

# Beneficial Use of Industrial Byproducts

Guidance on the requirements of ch. NR 538, Wis. Adm. Code  
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## Introduction

This document applies to industrial byproduct generators, brokers and storage facilities that choose to participate in the beneficial use program under the requirements of ch. NR 538, Wis. Adm. Code. This revision updates “*Guidance for the Beneficial Use of Industrial Byproducts*” from March 2015. It reflects the substantive changes required due to code revisions of NR 538, Wis. Adm. Code, effective Nov. 1, 2020.

Beneficial use of industrial byproduct regulations are found in chapter [NR 538](#) of the Wisconsin Administrative Code.

The goal of ch. NR 538, Wis. Adm. Code, is to encourage the beneficial use of industrial byproducts in a nuisance-free and environmentally sound manner. This mostly self-implementing rule establishes standards for the acceptable recycling of specifically defined industrial byproducts and describes eligible uses and project criteria appropriate for each use. The industrial byproducts being used must provide a functional benefit to ensure that the material is being legitimately recycled. The rule addresses the:

- storage and transportation of these materials.
- notification of owners of properties where these materials are placed.
- establishment of a public participation process.

Additionally, the rule includes requirements for submittals of initial and annual certifications to the DNR, and a notification process to the DNR for larger projects to allow for additional evaluation of potential for impacts to human health or the environment. The rule also allows for DNR review of case specific approval for other uses or materials, where appropriate.

### **Benefits of Using Industrial Byproducts**

The DNR recognizes the benefits of recycling industrial byproducts and encourages the legitimate use of the materials to preserve resources, conserve energy and reduce or eliminate the need to dispose of these materials in landfills. Disposing of potentially useful materials in landfills is expensive and displaces landfill capacity that could be used for municipal solid waste. Industrial byproducts can also replace virgin products, thereby reducing the need for new quarries and extending the lives of existing quarry operations. Additional benefits for companies participating in the beneficial use program may include improved environmental performance and reduced landfill operational and/or disposal costs.

However, generators need to be aware that they are ultimately responsible for the disposition of their industrial byproducts and waste materials. The self-implementing nature of the rule requires a high level of competence and integrity among waste generators and end users. If materials are improperly handled and environmental problems result, the DNR will assess the cause and address the situation appropriately using existing administrative code and statutory authority.

## **Definitions**

### **Beneficial Use**

Section NR 538.03(2), Wis. Adm. Code, defines “beneficial use” as the utilization of an industrial byproduct in a productive manner.

### **Industrial Byproducts**

Section NR 538.03(8), Wis. Adm. Code, defines “industrial byproducts” as materials that have been generated as a byproduct of an industrial process and possess consistent physical and chemical properties including the following:

- papermill sludge;
- combustion ash including coal combustion residuals such as fly ash, bottom ash and boiler slag;
- material captured in flue gas desulfurization (FGD) systems;
- ferrous, steel and aluminum foundry excess system sand;
- aluminum foundry slag;
- byproducts from the production of lime including lime kiln dust; and
- other non-hazardous solid waste with similar characteristics as determined by the DNR.

Waste materials that are expressly not included in the definition of “industrial byproducts” under s. NR 538.03(8), Wis. Adm. Code, include the following:

- post-consumer waste or the byproducts of combusting or processing post-consumer waste;
- ash from solid waste incinerators;
- iron or steel foundry slag managed in accordance with ss. 289.01(33) and 287.29, Wis. Stats.; and
- material that was previously disposed or landfilled.

## Materials Regulated Elsewhere

Waste materials that do not qualify as industrial byproducts, but may have the potential to be reused or recycled under other regulations, include the following:

- hazardous waste per s. NR 600.03(98), Wis. Adm. Code;
- metallic mining waste per s. NR 182.02(30), Wis. Adm. Code;
- water treatment waste (lime) to be used as an agricultural soil amendment per s. NR 518, Wis. Adm. Code;
- wastewater treatment waste per ch. NR 214, Wis. Adm. Code; and
- other solid waste exempted from all requirements of chs. NR 500 to 538, Wis. Adm. Code, per s. NR 500.08, including dredged material.

## Productive Use

Section NR 538.03(10), Wis. Adm. Code, defines “productive use” as use of an industrial byproduct that meets all of the following criteria:

- provides a functional benefit;
- substitutes for the use of a virgin material that must be otherwise obtained; and
- meets relevant product specifications, regulatory or design standards when available and, when such standards are not available, is not used in excessive quantities.

“Excessive quantities” is further defined under s. NR 538.03(4), Wis. Adm. Code, as the use of industrial byproducts in volumes that are greater than necessary for the specific project purpose. Any proposed use that does not meet these criteria would be considered “solid waste disposal” and subject to regulation under chs. NR 500-520, Wis. Adm. Code.

## Characterization vs. Certification

**Characterization** refers to the collection and analysis of a representative sample of byproduct material in accordance with s. NR 538.06, Wis. Adm. Code. The sample results are then compared to the appropriate standards in the NR 538 Appendix tables to determine eligible uses for the byproduct material and submitted to the DNR in either the initial certification or recertification as described above.

**Certification** refers to the information submitted by the generator to the DNR demonstrating that use of the industrial byproduct will meet the performance standards for beneficial use under ch. NR 538, Wis. Adm. Code.

For more information regarding the use of “characterization” and “certification” in the ch. NR 538, Wis. Adm. Code, refer to *Guidance for Beneficial Use of Industrial Byproducts: Transition to Revised Rules* (WA-1906). Go to [dnr.wi.gov](http://dnr.wi.gov) and search “beneficial use of industrial byproducts.”

## Specific Waste Types and Uses

### Other Industrial Byproducts

The regulations allow the DNR authority to approve materials not specifically defined as “industrial byproducts” in ch. NR 538, Wis. Adm. Code, to be part of the beneficial use program. The generator should contact the DNR to discuss the potential for beneficial use of their material and to determine what level of review and approval will be required.

To be eligible for inclusion into the beneficial use program, waste materials not otherwise specifically listed in s. NR 538.03(8), Wis. Adm. Code, must meet the following criteria:

- 1) Be generated as a byproduct of an industrial process (see definition and exclusions listed above and under s. NR 538.03(8)(c), Wis. Adm. Code).
- 2) Possess consistent physical and chemical properties per s. NR 538.03(8)(b), Wis. Adm. Code.
- 3) Will not require additional testing beyond the frequencies and compounds in the NR 538 Appendix to verify its potential for appropriate uses.
- 4) Can be used in a productive manner in accordance with s. NR 538.03(10), Wis. Adm. Code, or one of the eligible uses listed under s. NR 538.10, Wis. Adm. Code.

If the industrial byproduct needs to be mixed with another byproduct or material to render it fit for use, the material requires a case specific approval under s. NR 538.09, Wis. Adm. Code.

Examples of materials not specifically listed in code, but which meet these criteria:

- Crushed scrap porcelain and pottery cull used for decorative stone or geotechnical fill.
- Spent sand blasting media from unpainted or uncoated clean iron or steel produced as part of a foundry finishing process and used in accordance with s. NR 538.10(2), Wis. Adm. Code.

### **Select Foundry Sand**

A new definition of higher-grade foundry sand was included in the beneficial use code revisions under s. NR 538.03(12m), Wis. Adm. Code. "Select foundry sand" is defined as foundry sand that, in addition to meeting the definition under s. NR 538.03(6), Wis. Adm. Code, consists of either spent green molding sand, resin bonded molding sand or core sand with primary components consisting of combinations of silica sand, bentonite clay and carbonaceous additives such as bituminous coal, gilsonite and cellulose.

- Select foundry sand may include nominal quantities of spent molding aides such as riser sleeves and ceramic filters but may not include uncured chemically bonded sands or debris beyond trace quantities.
- Select foundry sand must also have been determined to contain less than the concentration specified for the parameters listed in NR 538 Appendix, Table 1, Column B to meet this definition.

### **Coal Combustion Residuals from Electric Utilities**

Generators should be aware that certain federal rules also apply to the beneficial use of certain coal combustion residuals (CCRs) including the industrial byproducts of bottom ash, fly ash and flue gas desulfurization waste generated from electric utilities.

On Dec. 19, 2014, the U.S. Environmental Protection Agency (U.S. EPA) finalized federal regulations on the disposal of CCRs defining them as a solid waste subject to 40 CFR Part 257, Subtitle D of the Resource Conservation and Recovery Act (RCRA). To meet the federal definition of "beneficial use" a generator must demonstrate the:

- 1) CCR provides a functional benefit;
- 2) CCR substitutes for the use of a virgin material, conserving natural resources that would otherwise be needed;
- 3) use of CCR meets relevant product specifications, regulatory standards and design specifications, and if such standards are not available, must not be used in excess quantities; and

- 4) unencapsulated use of 12,400 tons or more of CCR placed on the land in non-roadway applications meets certain environmental protection criteria. Sand and gravel pits and quarries that receive CCR are defined as land disposal units and would not qualify as a beneficial use under the federal regulations.

