other Conditions

No person may land apply Type III foundry sand to any site if any of the cumulative pollutant loading rates in 327 IAC 6.1-4-9(b) have been reached or exceeded at that site through any land application operation, including but not limited to land application under this nonrule policy or 327 IAC 6.1. Foundry sand that was generated outside of Indiana that is land applied or used as a soil amendment must be in compliance with this nonrule policy.

Foundry sand must be stored and land applied in conformity with applicable laws, rules, and policies, including “Storage of Type III Foundry Sand Prior to Legitimate Use,” WASTE-0027-NPD (originally adopted April 9, 1998). Foundry sand may not be stored or land applied in a manner that would cause fugitive dust, fugitive particulate matter, or a violation of State or federal surface water or groundwater quality standards. Foundry sand that is land applied must be evenly applied on, or evenly incorporated into, the land. The Indiana Department of Natural Resources prohibits the unpermitted deposit of material in or on a floodway of certain rivers or streams. IC 14-28-1-22.

Foundry sand may not be stored or land applied within areas of Karst topography, in wetlands, in critical habits of endangered species, or in a floodway unless special arrangements are made to prevent environmental damage to these areas. Placement of Type III foundry sand in accordance with the requirements set forth in 329 IAC 10-3-4(b)(1-4) will constitute compliance with this paragraph.

INDIANA STORAGE REGULATION

Title: Storage of Type III Foundry Sands Prior to Legitimate Use
 Identification Number: WASTE-0027-NPD
 Date Originally Adopted: April 9, 1998
 Dates Revised: [none]
 Other Policies Repealed or Amended: [none]
 Citations Affected: IC 13-19-3-7; 329 IAC 10-2; 329 IAC 10-9
 Brief Description of Subject Matter: Type III foundry sands may be stored for legitimate use in a manner that complies with state regulations and is protective of the environment.

These guidelines apply only to Type III foundry sands that have received a waste classification issued by IDEM and will be used in accordance with state regulations. It is not IDEM’s intention

to include storage of intermediate by-products at the generating facility or short-term storage at job sites within the scope of these guidelines. However, these facilities must still comply with 329 IAC 10-2-181, 329 IAC 10-4-2, & IC 13-30-2. Additionally, Indiana's Solid Waste Rule allows for other uses of foundry sand not covered in the statute. 329 IAC 10-3-1 (14), states that the legitimate use of foundry sand which has been demonstrated as suitable for restricted waste site type III under the provisions of 329 IAC 10-9-4, including the use as a base for road building, but not including use for land reclamation except as allowed under subdivision (15) is excluded from regulation as a solid waste. This exclusion would allow for other uses of type III foundry sand not specified in the above-mentioned statute. IDEM approval is required for use under this exclusion.

Foundry sands may also contain de minimus quantities of grinder fines, slag, baghouse dust, refractory, spent shot and pattern shop sawdust. At no time is the foundry sand to be mixed or commingled with hazardous or other non-hazardous industrial waste or municipal solid waste. Additionally, the foundry sand may not be mixed with other aggregate or raw materials unless to meet a product specification.

Facilities that will be storing foundry sands for more than twenty-four (24) hours should notify IDEM in writing prior to acceptance of foundry sands to avoid any misunderstandings between the facility and IDEM regarding the types of wastes stored, the length of storage, and intended end use. This notification must include, at a minimum, the name of the owner/operator and location of the facility, the source of the foundry sand, facility design, operational plans (including procedures for screening hazardous or other unacceptable wastes), turnover rate, and demonstration that there is a market for the sand and that it will be used within the following six (6) months. To assist IDEM in determining compliance with the definition of storage, a notification should be submitted to IDEM for a

facility storing longer than six (6) months to rebut the presumption that disposal has occurred. Facility notifications should be directed to: Industrial Waste Compliance, Office of Land Quality, Indiana Department of Environmental Management, 100 North Senate, Indianapolis, IN 46206. Please note that approval from local government may also be necessary.