It is recommended that interested parties consult a copy of the federal rule for more details.

### **Case Specific Exemption or Approval**

If the proposed industrial byproduct material would need conditions that fall outside of the requirements in ch. NR 538, Wis. Adm. Code, (such as additional testing beyond the frequencies and compounds in the NR 538 Appendix, uses not listed in s. NR 538.10, Wis. Adm. Code, or conditions restricting its use) then the generator may request a case specific exemption or approval with the applicable requirements of s. NR 538.09, Wis. Adm. Code, and s. 289.43(7), Wis. Stats. If the waste material does not meet the definition of an “industrial byproduct,” then any proposed use must be approved in accordance with s. NR 500.08(5), Wis. Adm. Code, and s. 289.43(8), Wis. Stats.

Case specific exemption and approvals under s. NR 538.09, Wis. Adm. Code, allow the DNR to:

- 1) Assign eligible uses to a high-volume industrial byproduct not included in the definition of industrial byproduct in s. NR 538.03(8), Wis. Adm. Code; or
- 2) Conditionally approve a beneficial use not specified in the rule at s. NR 538.10, Wis. Adm. Code. These approvals are based on statutory exemptions under s. 289.43(7), Wis. Stats.

Example of an industrial byproduct not defined in ch. NR 538, Wis. Adm. Code, that could be approved for eligible beneficial uses under s. NR 538.10, Wis. Adm. Code:

- Spray dryer ash or spray dryer ash/fly ash mixtures from coal burning power plants for use as a soil amendment.

Example of an industrial byproduct defined in ch. NR 538, Wis. Adm. Code, approved for a non-s. NR 538.10, Wis. Adm. Code, use:

- Beneficial use of fired off-spec ceramic roofing granules for use in various quarry operations, including blasthole backfill.

Per s. NR 538.06(1), Wis. Adm. Code, the DNR may require additional information prior to a case specific exemption or approval. In addition, the testing program must be approved by the DNR prior to characterization. Therefore, it is important that the generator contact the DNR prior to having the material tested to ensure that the testing program proposed is acceptable. See Appendix D of this document for an example of a case specific approval request.

The plan review fee associated with a case specific exemption or approval request is \$550 (Table 2 of s. NR 520.15, Wis. Adm. Code). Upon receipt of the fee, the DNR has 90 days to act on the request. If granted, the exemption or approval may contain conditions outlining specific requirements to ensure that the byproduct is used appropriately and placed in a safe manner.

### Low-Hazard Waste Exemptions

If a material is not an industrial byproduct as defined in ch. NR 538, Wis. Adm. Code, and the proposed use is not specified in the rule at s. NR 538.10, Wis. Adm. Code, the generator may wish to investigate a low hazard exemption from the solid waste regulations as allowed in s. 289.43(8), Wis. Stats. For more information, see *Exempting Low-Hazard Wastes from Solid Waste Regulations* (WA-1645). To access this guidance, go to [dnr.wi.gov](http://dnr.wi.gov) and search “WA-1645.”

## Characterization/Recharacterization

Characterization consists of a chemical analysis of a representative sample of the industrial byproduct for both bulk analysis (also referred to as a totals analysis) and water leachability per American Standard Test Methods (ASTM) standards, specifically testing method ASTM D-3987. Samples must be taken at the point of accumulation nearest to the where the byproduct is generated and compared to the appropriate standards in Tables 1-4 of the NR 538 Appendix.

Prior to any use determination, the byproduct must be determined by the generator to not be a “hazardous waste” in accordance with s. NR 538.06(3)(b), Wis. Adm. Code.

In addition to the chemical testing, byproducts and uses must meet applicable structural and physical specifications and generally accepted engineering practices for the use. Byproducts must also ensure that the use of the material meets the definition of recycling under s. 289.43(1), Wis. Stats., and can be used in a productive manner per s. NR 538.03(10), Wis. Adm. Code. Byproducts that meet these criteria are used in such a way that:

- they provide a functional benefit;
- can substitute for the use of a virgin material that must be otherwise obtained; and
- meet relevant product specifications, regulatory standards or design standards when available, and, when such standards are not available, are not used in excess quantities.

## Characterization

### Initial Characterization

Prior to use, each individual industrial byproduct produced at the facility must be characterized to determine their eligible beneficial uses under s. NR 538.10, Wis. Adm. Code. The potential eligible uses for a byproduct will vary depending on its physical and chemical properties.

Initial characterization refers to when the generator collects and analyzes a representative sample of a new or substantially changed byproduct material in accordance with the requirements of s. NR 538.06(2), Wis. Adm. Code. The test results are then compared to Tables 1-4 in the NR 538 Appendix to determine potential eligible uses for the byproduct. Documentation of the initial characterization test results must then be reported to the DNR in accordance with s. NR 538.14(1), Wis. Adm. Code.

The numeric standards in the NR 538 Appendix tables were developed based on their potential risk to human health and the environment and the test parameters were based on U.S. EPA and Natural Resource Conservation Service (NRCS) studies. The bulk analysis numeric standards are based on specific exposure models developed by the Wisconsin Department of Health Services (DHS) to calculate direct contact limits (inhalation and ingestion) and the water leachability standards are based on ch. NR 140, Wis. Adm. Code, ground water quality standards.

## Recharacterization

Recharacterization refers to the process of a generator collecting and analyzing a representative sample of an existing byproduct material in accordance with s. NR 538.06(5), Wis. Adm. Code, including both a bulk analysis and a water leach test, for the appropriate parameters listed in Table 1 and 2 of the NR 538 Appendix. This recharacterization is required at least once every 4 years unless the generator uses or stores less than 1,000 cubic yards per year. Documentation of any recharacterization test results must then be reported to the DNR in accordance with s. NR 538.14(2), Wis. Adm. Code. Recharacterization is also required if the process generating the industrial byproduct has changed significantly enough to potentially result in a change in the eligible uses of the industrial byproduct.

## Byproduct Specific Requirements

### Commingled Industrial Byproducts

Generators sometimes mix industrial byproducts, including those with different eligible uses, to facilitate storage and use or mix them with other non-waste materials. The resulting mixture will be limited to the eligible uses of the most restricted byproduct present in the mix in accordance with s. NR 538.06(4), Wis. Adm. Code.

In addition to meeting chemical requirements, in order to ensure that legitimate recycling is taking place, each industrial byproduct in the mixture must meet physical and geotechnical specifications for the proposed end uses. Recharacterization must be performed on each individual byproduct at the point of accumulation nearest to where each byproduct is generated prior to mixing. Recharacterization cannot be performed on a sample of the byproduct mixture in lieu of sampling each individual byproduct.

Example of the beneficial use of commingled industrial byproducts:

- A foundry mixes a spent green sand that is eligible for use as geotechnical fill with a spent resin sand that cannot meet the water leaching standards under Table 1, Column B in the NR 538 Appendix. The resulting mixture is not eligible for use in geotechnical fill projects, although it still could be used as alternate daily cover in a landfill if it meets the criteria under s. NR 538.10(1)(d), Wis. Adm. Code. Each foundry sand must still be recharacterized separately in accordance with s. NR 538.06(5), Wis. Adm. Code, even though the two byproducts are mixed at the production facility.

### Flue Gas Desulfurization Byproducts

All flue gas desulfurization (FGD) byproducts to be marketed and used as soil or plant additives in accordance with s. NR 538.10(5), Wis. Adm. Code, must be analyzed using a total elemental analysis for the parameters in NR 538 Appendix, Table 3, unless another analytical method or parameters are approved by the DNR in writing. FGD byproducts do not need to be analyzed for the parameters in NR 538 Appendix, Tables 1 and 2 or held to those standards unless the FGD byproduct is intended for a use other than as a soil or plant additive (such as drywall or as an ingredient in concrete mixes).

### Select Foundry Sand

Generators of certain foundry byproducts have the option of requesting that the DNR designate some or all their foundry byproducts as “select foundry sand” in accordance with s. NR 538.06(3)(f), Wis. Adm. Code.

The request must include all the following:

1. an initial certification or recharacterization notification per s. NR 538.14(1) or (2), Wis. Adm. Code, submitted with Form 4400-197;
2. supporting documentation demonstrating that the foundry byproducts meet the definition of “select foundry sand” under s. NR 538.03(12m), Wis. Adm. Code. Supporting documentation must include evidence of segregation which may include process flow diagrams, written material handling and segregation procedures, or byproduct management summaries;
3. analytical results demonstrating that the byproducts contain less than the concentration specified for the parameters listed in ch. NR 538 Appendix, Table 1, Column B; and
4. a determination, along with supporting documentation, that the foundry sand cannot be classified as a hazardous waste in accordance with s. NR 538.06(3)(b), Wis. Adm. Code.

## Certification

After characterization of an industrial byproduct, generators must complete the **initial certification** process per s. NR 538.14, Wis. Adm. Code, and submit the information to the DNR for certification that the byproduct is eligible for inclusion into the beneficial use program. This process requires a formal submittal from the generator or storage facility operator and must be completed prior to utilizing the industrial byproduct for any beneficial use or the establishment of a storage facility for industrial byproducts.

**Recertification** refers to the reporting requirement that existing industrial byproducts already certified through the initial certification process be “recertified” at least once every 4 years in accordance with s. NR 538.14(2), Wis. Adm. Code, by the byproduct generator for the purpose of confirming the eligible beneficial uses are still appropriate.

Generators and storage facilities must submit an annual certification form (Form 4400-198), which summarizes the estimated volume of the industrial byproduct beneficially used or put into storage in the previous year.

Failure to comply with the requirements of either the Initial Certification or Annual Certification may result in the beneficial use or storage of industrial byproducts being subject to licensing under s. 289.31, Wis. Stats., and the regulatory requirements in chs. NR 500 to 536, Wis. Adm. Code.

### Initial Certification

This reporting requirement applies to any new byproduct material which has not been previously certified, or an existing byproduct material for which the generation process has substantially changed such that the byproduct could be considered a new and separate byproduct from the original. The certification information must be submitted to the DNR by the byproduct generator for certification in accordance with s. NR 538.14(1), Wis. Adm. Code, for the purpose of confirming appropriate eligible beneficial uses.



The initial byproduct certification submittal consists of:

- 1) a completed initial certification form (Form 4400-197) and
- 2) analytical test results from the initial characterization performed in accordance with s. NR 538.06, Wis. Adm. Code, along with the proposed eligible uses of the industrial byproduct (see Appendix A of this document). Testing includes both a water leach test and a bulk elemental analysis for the parameters listed in Table 1 and 2 of NR 538 Appendix, for the appropriate byproduct column.

Once the form and analytical results have been submitted, the DNR will review the results and either object or concur with the eligible uses proposed by the generator of the byproduct. For any byproducts not specifically listed in the NR 538 Appendix Tables, the DNR may require any of the following:

- 1) exempt the requirement to analyze for certain parameters on a material-specific basis;
- 2) require analysis for additional parameters on a material-specific basis to demonstrate compliance with performance standards identified at s. NR 538.04, Wis. Adm. Code; or
- 3) require the applicant submit a testing program plan which the DNR must approve in writing prior to commencement of the initial certification.

### Recertification

Recertification can be submitted to the DNR using the Form 4400-197. As with the Initial Certification, the DNR has the option of either objecting or concurring with the recertification submittal in accordance with s. NR 538.06(5)(c), Wis. Adm. Code.

### Annual Certification

Annual certifications are due by April 1 of the year following the reporting period. A separate form should be used for each industrial byproduct and for each storage facility. This submittal can be made online or by submitting a signed paper copy of the electronic version of Form 4400-198. Go to [dnr.wi.gov](http://dnr.wi.gov) and search “beneficial use of industrial byproducts” for instructions and to access the online reporting system and form.

#### For more information see:

- Appendix A and C of this document, initial certification and recertification (Form 4400-197)
- Annual certification form (Form 4400-198)
- Section NR 538.06(1), Wis. Adm. Code

## Eligible Uses

Once an industrial byproduct has been characterized or recharacterized in accordance with s. NR 538.06, Wis. Adm. Code, the test results are compared to the appropriate standards under Tables 1-3 in the Appendix and assigned eligible uses for those materials as defined in ss. NR 538.10(1) to (5), Wis. Adm. Code.

#### For more information, see:

- Subsections NR 538.10(1) to (5), Wis. Adm. Code
- NR 538 Appendix, Tables 1-4

The generator determines the eligible uses for the byproduct material and submits the results to the DNR for concurrence as specified in s. NR 538.06(1), Wis. Adm. Code. Eligible uses of the industrial byproducts are based on the ability of the material to meet specific project requirements for each use without resulting in adverse environmental impacts.

<b>Beneficial Uses</b>		Must contain less than the concentration specified for the parameters in the following Appendix Tables:		
		<b>1</b>	<b>2</b>	<b>3</b>
<b>s. NR 538.10, Wis. Adm. Code</b>		<b>1</b>	<b>2</b>	<b>3</b>
<b>(1)</b>	<b>Contained or Converted Uses</b> (a) Encapsulated uses (b) Waste stabilization or solidification (c) Supplemental fuels (d) Daily cover	---	---	---
	<b>Geotechnical Fill</b> (a) Building sub-base (b) Paved lot sub-base (c) Soil/gravel cover (d) Feed and manure storage structures (e) Transportation embankments (f) Non-metallic mine reclamation	X	---	---
	<b>Construction Uses</b> (a) Paved roadway base course (b) Base aggregates (c) Utility trench backfill (d) Tank, vault or tunnel abandonment (e) Slabjacking material (f) Soil and pavement base stabilization for structural improvements (g) Flowable fill for structural improvements (h) Bonded surface course	X	---	---
	<b>Unconfined uses</b> (a) Unbonded Surface Course (b) Winter road abrasives (c) Manufactured soil	X	X	---
<b>(5)</b>	<b>Soil or Plant Additives</b> (a) Flue gas desulphurization material (b) Agricultural liming agents	---	---	X

**Notes:**

- Contained or converted uses do not have to meet any numeric standards.
- Geotechnical fill and construction uses must meet groundwater protection standards.
- Unconfined uses must meet both groundwater protection and inhalation/ingestion standards.
- Flue gas desulfurization (FGD) byproducts used as soil and plant additives must meet the NR 538 Appendix Table 3 numeric standards based on NRCS guidance.
- Some eligible uses are specific to certain industrial byproducts such as fill under livestock operations (foundry sand), soil and pavement stabilization (coal fly ash), and manufactured soil blends (spent silica foundry sand), among others.

**Livestock Operations**

In accordance with the language in s. NR 538.10(2)(d), Wis. Adm. Code, the NRCS construction standards for the use of foundry sand as geotechnical fill in livestock operations applies to both confined feeding farm operations (CAFOs) and non-CAFOs:

- If a feed storage pad or waste storage facility is licensed and approved as part of a CAFO, it must conform to both the NRCS design standards and any other conditions imposed under chs. NR 213 and NR 243, Wis. Adm. Code.
- If the feed storage pad or waste storage facility is part of a farm operation which is not classified as a CAFO nor permitted under ch. NR 213 and ch. NR 243, Wis. Adm. Code, the proposed feed storage pad or waste storage facility would still have to conform with the design standards under NRCS 629 or NRCS 313, respectively, if the applicant wants to use foundry sand as a liner or fill material.

**Standards for Agricultural Liming Agents**

Industrial byproducts resulting from the manufacturing of lime (such as lime kiln dust) must not exceed the numerical standards for certain metals under s. NR 204.07(5)(c), Table 3, Wis. Adm. Code, to be eligible for use as agricultural liming agents:

**Table 3 – Pollutant Concentrations**

<b>Pollutant</b>	<b>Monthly average concentrations (milligrams per kilogram—ppm) (dry weight)</b>
Arsenic	41
Cadmium	39
Copper	1500
Lead	300
Mercury	17
Molybdenum	Deleted until EPA revises
Nickel	4200
Selenium	100
Zinc	2800

Industrial byproducts from the manufacturing of lime do not have to also meet the numeric standards in Table 3 of the NR 538 Appendix for use as an agricultural liming agent. The numeric standards only apply to the use of FGD byproducts as soil and plant additives.

**Alternate Daily Cover at Landfills**

Although the use of industrial byproducts as alternate daily cover (ADC) at landfills is an eligible use under s. NR 538.10(d), Wis. Adm. Code, generators are not required to participate in the beneficial use program under ch. NR 538, Wis. Adm. Code, for the use of industrial byproducts as ADC or other internal landfill uses at licensed, approved landfills.

However, generators that send their industrial byproducts to landfills for use as ADC may choose to participate in the beneficial use program provided they characterize and certify their byproducts in accordance with s. NR 538.06, Wis. Adm. Code, and meet the requirements for eligible use as ADC under s. NR 538.10(d), Wis. Adm. Code. Generators may choose this option to demonstrate to internal or external auditors that the byproduct material was beneficially used and not disposed. Industrial byproducts sent to licensed landfills for disposal (not beneficial use) are not subject to any requirements under s. NR 538, Wis. Adm. Code.