General provisions for the management of solid wastes, which can be applied to the stockpiling of foundry sands, can be found in the Solid Waste Land Disposal Facilities rule (329 IAC 10) and in Indiana's Environmental Laws (IC 13) in the following two places:

Definition of Storage - 329 IAC 10-2-181

Indiana's Solid Waste Rule defines storage as the retention, containment or accumulation of solid waste on a temporary basis in such a manner that it does not threaten or potentially threaten human health or impact the environment, for a period of more than twenty-four hours, in such a manner as not to constitute disposal of the waste. It must be a rebuttable presumption that storage of waste for more than six (6) months constitutes disposal. Six (6) months may not be adequate time for accumulation considering the volume required for some projects or in the length of the construction season in Indiana. The agency will allow storage of foundry sands for a longer period of time provided that the facility has submitted a notification as discussed earlier and can adequately demonstrate that the material is being stored in an environmentally sound manner and will be used in accordance with state regulations. The storage facility is responsible for maintaining adequate records to demonstrate that the foundry sands have been used in accordance with state regulations. This may include bills of lading or other shipping papers, receipts, or contracts showing volumes and designated end use. Speculative accumulation will not be permitted. Please note that if a facility accumulates sand for a project and it is not utilized within a reasonable time

frame, IDEM will require the sand to be removed and disposed in a permitted facility.

Acts Prohibited - 329 IAC 10-4-2 and IC 13-30-2

Appropriate measures must be taken during the processing and storage of foundry sands to ensure that no threat to the environment or public health is created such as pollution, contamination, and fugitive emissions in accordance with 329 IAC 10-4-2 [Open Dumping and Open Dumps] and IC 13-30-2 [Acts Prohibited]. The following specific requirements and guidelines will help foundry sand storage facilities, excluding those facilities at generating facilities and those short term facilities at job sites, maintain compliance with Indiana regulations:

1. Storage facilities containing foundry sand stockpiles must prevent the contamination of groundwater by foundry sand.

2. Foundry sand stockpiles must be located on a low permeability barrier such as, but not limited to, the following:

- a. Concrete or asphalt pads;
- b. Clay-like soil* pads;
- c. Pads constructed of synthetic materials;
- d. Pads constructed with underdrain systems;
- e. Alternative designs insuring ground water protection.

3. The seasonal high groundwater table must be separated from the bottom of stockpiled foundry sand by at least two feet.

4. Storage facilities must also protect surface waters and control the discharge of pollutants from foundry sand. Surface water run-on should be diverted away from foundry sand stockpiles and run-off from foundry sand stockpiles should be properly managed. A storage facility may not discharge pollutants to surface waters except through a valid National Pollutant Discharge

Elimination System (NPDES) permit as identified in 327 IAC 5-2-2. Storage facilities should contact IDEM's Office of Water Quality at (317) 232-8670 to determine compliance requirements with the NPDES permit program to prevent pollution of surface waters.

5. Foundry sand stockpiles should not be located within six hundred (600) feet of a potable water well. The six hundred (600) feet setback restriction may be reduced to two hundred (200) feet if a well record is on file with the Department of Natural Resources confirming that the well integrity is maintained in compliance with the well construction requirements delineated in 310 IAC 16-6.

6. Foundry sand stockpiles should not be located in such a place or manner that would result in the washout of foundry sand caused by the flooding of any body of water. Erosion and sediment controls should be implemented that will prevent the erosion of foundry sand and subsequent deposition of foundry sand off of the storage facility boundaries.

7. Storage facilities should not be located in the critical habitat of an endangered species, within areas of karst topography or within fifty (50) feet of the real property boundaries of the facility.

8. Storage facilities should control public access during normal business hours and restrict public access during non-operational periods.

9. Storage facilities should implement appropriate management practices to prevent offensive and noxious odors and fugitive dust from leaving the site.

10. Screening procedures should be in place at both the generating facility and storage facility to ensure that only source segregated type III foundry sands are accepted at the storage facility. These procedures should include methods for detecting hazardous waste, special

waste, general solid waste or any unacceptable waste. All unacceptable waste received at the storage facility must be removed and properly disposed immediately. Additional steps should be taken to ensure that changes in the waste or its characteristics are tracked and that IDEM is informed of those changes immediately. It should also be noted that the end-user may require additional tests such as the Microtox™ prior to acceptance for use.

11. Storage facilities must ensure that the final disposition of foundry sand is environmentally acceptable and in compliance with all applicable regulations.

* Clay like soils are soils such as: clays, sandy clays, silty clays, sandy silty clays, silts, sandy silts, clayey sands or clays without organic matter, able to achieve a hydraulic conductivity of 1×10^{-6} centimeters per second or less. Clay-like soil pads should be two feet thick, whether naturally occurring or constructed with recompacted soil.

Since every site is unique, some factors or situations concerning the storage of type III foundry sands may not be addressed in this guidance document. Additional guidance regarding waste classification and use of foundry sand is available. If you need additional information, or have any questions or concerns, please contact staff in the Industrial Waste Section, Office of Land Quality at 317-232-3111. The IDEM toll-free number is 1-800-451-6027.