## Additional Requirements

All industrial byproduct storage facilities and projects must be operated in a manner that minimizes windblown dust, odor, tracking and spillage of the industrial byproduct. The use must also not result in nuisance conditions or environmental pollution as defined under s. 289.01(8), Wis. Stats., and must comply with the performance standards listed in s. NR 538.04, Wis. Adm. Code. All construction-related uses, especially geotechnical fill, must be utilized in accordance with best management and engineering practices including any applicable ASTM, NRCS or Department of Transportation (DOT) standards.

## Geotechnical Fill Projects

Geotechnical (or engineered) fill refers to an industrial byproduct that is used to create a structure or infrastructure that, when placed, changes the grade or elevation of the receiving site with the purpose of solving an engineering problem.

**For more information, see:**  
Section NR 538.12, Wis.  
Adm. Code

Geotechnical fill is differentiated from general fill material by utilization of the unique physical or chemical qualities of the byproduct to achieve applicable construction standards (such as ASTM, NRCS or DOT) for the specified use. For example, green foundry sand can be wetted and compacted in lifts to form a firm sub-base for buildings or manure lagoons due to the presence of clay in the sand mixture. In most cases, any byproduct material to be used as geotechnical fill should be well graded, capable of being well compacted, be within a proper range of moisture to optimize compaction, and be free of unsuitable or deleterious materials, such as sludge, metal or trash.

In addition to complying with the performance criteria under s. NR 548.04, Wis. Adm. Code, some other protective measures are required under s. NR 538.12, Wis. Adm. Code, for eligible geotechnical fill projects under s. NR 538.10(2), Wis. Adm. Code.

Fill projects that require placement of materials in a floodplain in a manner that would cause an obstruction to flood flows, an increase in regional flood event, or adverse effect upon a drainage course is that is regulated under ch. NR 116, Wis. Adm. Code, may require additional permits from the DNR and are generally discouraged.

Some of these requirements are based on certain volume limits and others apply to all geotechnical fill projects. Unlike the previous version, differentiation is made under this section of the rules between geotechnical fill projects that have impermeable covers and those that have soil covers.

### Residential Areas

The most significant opportunities for the use of industrial byproducts as geotechnical fill are in commercial or industrial construction. Use of industrial byproducts in residential settings is very limited and, in most cases, prohibited. The definition of a residential area is found in ch. NR 538.03(12), Wis. Adm. Code, and includes areas zoned residential or within 100 feet of a human residence. An exception is for certain uses of byproduct materials for roadways that are designed with a rural-type cross-section. This includes mostly rural, unincorporated roads that lack curbs or gutters.

### Large Fill Projects

Beneficial use projects proposing utilization of 100,000 cubic yards or more of geotechnical fill materials under s. NR 538.10(2), Wis. Adm. Code, can only be approved under a case specific exemption in

accordance with s. NR 538.09, Wis. Adm. Code, and s. 289.43(7), Wis. Stats. Projects that exceed 100,000 cubic yards may require additional protective measures such as groundwater monitoring or engineered features.

### **Water Table Separation**

To limit potential impact to surface water and groundwater, byproducts in any quantity may not be placed below the ground water table, into permanent standing water, or in areas that need to be dewatered prior to placement due to groundwater infiltration. Storm water that may accumulate in excavations associated with the fill project should be removed prior to placement of the byproduct to facilitate compaction.

3-foot Separation Distance: A minimum separation distance of 3 feet between the industrial byproduct and the groundwater table at the time of placement for geotechnical fill projects is allowed for foundry byproducts designated by the DNR as select foundry sand under s. 538.06(3)(f), Wis. Adm. Code, or for byproducts that do not exceed the concentrations specified in ch. NR 538 Appendix, Table 1, Column A. This applies to all geotechnical fill uses under s. NR 538.10(2), Wis. Adm. Code, except geotechnical fill used for nonmetallic mine reclamation which must maintain a minimum separation distance of 5 feet from the groundwater table at the time of placement.

5-foot Separation Distance: A minimum separation distance of 5 feet between the industrial byproducts and the groundwater table at the time of placement is required for geotechnical fill projects using industrial byproducts, excluding select foundry sand, that exceed the concentrations specified in ch. NR 538 Appendix, Table 1, Column A, but are less than the concentrations specified in ch. NR 538 Appendix, Table 1, Column B.

The generator or their designee must determine the best methods to delineate the ground water table elevations based on soil and groundwater conditions at the site, but site observation, test pits and nearby available water well logs can all be used to determine the relevant groundwater depth. Significant observed or suspected fluctuations in the water table should also be noted. The DNR will evaluate evidence indicating the presence of a perched water table (unconfined groundwater held above the regional water table by a layer of impermeable rock or sediment) to determine if the groundwater separation distance has been met.

### **Public or Private Water Supply Well Setbacks**

Geotechnical fill projects that exceed 5,000 cubic yards may not be placed closer than 100 feet from a private or public water supply well in accordance with s. NR 538.12(3), Wis. Adm. Code. For separation distances less than 100 feet, the generator or its designee must submit a written request for a concurrence from the DNR prior to placement of the byproduct. Concurrence by the DNR will be based on site-specific conditions such as well construction and ground water flow direction.

### **Time Limits for Completion of the Project**

In accordance with s. NR 538.12(4), Wis. Adm. Code, geotechnical fill projects must be completed, including the placement of final cover, within 12 months of first accepting industrial byproduct material. This period may be extended to no more than 16 months provided the site is adequately secured from public access by means of exclusion fencing and signage or other equally effective means as approved by the DNR in writing.

- If the generator or their designee knows or suspects the fill project will take longer than 12 months to complete, the simplest way to fulfill this requirement is to include details of how the site will be secured in the project notification to the DNR and, if it meets the criteria, the approval can be included in the concurrence response.

If the beneficial use project requires more than 12 months to complete, or 16 months to complete if the site is adequately secured, the project must be planned in phases with each phase of filling completed and interim or final cover placed prior to initiation of filling the next phase. Alternate interim covers need DNR approval prior to use.

- If the generator or their designee knows or suspects the fill project will take longer than 12 months to complete, the simplest way to complete this notification requirement is to include details of the phasing plan in the project notification. Approval by the DNR will be based upon site-specific conditions and adherence to good engineering practices.

## **Nonmetallic Mine Reclamation**

Certain industrial byproducts can be used in the reclamation of inactive nonmetallic mine sites or portions of active mine sites that are no longer in operation to return them to a stable and safe condition as detailed in ss. NR 538.10(2)(f) and NR 135.10, Wis. Adm. Code. However, nonmetallic mine sites can be sensitive to potential groundwater contamination due to:

- the removal of the fine-grained and humic soil material overburden that comprise most of the contaminant attenuation capacity of soils;
- the transmissivity of the remaining sand and gravel or fractured rock, including enhanced fracture flow pathways due to blasting; and
- the close proximity of the water table after mining ceases.

For these reasons, additional requirements have been included for this use to safeguard groundwater quality.

Eligible mine reclamation uses for industrial byproducts as part of the reclamation of a nonmetallic mine site include:

- constructing safety berms;
- buttressing of unstable side slopes of unconsolidated material to provide for a revegetated surface;
- placement of no more than 2 feet of manufactured soils or other appropriate byproducts to establish a rooting zone layer; or
- the use of byproducts or byproduct blends as a topsoil substitute material.

Proposing the use of an industrial byproduct in excess of what is needed to return the mine site to a stable and safe condition would not be considered a beneficial use but an alternate means of disposal.

Only industrial byproducts that have been designated by the DNR as select foundry sand under s. NR 538.06(3)(f), Wis. Adm. Code, or that do not exceed the concentrations specified in the NR 538 Appendix, Table 1, Column A may be beneficially used as geotechnical fill material in the reclamation of nonmetallic mining sites.

Federal rules under ss. 40 CFR 257.50-107, Subpart D, consider the use of coal combustion residuals as landfilling when used in sand and gravel pits and quarries (nonmetallic mines).

### **Additional requirements**

1. Prior written notification in accordance with s. NR 538.14(5), Wis. Adm. Code, and concurrence by the DNR under s. NR 538.14(6), Wis. Adm. Code, are required for all nonmetallic mine reclamation projects. Any proposed use in a nonmetallic mine located within an area of Silurian

bedrock as defined under s. NR 151.015(17), Wis. Adm. Code, must be approved as a case specific approval in accordance with s. NR 538.09, Wis. Adm. Code.

2. Nonmetallic mine sites that were active after 2001 are required to have a reclamation plan approved by the regulatory authority, typically the county in which the mine operates, in accordance with ch. NR 135, Wis. Adm. Code. The use of industrial byproducts at a nonmetallic mining site with a reclamation permit issued under ch. NR 135, Wis. Adm. Code, must be in accordance with the approved reclamation plan approved by the regulatory authority. If the reclamation plan does not specify the use of industrial byproducts as fill material, the plan must be modified by the operator or landowner and approved by the regulatory authority to reflect the use of these byproducts. The reclamation plan or modification must be approved by the regulatory authority before applying for a project concurrence from the DNR.
3. Any mine reclamation project at a mine site that does not have an approved reclamation plan issued under ch. NR 135, typically because mining operations ceased prior to 2001, can only be approved as a case specific approval in accordance with s. NR 538.09, Wis. Adm. Code. The applicant must submit a reclamation plan that meets the applicable requirements under ss. NR 135.19(1) to (4), Wis. Adm. Code, to the DNR as part of the case specific approval request since a mine reclamation plan was not submitted or approved by the regulatory authority.
4. The buttressing of unstable side slopes under s. NR 538.10(2)(f)3, Wis. Adm. Code, is intended for use on side slopes of unconsolidated material (such as sand and gravel) to bring the slopes into compliance with the mine reclamation standards under s. NR 135.10(1), Wis. Adm. Code, for obtaining a safe and stable slope. The mine reclamation standards under ch. NR 135, Wis. Adm. Code, allow for vertical highwalls of competent bedrock, so buttressing is typically not required to meet the mine reclamation standards.
5. Any areas where industrial byproducts are beneficially used as geotechnical fill in a nonmetallic mine site that are to be revegetated as part of the mine reclamation plan must be sloped to prevent ponding of water, covered with 2 feet of native soils including a minimum of 4 inches of topsoil, and seeded in accordance with the reclamation plan as soon as practical after placement of the industrial byproducts. Other cover material, such as manufactured soils, may be approved by the DNR if included in a written request. Final vegetated slopes may not be steeper than a 3:1 horizontal to vertical incline to prevent slope instability and erosion.
6. Due to the higher potential for groundwater contamination as noted above, for all nonmetallic mine reclamation project sites, industrial byproducts, including select foundry sand, used as geotechnical fill may not be placed within 5 feet of the groundwater table at the time the byproduct material is placed. If the site cannot meet the 5-foot separation distance, it is acceptable to fill the site with clean soils or overburden, preferably containing appreciable silt and/or clay, to meet the required separation distance. A minimum 10-foot horizontal separation distance is recommended from the edge of byproduct placement to any exposed surface water expression of the water table.

Be aware that the environmental protection standards in NR 538 Appendix tables were not designed to account for the potential of groundwater flow through fractures or karstic features that may be present in bedrock quarries, especially ones developed in dolomitic bedrock. In these cases, the NR 538 Appendix standards cannot be used when evaluating the potential for groundwater contamination from the use of industrial byproducts as geotechnical fill. This is especially true in reclamation plans where the byproduct is proposed to be in direct contact with fractured bedrock.

# Project Notification

In accordance with s. NR 538.14(5), Wis. Adm. Code, each industrial byproduct generator or a person designated by the generator such as a broker, must submit written notification to the DNR requesting project concurrence prior to initiating a project where required under ss. NR 538.10(2) and NR 538.12, Wis. Adm. Code.

If multiple projects are planned for a single property at the same time, the total volume of the multiple projects must be used to determine notification requirements.

The notification and concurrence request process provide the opportunity to evaluate the potential for impacts to human health and the environment from projects involving large volumes of byproduct or projects located in environmentally sensitive areas. Once a notification is submitted by the applicant, the DNR will determine if the proposal meets the applicable criteria and provide a written notice of concurrence or non-concurrence within 10 business days.

If the DNR does not concur with the proposal, the response letter will note any deficiencies and allow the applicant an opportunity to correct them, provide additional information, or inform the applicant that the project needs to be approved under different authority. The applicant may modify and resubmit the proposal to the DNR as needed. If the DNR does not respond to the notification within 10 business days, concurrence is considered granted.

## Geotechnical Fill Projects

### More Than 5,000 Cubic Yards

If more than 5,000 cubic yards of industrial byproduct are to be used as geotechnical fill under s. NR 538.10(2), Wis. Adm. Code, in an individual project, prior written notification in accordance with s. NR 538.14(5), Wis. Adm. Code, and concurrence by the DNR under s. NR 538.14(6), Wis. Adm. Code, are required for the following uses:

- a) Subgrade fill for the construction of commercial, industrial or non-residential institutional buildings.
- b) Subgrade fill for the construction of portland cement concrete or asphaltic concrete paved infrastructure. Notification is also required for any volume if the fill project does not meet the criteria in this subsection.
- c) Geotechnical fill material with a soil or gravel cover.
- d) Use of foundry sand at livestock operations.
- e) Transportation facility embankments.

### Less Than 5,000 Cubic Yards

Geotechnical fill projects that use less than 5,000 cubic yards of industrial byproducts do not have to notify the DNR or receive a concurrence provided they meet the specifications in the appropriate eligible use under s. NR 538.10(2), Wis. Adm. Code, with the exceptions for some paved infrastructure projects as noted above and mine reclamation as noted below.

#### **For more information see:**

Section NR 538.14(5), Wis. Adm. Code, and the Property Owner Notification Form (Form 4400-199). To access the form, go to [dnr.wi.gov](http://dnr.wi.gov) and search "beneficial use of industrial byproducts."



## Nonmetallic Mining Sites

Geotechnical fill material used in the reclamation of nonmetallic mining sites require prior written notification in accordance with s. NR 538.14(5), Wis. Adm. Code, and concurrence by the DNR under s. NR 538.14(6), Wis. Adm. Code, for all nonmetallic mine reclamation projects. Reclamation of a nonmetallic mine within an area of Silurian bedrock as defined under s. NR 151.015(17), Wis. Adm. Code, can only be approved as a case specific approval in accordance with s. NR 538.09, Wis. Adm. Code.

## Multiple Fill Projects

Geotechnical fill projects on the same property generally will be considered as separate projects for the purposes of notifications if they are completed at different times unless the fill projects are adjacent to one another and intended for the same eligible use, in which case they will be considered one project by the DNR and must be notified and approved appropriately.

Example: A farmer uses 3,000 cubic yards of foundry sand as a sub-base under an equipment storage pad, so he does not need to notify the DNR prior to constructing the pad. Two years later, the same farmer wishes to expand the equipment storage pad by using an additional 4,000 cubic yards of foundry sand. The project will now exceed the 5,000 cubic yard limit and must be notified and approved in accordance with s. NR 538.14(5), Wis. Adm. Code.

## **Modifications**

If any generator, or the generator's designee, wants to modify a project for which the DNR granted concurrence, they are required to notify the DNR in writing describing the nature of the modification requested. A modification may be necessary due to a change in the project scope, scheduling delays, or other unforeseen circumstances. Once the modification notification is submitted, the DNR will evaluate that change in the project and determine if a formal modification of the existing concurrence is needed.

The applicant needs to consider, and provide details to the DNR on these issues, if the proposed modification:

- alters the original project footprint,
- substantially increases the volume of byproduct material, or
- has the potential to affect any of the performance standards under s. NR 538.04, Wis. Adm. Code.

The modification request will be reviewed by the DNR, and the applicant will be notified in writing if submission of a revised notification and subsequent concurrence decision is required.

## **Excavation of existing geotechnical fill**

For all projects where existing industrial byproduct fill material will be excavated and reused under s. NR 538.24, Wis. Adm. Code, the property owner, or the owner's designee, is required to submit a written notification to the DNR for reuse of the existing geotechnical fill. The DNR will then review and respond to the notification in accordance with s. NR 538.14(6), Wis. Adm. Code.

Excavation and reuse projects that are less than 1,000 cubic yards do not require notification or renotification under s. NR 538.24(5), Wis. Adm. Code.

# Performance Standards for Beneficial Use

Performance standards for generators, storage facilities and industrial byproduct beneficial reuse projects are outlined in s. NR 538.04, Wis. Adm. Code, and address the following areas:

**For more information:**  
Section NR 538.04, Wis.  
Adm. Code

- wetlands
- threatened or endangered resources
- surface water quality
- groundwater quality
- storm water protection
- explosive gases and air contaminants

The purpose of beneficial use requirements and best management practices is to prevent any violation of these standards. However, the applicant must provide the DNR with documentation of any circumstances that may result in a potential violation of a performance standard, along with any preventative measures proposed to address the situation. A concurrence or case specific approval for a beneficial use project will not be issued by the DNR until all required investigations or permits associated with compliance with these standards have been completed.