Things IDEM Looks for when Evaluating Foundry Sand Reuse Projects

Since IC 13-19-3-7 was enacted and IDEM published the three (3) nonrule policy documents, INCMA and its members have continued to work with IDEM on foundry sand reuse issues. As a result of this ongoing effort, INCMA has identified issues that should be considered when developing foundry sand reuse

projects. This is not an exhausted list, but does represent what concerns IDEM most including that the proposed reuses are not disposal:

1. The reuse must meet a specific purpose.
2. To accomplish the purpose, there should be a design and engineering consideration such as slope, compaction, and suitability of the foundry sand for the purpose. [See definition of structural fill at 329 IAC 10-2-183.]
3. Location consideration such as high groundwater tables, well field protection, springs, drainage ways, and flood plains.
4. Stormwater runoff management during use and any accompanying storage.

While there is no guarantee what issues IDEM will consider when evaluating the foundry sand reuse projects, considering and addressing the issues listed above should address major concerns that IDEM has historically identified as issues with foundry sand reuse projects.



Indiana Department of Transportation Draft Policy

(Proposed and Approved October 2011)
200-R-401 RECYCLED FOUNDRY SAND

Description

Recycled foundry sand (RFS) consists of a mixture of residual materials used from ferrous or non-ferrous metal castings and natural sands. The Contractor shall have the option of incorporating RFS into applicable operations in accordance with 105.03.

Materials

RFS sources are to be selected from the Department's list of approved Foundry Sand Sources. RFS may be substituted for B borrow (211) or Borrow (203) upon the approval of the Department Geotechnical Section.

The Contractor shall provide a copy of the Indiana Department of Environmental Management (IDEM) waste classification certification for Type III or IV residual sands prior to use. The IDEM certification shall clearly identify the stockpiles with regard to their extent and geographical location.

The Contractor shall provide the Engineer with a type A certification in accordance with 916 for RFS prior to use of the materials. The type A certification shall consist of applicable laboratory tests results of gradation. Consultants on the Department list of approved Geotechnical Consultants shall perform the testing of RFS materials.

RFS use is restricted to the following additional requirements:

1. RFS derived from Type III residual sand shall not be permitted within 100 ft (30 m), horizontally, of a stream, river, lake, reservoir, wetland or any other protected environmental resource area.
2. RFS derived from Type III or Type IV residual sand shall not be placed within 150 ft (50 meters), horizontally, of a well, spring, or other ground source of potable water.
3. RFS shall not be permitted adjacent to metallic pipes, or other metallic structures.
4. RFS shall not be used as encasement material.
5. RFS shall not be used in MSE wall applications.

If RFS is used in embankment, excavation and replacement operations as a replacement for

B borrow or borrow, the following additional restrictions shall be required.

1. Borrow: RFS shall be in accordance with 203.
2. B borrow: RFS shall be in accordance with 211.

Construction Requirements

RFS shall be transported in a manner that prevents the release of fugitive dust and loss of material. Adequate measures shall be taken during construction operations to control fugitive dust from RFS. RFS shall not be applied when wind conditions result in problems in adjacent areas or result in a hazard to traffic on any adjacent roadway. The spreading of RFS shall be limited to an amount that shall be encased within the same workday. If weather causes stoppage of work or exposes the RFS to washing or blowing, additional RFS may be spread when the work resumes. Spraying with water, limewater, or other sealing type sprays will be considered to be acceptable methods for dust control.

When RFS is used as borrow or B borrow, compaction of the materials shall be in accordance with 203. Compaction will be determined by dynamic cone penetrometer (DCP) testing in accordance with ASTM D 6951 using a 17.6-lb (8-kg) hammer. The moisture content shall be controlled within -3 and +2 percentage points of the optimum moisture content determined in accordance with AASHTO T 99. The DCP criteria will be determined from a test section using the DCP and a sand cone in accordance with AASHTO T 191. If compaction operations are insufficient, the Contractor shall coordinate with the Department Geotechnical Section to develop and conduct alternative compaction procedures of the material. Nuclear density testing of RFS will not be allowed.

When RFS is used in embankment construction, the sideslopes of the RFS shall be encased with 1 ft (0.3 m) of borrow materials. All RFS shall

be encased with a minimum of 1 ft of borrow materials prior to the completion of construction operations in a calendar year. The encasement materials shall be placed and compacted concurrently with the RFS lifts. Encasement materials meeting the AASHTO M 145 Classifications of A-6 and A-7 shall be submitted to the Department Geotechnical Section for approval.

Method of Measurement

RFS applications will be measured in accordance with the respective uses for borrow or B borrow.