## Wetlands

Beneficial use projects must not result in a significant adverse impact on wetland water quality standards in ch. NR 103, Wis. Adm. Code. The best way to comply with this requirement is to plan the project such that it does not directly fill in any wetland areas and maintains a setback from the edge of the wetland adequate to prevent indirect impacts. Indirect impacts can also be addressed and enhanced by utilizing protective measures such silt fencing and staked hay bales.

If the applicant is unsure if wetlands or wetland indicators are present in the project area, the best resource is looking up the project location on the DNR's publicly accessible Surface Water Viewer. To access the viewer, go to [dnr.wi.gov](http://dnr.wi.gov) and search "Surface Water Data Viewer." The applicant can view the proximity of mapped wetlands, surface water features and wetland soil indicators to the project area. If this mapping tool is used, a copy of the project area map with the wetland areas marked should be included with the project notification to the DNR required under s. NR 538.14(5), Wis. Adm. Code.

If the applicant suspects the proposed project has the potential to adversely impact wetland resources, they should contact the appropriate DNR regional water resources staff to appraise them of the situation and determine if additional investigations or permits would be needed to initiate the project.

## Threatened or Endangered Resources

A beneficial use project cannot be approved by the DNR if it results in the "take" of an endangered or threatened species or other activity prohibited under s. 29.604, Wis. Stats. The "take" of a threatened or endangered species refers to the killing or injuring of any wild animal or the removal or destruction of any wild plant in accordance with ch. NR 27, Wis. Adm. Code.

To determine if a proposed beneficial use project might impact a listed threatened or endangered species, the applicant can access the publicly available Natural Heritage Inventory database (NHI Portal) or request a formal endangered resources review from the DNR for a nominal review fee. To access the NHI Portal or request a review, go to [dnr.wi.gov](http://dnr.wi.gov) and search "endangered resources review."

## **Surface Water Quality**

A beneficial use project cannot cause a detrimental effect on any surface water quality standard as provided in s. NR 102.03(7), Wis. Adm. Code. Beneficial use projects that involve direct impacts to navigable waterways (such as placing fill within a pond or stream), will require obtaining a permit from the DNR under ch. 30, Wis. Stats. A permit may also be required for larger projects that involve grading or the removal of topsoil in excess of 10,000 square feet on the banks of a navigable water under s. 30.19(1g)(c), Wis. Stats.

More information on the applicability of Chapter 30 permits for projects that may impact navigable water ways can be found on the DNR website and search “waterways permitting process.” The applicant can contact the DNR regional water resources staff assigned to the project area for assistance.

If the applicant is unsure if surface water bodies are present in the project area, the best resource is to look up the project location on the DNR’s Surface Water Data Viewer. From this mapping tool, the applicant can view the proximity of surface water features to the project area. If this mapping tool is used, a copy of the project area map with the surface water features marked should be included with the required project notification to the DNR under s. NR 538.14(5), Wis. Adm. Code.

## **Groundwater Quality**

A beneficial use project cannot cause a detrimental effect on groundwater quality or cause or exacerbate an attainment or exceedance of any preventive action limit or enforcement standard at a point of standards application as defined in ch. NR 140, Wis. Adm. Code. Based on scientific studies used to develop the beneficial use standards, it is assumed that use of industrial byproducts in accordance with ch. NR 538, Wis. Adm. Code, will not result in a detrimental effect on groundwater quality. However, evidence that a beneficial use activity is resulting in an adverse impact on groundwater quality may result in the DNR requiring additional environmental monitoring and/or remedial actions.

## **Storm Water**

A beneficial use project cannot cause a discharge of pollutants carried by storm water exceeding any applicable permit requirements or standards under ch. NR 216, Wis. Adm. Code. Larger beneficial use sites that have the potential to disturb an acre or more may need to obtain a construction site storm water discharge permit from the DNR. Byproduct storage facilities at generating facilities may need to obtain an industrial storm water discharge permit also under ch. NR 216, Wis. Adm. Code, or have the storage activity covered under a DNR-approved Storm Water Pollution Prevention Plan (SWPPP) for the production facility.

More information on the applicability of storm water permits and application procedures can be found on the DNR’s website. Go to [dnr.wi.gov](http://dnr.wi.gov) and search “storm water runoff permits.” Alternatively, the applicant can contact the DNR regional water resources staff assigned to the project area for assistance.

## **Explosive Gases and Air Contaminants**

Defined industrial byproducts should not result in any problems relating to the release of explosive gases or air contaminants When used in accordance with the standards under ch. NR 538, Wis. Adm. Code. The applicant should note any special circumstances relating to these issues and notify the DNR of any mitigation measures that will be taken or permits required.

## Storage and Transportation

Facilities storing industrial byproducts are generally exempt from solid waste licensing and plan approval under s. NR 502.05, Wis. Adm. Code, provided the byproduct material is being stored in anticipation of being beneficially used and the storage facility requirements listed in s. NR 538.16, Wis. Adm. Code, are met. All storage locations must:

**For more information:**  
Section NR 538.16, Wis.  
Adm. Code.

- meet performance standards described in NR 538.04, Wis. Adm. Code; (see previous section)
- must be operated in a manner that minimizes windblown dust, odor and tracking; and
- must not cause nuisance conditions.

Industrial byproducts that have are intended for beneficial use must be kept segregated from other materials being stored at the same location.

### Storage Locations

Industrial byproduct storage facilities are typically located at:

1. the facility generating the industrial byproduct;
2. a long-term (permanent) off-site storage facility before being used for beneficial use projects; or
3. temporarily at or near a beneficial use project site.

### Exempt Storage Facilities

In accordance with s. NR 538.16(1)(b), Wis. Adm. Code, the following industrial byproduct storage facilities are exempt from the design and operational requirements of s. NR 538.16(1)(a), Wis. Adm. Code:

1. Facilities for the storage of industrial byproducts contained within enclosed structures such as buildings, silos or roll-off boxes.
2. Facilities for the storage of industrial byproducts within a lined area at a licensed engineered landfill. Storage of industrial byproducts at a licensed engineered landfill are subject to the conditions of the plan of operation and any other applicable solid waste approvals associated with the landfill.
3. Municipal maintenance and storage facilities that stockpile no more than 300 cubic yards of industrial byproduct material at any given time. The stored material must be contained by perimeter berms or curbs and operated to minimize dust, minimize off-site tracking and manage storm water runoff.
4. Facilities for the temporary off-site storage or staging of industrial byproducts to be used beneficially in accordance with s. NR 538.10, Wis. Adm. Code. These temporary facilities must also be operated and maintained to minimize dust, off-site tracking and storm water runoff, and they must limit public access. Industrial byproducts may not remain in temporary off-site storage or staging areas for more than 16 months after the date of their placement. These facilities are required to provide the DNR with a written notice of the storage location, the date on which the storage of materials began, and the total volume stored.
5. Facilities for which the DNR issues an exemption on a case specific basis in accordance with s. NR 538.09, Wis. Adm. Code.

## Non-exempt Storage Facilities

Non-exempt storage facilities must meet the design and operational criteria outlined in s. NR 538.16(1) (a), Wis. Adm. Code, listed below. This typically includes outdoor storage of industrial byproducts at the generating facility or other long-term (greater than 16 months) off-site byproduct storage sites such as loading docks or adjacent to processing facilities.

Requirements for the construction and operation of non-exempt storage facilities include the following:

1. Storage of industrial byproducts for beneficial use must meet the performance standards specified in s. NR 538.04, Wis. Adm. Code, including protection of wetlands and surface water quality.
2. Storage Area Liner Requirements
  - a. Areas intended for the storage of industrial byproducts that have been determined to contain greater than the concentrations specified for the parameters listed in NR 538 Appendix, Table 1, Column B must incorporate an impervious surface pad and be surrounded by curbs or berms to control surface water run-on and runoff. Impervious surfaces include any of the following:
    - a minimum 3 inches thickness of asphalt or concrete pavement;
    - a minimum 2-foot thickness of compacted clay liner constructed in accordance with s. NR 504.06(2)(a) and (f), Wis. Adm. Code. If a low permeability clay surface is used, it must include a protective material cover of, at a minimum, one foot of gravel or an equivalent material over the clay;
    - a geomembrane layer constructed in accordance with s. NR 504.07 (5), Wis. Adm. Code; or
    - other impervious surface designs approved in writing by the DNR.
  - b. Areas intended for the storage of byproducts that have been determined to contain less than the concentrations specified for the parameters listed in NR 538 Appendix, Table 1, Column B must be constructed with a surface pad beneath the storage pile consisting of either an impervious surface (see above), compacted soil, an aggregate surface with a minimum 1-foot thickness, or an equally effective design as approved by the DNR in writing.
3. Storage facilities must be operated and maintained to minimize dust, off-site tracking and storm water runoff.
  - The storage area must be clearly delineated and lined on three sides with curbs, blocks or berms designed to prevent spillage and contain the byproduct to the designated storage area.
  - The height of the curbs or berms to control surface water run-on and runoff should account for the size of the pad and how often the setback area from the curb is cleaned.
  - For larger storage facilities a minimum 3-foot high berm is recommended.
  - A setback must be maintained between the stored material and the entrance to the storage area to prevent spillage of material and to reduce off-site tracking.
  - The setback between stored materials and the edge of the pad is recommended to be at least 10 feet wide to prevent spillage of materials off the pad and allow for vehicle movement completely around stored material.