Basis of Payment

RFS will be paid for at the contract unit price in accordance with the respective uses for borrow or B borrow.

No payment will be made for the transportation, handling, or any special construction requirements such as alternative compaction means or encasement activities when using RFS materials.

The cost of the use of water, limewater, sprays, or other activities necessary for dust control shall be included in the cost of the respective pay item.

The cost of geotechnical testing for the use of RFS materials shall be included in the cost of the respective pay item.

RECYCLED FOUNDRY SAND SOURCE APPROVAL CRITERIA

The following procedures are required for Foundry Sand source approvals or otherwise prescribed subject matter to be added, maintained or removed from the Department approved list.

The procedures for approval may involve hazardous materials, operations, and equipment and may not address all of the safety problems

associated with the use of the material. The source is responsible for establishing the appropriate safety and health practices and determining the applicability of regulatory limitations prior to use.

General Requirements

1. A source, requesting approval for addition to the Department approved list, shall provide to the Office of Materials Management the following:

- (a) Name and location of source or manufacturer,
- (b) List of material and specification reference for the material that the approval is being requested,
- (c) Average monthly production of the material by size, type or grade,
- (d) Name, address and telephone number of responsible contact person,
- (e) Facility layout or production process of the material,
- (f) Quality parameters of the material,
- (g) Raw material sampling and testing frequency,
- (h) Procedures for conforming materials which provides a positive linkage between the furnished materials and the quality control test data,
- (i) Procedures for non-conforming materials,
- (j) Procedures for marking and tracking materials,
- (k) Procedures for documentation maintenance,
- (l) Finished material sampling and testing frequency,
- (m) Procedures for reviewing and updating the source operations,
- (n) Testing laboratory quality system,
- (o) Names, titles and qualifications of sampling and testing personnel,
- (p) Location and telephone number of the laboratory testing office,
- (q) Sample management describing procedures for samples identification,

maintenance of the samples prior to testing, sample retention and disposal of samples,

- (r) Testing report procedures,
- (s) Methods used to identify improper test results and procedures followed when testing deficiencies occur,
- (t) Statistical analysis of test results, and
- (u) Maintenance of test records

The application shall be signed and dated by the source or manufacturer representative at the time the application is submitted for acceptance. The application shall be maintained to reflect the current status and revisions shall be provided to the Department in writing.

2. Testing may be required which will be performed outside the Department laboratories. A recognized laboratory shall be the following:

- (a) A State transportation agency testing laboratory,
- (b) A testing laboratory inspected by the AMRL, or
- (c) A testing facility approved by the Department

Approval Requirements

In addition to the general requirements, the source shall also submit the following to the Office of Materials Management.

- (a) Name of Testing Facility
- (b) Dates samples were obtained
- (c) Dates samples were tested
- (d) Test method used for IDEM classification
- (e) Letter from IDEM indicating the waste classification of the materials
- (f) Test results for TCLP and neutral leachate
- (g) Stockpile sampling locations, including depths and available historical testing results
- (h) Gradation test results
- (i) Recycled Foundry Sand Source Certification

The Recycled Foundry Sand source certification is included as Attachment A. A new approval submission shall be required when re-sampling is required in accordance with 329 IAC 10-9-4(e) (2). (In accordance with 329 IAC 10-9-4 (e)(2) for foundry waste, re-sampling is conducted at two year intervals whenever the process changes or according to a schedule for re-sampling by the IDEM Commissioner based on variability noted in previous sampling and other factors affecting the predictability of waste characteristics.)

When metal concentration of the Type III residual sand exceeds 80% of the allowable limits within IDEM classification, an indemnification clause is required. A "Recycled Foundry Sand (RFS) Indemnification Clause" is included as Attachment B.

Maintaining Approval

Test reports shall be generated in accordance with specification requirements for the material and submitted monthly to the Office of Materials Management. If the material is not produced by the source in a given month, the monthly submittal shall state:

"No _____ was manufactured during _____." material _____ month/year

Samples of material may be obtained randomly for verification at the source or at the point of incorporation into the work in accordance with 106.02.

The source shall provide written notification of any changes, revisions or updates of their operations, source name or address, contact person or product name to the Office of Materials Management.

To maintain approval, a summary of new stockpile test results for the acceptance analysis shall be submitted monthly indicating testing on an every 2000 t (2,000 Mg). Tested and approved

RFS stockpiles shall be properly signed for easy identification. If no new stockpiles are created in a given month, a letter indicating, “no new RFS stockpiles for month/year were created” shall be submitted to the Office of Materials Management.

Removal From Approved List

A source will be removed from the approved list for the following, but not limited to, reasons:

- (a) Test failures determined by Department verification sampling,
- (b) Monthly test reports not provided for three consecutive months,
- (c) Test reports generated by the source which indicate non-compliance with specification requirements, or
- (d) Performance of the product no longer meets the intended purpose.



Attachment A
RECYCLED FOUNDRY SAND (RFS) SOURCE CERTIFICATION

This is to certify recycled foundry sand (RFS) stockpiles geographically located as follows:

RFS _____

RFS was produced by the _____ Company located in _____ (City), and _____ (State) and was shipped for use on Indiana Department of Transportation projects is Type _____ (III or IV) material according to the IDEM restricted waste criteria. If any metal concentration exceeds 80% of the allowable limits for a Type III material the foundry shall provide the Department with an acceptable indemnification clause. The _____ RFS source also agrees that processes and stockpiles associated with the production of such RFS may be inspected and sampled at regular intervals by properly identified representatives of the Department or a duly assigned representative.

_____ (RFS Producer)
_____ (Date of Signing)
_____ (Title)
_____ (Signature)

State of _____ SS:
County of _____

Subscribed and sworn to before me by _____
of the firm of _____
this _____ day of _____ 20 _____.

_____ Notary Public My Commission Expires: _____

This certification has been reviewed and approved by:

(INDOT Representative) Date

Attachment B

RECYCLED FOUNDRY SAND (RFS) INDEMNIFICATION CLAUSE

_____ RFS producer shall indemnify, defend, exculpate, and hold harmless the State of Indiana, its officials, and employees from any liability of the State of Indiana for loss, damage, injury, or other casualty of whatever kind or to whomever caused, arising out of or resulting from a violation of the federal or Indiana Occupational Safety and Health Acts (OSHA), the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or any other environmental law, regulation, ordinance, order or decree (collectively referred to hereinafter as “Environmental Laws”), as a result of the supply, testing, and application of residual sand or other materials supplied under this Contract by _____ source, whether due in whole or in part of the negligent acts or omissions of: (1) _____ Foundry, its agents, officers, or employees, or other persons engaged in the performance of the contract; or (2) the joint negligence of them and the State Of Indiana, its officials, agents, or employees.

This contract shall include, but not be limited to, indemnification from: (1) any environmental contamination liability due to the supply, testing, and application of residual sand in road base, embankments, or other projects designated by the Department as agreed to by the parties, and (2) any liability for the clean up or removal of residual sand, or materials incorporating such sand, pursuant to any Environmental Law.

The RFS producer also agrees to defend any such action on behalf of the State of Indiana, to pay all reasonable expenses and attorneys fees for such defense, and shall have the right to settle all such claims. Provided, however, that no liability shall arise for any such fees or expenses incurred prior to the time that _____ Foundry shall have first received actual and timely written notice of any claim against the State which is covered by this Indemnification Agreement. If timely written notice of any claim hereunder is not received by _____ Foundry, and _____ Foundry is thereby prejudiced in its ability to defend or indemnify, then to the extent of such prejudice, this Indemnification Agreement shall be void.

This Indemnification Agreement does not create any rights in any third party, and is solely for the benefit of the State of Indiana and its agents, officials, and employees.

References

- Powers and duties concerning solid and hazardous waste management: use of foundry sand that meets Type III criteria without permits, IC 13-19-3-7 (as amended by Senate Enrolled Act 495 (PL 30-1999) (effective July 1, 1999)).
- Flood Control, IC 14-28-1.
- Criteria for Classification of Solid Waste Disposal Facilities and Practices, 40 CFR Part 257.
- Land Application of Biosolid, Industrial Waste Product, and Pollutant-Bearing Water, 327 IAC 6.1.
- Solid Waste Land Disposal Facility Classification, 329 IAC 10-9.
- Waste Determination, 329 IAC 10-7.1.
- Fugitive Dust Emissions, 326 IAC 6-4.
- Fugitive Particulate Matter Emission Limitations, 326 IAC 6-5.
- Exclusions: disposal of wastes that meet restricted waste site Type IV criteria, 329 IAC 10-3-4.
- “Test Methods For Evaluating Solid Waste: Physical/Chemical Methods” EPA Guidance Document, SW-846.
- “Use of Foundry Sands in Accordance with House Enrolled Act 1541” nonrule policy document, WASTE-0028-NPD.
- “Storage of Type III Foundry Sand Prior to Legitimate Use” nonrule policy document, WASTE-0027-NPD
- “Solid Waste Program Analytical Data Deliverable Requirements: A Guidance Document” nonrule policy document,

OSHWM General ID#0038-01-SW.

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