4. All storm water runoff that contacts the byproduct material in the storage area must be managed and treated properly. This may include:

Storm water or surface water treatment ponds - Contacting DNR regional storm water program staff for more information about obtaining the appropriate permit or updating a facility's Storm Water Pollution Prevention Plan (SWPPP).

Wastewater treatment plant - Complying with a facility's existing agreement with its wastewater treatment plant (WWTP) if contact runoff water is discharged into the sewage treatment system. If no agreement exists, contact the WWTP to determine what approvals or permits are needed.

5. The operator of a non-exempt storage facility must submit an annual certification in accordance with s. NR 538.14, Wis. Adm. Code, including a summary of the storage facility performance, problems and maintenance. The annual certification must also include an affirmation that the impervious or low permeability surface pad, if required, still meets the design criteria specified in the code requirements.
6. Upon closure of an industrial byproduct storage facility, the storage operator must remove all visible residues from the storage area.

Permanent non-exempt storage facilities that are not on the property where the byproduct is generated (off-site) must provide the DNR with documentation demonstrating that any byproduct material that will be stored at the proposed facility has been certified by the DNR for beneficial use in accordance with s. NR 538.14(1)(a), Wis. Adm. Code. The documentation must also include information demonstrating that the proposed facility will meet the performance criteria under s. NR 538.04, Wis. Adm. Code, and construction plans showing that the storage facility will be constructed in accordance with the surface pad, access controls and containment specified in s. NR 538.16(1)(a)1.a. and b., Wis. Adm. Code.

## Transportation

Transportation of industrial byproducts for beneficial use does not require a special license under ch. NR 502, Wis. Adm. Code, but all transport must be done in a nuisance-free manner.

Vehicles used to transport industrial byproducts intended for beneficial use should be durable and leak proof. In addition, vehicles should be loaded and hauled in a manner so that the contents do not fall, spill or leak. Covers should be provided to prevent littering and spillage especially if the material is dusty or will be hauled long distances. Any spilled industrial byproducts must be properly recovered.

## Public Participation for Projects and Storage Facilities

No person may initiate a beneficial use project where the volume of the industrial byproduct to be used is greater than 30,000 cubic yards, or construct or operate a storage facility with a design capacity greater than 30,000 cubic yards, prior to the person giving notice to the affected public and providing opportunity for public participation.

**For more information:**  
Section NR 538.18,  
Wis. Adm. Code

If a previously approved project will be contiguously expanded and the expansion results in the total volume exceeding 30,000 cubic yards, a public notification may be required at the time of the expansion request.

The responsibility for preparing and posting the public notice as well as arranging any subsequent public meeting is the responsibility of the generator or project broker. If required, documentation of

completion of the public notice requirements must be submitted before the DNR can issue a concurrence for the project.

At a minimum, the notice and public participation process must include the following:

1. Placing a public notice in the local newspaper at least 30 days prior to initiating an industrial byproduct project or storage facility. Public notice should include the following information concerning the nature of the beneficial use project or storage facility:
  - a. The type and amount of industrial byproduct to be used or stored
  - b. How and where the material will be used
  - c. The time frame of the project or storage facility operation
  - d. The contact person for interested parties to contact to request a public information meeting
2. If requested by the public, a public informational meeting must be held so details of the project can be discussed. DNR staff may choose to participate in the meeting, but their attendance is not required.

Project and storage facilities exempt from public participation requirements:

1. Beneficial uses described under s. NR 538.10(1), (3), (4), and (5), Wis. Adm. Code
2. Wisconsin DOT beneficial use projects that were addressed in DOT's environmental review process
3. Projects at solid waste facilities licensed under chs. NR 500 to 538, Wis. Adm. Code
4. Storage at licensed solid waste facilities under ch. NR 502, Wis. Adm. Code
5. Storage facilities located on the property where the byproducts are generated
6. Municipal maintenance and storage facilities under s. NR 538.16(1)(b)3., Wis. Adm. Code

## Environmental Monitoring

While specific environmental monitoring requirements are not contained in the ch. NR 538, Wis. Adm. Code, the DNR has the option of requiring environmental monitoring for beneficial use projects that do not meet the beneficial uses described in s. NR 538.10, Wis. Adm. Code, or are subject to a case specific approval under s. NR 538.09, Wis. Adm. Code.

**For more information:**  
Section NR 538. 20,  
Wis. Adm. Code

Environmental monitoring may include the installation of groundwater monitoring wells, head wells or lysimeters to determine if there are any releases to groundwater, or other monitoring devices related to potential air or surface water releases. Environmental monitoring will typically only be required in beneficial use projects that involve large volumes, byproduct material with properties that may lend themselves to a potential adverse environmental release, or projects located in environmentally sensitive areas.

**Please note:** Subsections NR 538.20(2) and (3), Wis. Adm. Code, were retained in the final printing of the rules by mistake and should be disregarded. Fully encapsulated transportation facility embankments and capped transportation facility embankments are no longer listed as eligible uses under the current version of the beneficial use rules.

## Property Owner Notification

Property owner notification is intended to serve two purposes. First, it ensures that the property owner is aware that industrial byproducts are present and that appropriate institutional controls must be maintained. Second, it provides the property owner documentation that the industrial byproducts have been beneficially used in accordance with ch. NR 538, Wis. Adm. Code, rather than being improperly disposed as waste.

**For more information:**  
Property Owner Notification  
(Form 4400-199), Affidavit (Form  
4400-200), s. NR 538.22, Wis.  
Adm. Code.

This documentation serves to protect the property owner at the time of future sale of the property. Additionally, the documentation can prevent these materials from being disturbed and mishandled in the future because the subsequent property owner was unaware of their presence. A copy of the property owner notification form must also be provided to the DNR in accordance with s. NR 538.22(3), Wis. Adm. Code, to act as back-up documentation in case the original provided to the property owner is lost.

The generator of the industrial byproduct or a person designated by the generator is responsible for providing the notice to the property owner and sending a copy to the DNR. The notice must be on the DNR form (Form 4400-199), or in an alternate form approved by the DNR. If multiple projects are planned for a property, the total volume of the multiple projects must be used to determine property owner notification requirements.

Any property owner receiving the notice must retain this information and provide this information to the next purchaser of the property. We suggest placing a copy of the notification on the property deed to help assure that all potential future owners are aware of the presence of industrial byproducts on the property as well as any real estate agents marketing or brokering the sale of the property. The DNR copy is only intended as back-up documentation in case the originals are misplaced.

- In accordance with s. NR 538.22(1), Wis. Adm. Code, written notice must be provided to the owners of all properties on which industrial byproducts are used as geotechnical fill under s. NR 538.10(2), Wis. Adm. Code, regardless of volume.
- Property owner notification is not required for any eligible uses under s. NR 538.10(1), (3), (4), or (5), Wis. Adm. Code, which includes contained and converted, construction, unconfined and soil additive uses.

In addition to the above property owner notification requirements, for projects that utilize more than 10,000 cubic yards of industrial byproducts, an affidavit must be recorded with the register of deeds for the county in which the project is located. The affidavit must be recorded within 60 business days of completing the placement of the byproduct, must indicate that industrial byproducts were used on the property, and must indicate where the property owner notification information may be obtained.

## Reporting and Recordkeeping

### Recordkeeping

The generator of an industrial byproduct, or their designee, must maintain records of where their industrial byproduct has been used for any of the eligible uses described under s. NR 538.10 (2), Wis. Adm. Code, regardless of volume, and maintained and be accessible to DNR

**For more information:**  
Section NR 538.14, Wis.  
Adm. Code, Appendix C  
and Appendix D of this  
document



staff upon request for 5 years after use of the byproduct material in accordance with s. NR 538.14(8), Wis. Adm. Code.

**Industrial Byproduct Reporting Summary per s. NR 538.14, Wis. Adm. Code**

Report	Who	Report Due	Form / Documents
<b>Initial Certification and Recertification</b>	Generators  Storage facility operators or their designee	Before using or storing an industrial byproduct for beneficial use.  When a significant change has occurred in the process generating the material.  A minimum of every 4 years when the byproduct(s) must be recharacterized under s. NR 538.06(5)(b)2, Wis. Adm. Code	Beneficial Use of Industrial Byproducts Initial Certification and Recertification (Form 4400-197)  Documentation, including test results supporting the eligible uses, must be included.
<b>Annual Certification</b>	Generators  Storage facility operators or their designee	Before April 1 of the year following the reporting period.	Beneficial Use of Industrial Byproducts Annual Certification (Form 4400-196)  Volumes of byproducts used or stored over the reporting year. Details concerning how the byproduct was used.
<b>Project Notification</b>	Generator or person designated by the generator such as a broker	Before initiating projects that require concurrence from the DNR. See Appendix A of this document.	No form. See specific requirements in s. NR 538.14(4), Wis. Adm. Code.

**Property Owner Notification**

In accordance with s. NR 538.22(3), Wis. Adm. Code, a copy of the property owner notification form (Form 4400-199) must be submitted to the DNR prior to placement of any industrial byproduct material for any eligible geotechnical fill use under s. NR 538.10(2), Wis. Adm. Code. A copy of the notification may be submitted by mail or electronically as directed by the DNR.

**Excavation of Geotechnical Fill Projects**

Section NR 538.24, Wis. Adm. Code, establishes a process for the excavation and reuse of existing, documented geotechnical fill material that was placed in accordance ch. NR 538, Wis. Adm. Code. Excavation of geotechnical fill projects or sites that do not have documentation demonstrating that they were placed in accordance with ch. NR 538, Wis. Adm. Code, cannot be

**For more information:**  
Section NR 538.24, Wis. Adm. Code

approved under the provisions of this section. These sites and any excavated material will be regulated as an unlicensed landfill or a historic fill site.

## **Reuse**

The property owner, or the owner's designee, can submit a written notification to the DNR if they wish to reuse excavated geotechnical fill material in a new beneficial use project on the existing fill site property or off-site. The notification must contain, at a minimum, the following information:

1. The name, address, and contact information for the property owner and the owner's representative or consultant.
2. Information demonstrating that the existing geotechnical fill had been placed as a beneficial use project in accordance with ch. NR 538, Wis. Adm. Code. This information may include a copy of the concurrence letter from the DNR, a copy of the owner notification notice required under s. NR 538.22, Wis. Adm. Code, the location on a database maintained by the DNR for locating beneficial use projects or other proof as accepted by the DNR.
3. The location of the existing geotechnical fill material and the proposed extent of the excavation and relocation of the material.
4. The proposed reuse, including a demonstration that it will meet the applicable standards specified in ss. NR 538.04 and 538.10, Wis. Adm. Code.

If the excavated material is to be beneficially used on a property other than the original fill site, the property owner of the reuse site must be notified in accordance with s. NR 538.22, Wis. Adm. Code. A public notice must also be issued in accordance with ch. NR 538.18, Wis. Adm. Code, for excavated material reuse projects with a design capacity greater than 30,000 cubic yards.

Once the information has been reviewed, the DNR will respond to the notification within 10 business days with either a concurrence, a request for additional information, or a denial in accordance with s. NR 538.14 (6), Wis. Adm. Code.

## **Disposal**

If any excavated geotechnical fill material will be disposed rather than reused, the property owner or the owner's designee must provide the DNR, in writing, with the information required under 1 through 3 above, including the name of the disposal facility and the volume of disposed material. This written notification is due to the DNR within 60 days after completion of the project.

## **Exemptions**

Minor excavations of 1,000 cubic yards or less of geotechnical fill material that had previously been approved under the provisions of NR 538 are exempt from the requirements of this section, provided the excavated fill material is either reused in accordance with s. NR 538.04 and an eligible beneficial use per s. NR 538.10, or disposed in a licensed landfill. Any remaining fill material must be covered with a confining surface or soil cover in accordance with an eligible use under s. NR 538.10 (2) (a) to (f), Wis. Adm. Code requirements.

## Appendix A - Initial Characterization Process

The following steps outline the responsibilities of the generator when characterizing an industrial byproduct:

**For further information see:**  
Subsections NR 538.06 and  
NR 538.08, Wis. Adm. Code

**Step 1:** Confirm that the material is not a hazardous waste.

To be eligible for beneficial use, the generator must first establish that the material is not a hazardous waste as defined in s. NR 660.10(52), Wis. Adm. Code, using a method specified under ch. NR 662.011, Wis. Adm. Code. For guidance on determining if the material is a hazardous waste, please refer to the guidance document, *Waste Determinations and Recordkeeping* (WA-1152).

For initial certification, the DNR will request verification that a proper hazardous waste determination has been made. The generator must provide supporting documentation of the waste determination along with the initial certification submitted to the DNR. Supporting documentation may include:

- representative sampling and analysis such as TCLP testing results,
- safety data sheets,
- published information,
- process flow diagrams,
- profiles developed from the prior handling of industrial byproducts, and
- supported process knowledge.

**Step 2:** Locate a certified laboratory that can perform the required chemical analysis.

For initial characterization of a new industrial byproduct, or if the process generating the byproduct changes, each byproduct must have an analysis performed for the parameters listed in the appropriate column for the byproduct type in ch. NR 538, Appendix I, Wis. Adm. Code, Table 1 and Table 2. Testing includes both a water leach test (ASTM D3987) and a bulk analysis.

All material sampling, bulk analysis and analysis of elutriate from leach testing must be performed using the latest version of EPA SW-846 methodologies with a limit of detection at or below the standards listed for parameters in Tables 1 and 2 by product type. The initial testing results will be used to establish a baseline for an industrial byproduct new to the beneficial use program. Therefore, even if the facility wishes to use the material for only one or two specific eligible uses, all initial certification testing must be performed for the parameters specified in the Table 1 and 2.

Flue gas desulfurization (FGD) materials to be used as soil amendments are only required to be sampled for a bulk analysis for the parameters under Table 3.

Industrial byproducts from the production of lime, such as lime kiln dust, that are intended for use as agricultural liming materials, as defined under s. 94.66 (1)(am), Wis. Stats., and meet the requirements of ch. ATCP 41, Wis. Adm. Code, are only required to analyze for the contaminants listed in Table 3 of s. NR 204.07(5)(c), Wis. Adm. Code.

Generators of papermill sludge, or other industrial byproducts approved by the DNR for beneficial use but are not specifically listed on the Appendix Tables 1 to 3, should contact DNR prior to characterization. The DNR may modify the list of chemical/physical parameters required to be analyzed for and may establish standards on material specific basis per s. NR 538.06(1), Wis. Adm. Code.

All laboratories performing initial certification analyses must be state certified for the analytical protocols performed by the laboratory. To find a list of certified laboratories, go to [dnr.wi.gov](http://dnr.wi.gov) and search, "laboratories."

**Step 3:** Collect a representative sample of industrial byproduct and send it to the lab for analysis.

To ensure that the industrial byproduct is properly categorized and appropriately used, it is important that the generator collect a representative sample of the material.

- In most cases, a composite sample may need to be collected from several locations or over a specific time period in order to accurately reflect the make-up of the industrial byproduct.
- To ensure that the industrial byproduct meets both waste regulations and end user material specifications, the sample must be taken at the point of accumulation nearest to where the byproduct is generated.

If the byproduct is subject to any deliberate post-accumulation processing, excluding mechanical size reduction or sorting and the application of water to improve handling or as dust suppression, a case specific approval under s. NR 538.09, Wis. Adm. Code, may be required.

It is also very important that the sampling technique be adequately documented. This should help if questions arise regarding sample results and allows for the most consistent sampling technique and greater reproducibility. If not familiar with material sampling, ask the lab performing the analysis for instructions on sample size, preservation, hold time, and storage and transportation requirements. If these requirements are not met, the analysis may be invalid.

**Step 4:** Compare industrial byproduct sample results to standards listed in the NR 538 Appendix.

Start with Tables 1 and 2, or Table 3 if it is appropriate for the byproduct and use. To facilitate both the generator and the DNR’s review of the characterization results, please fill out and submit the material appropriate template. Example templates are provided on the following pages, but facilities may develop their own spreadsheets.

<b>If the material meets the definition of an industrial byproduct under s. NR 538.03(8), Wis. Adm. Code, and</b>	<b>Then, the byproduct is eligible for appropriate<sup>1</sup> uses under:</b>
Contains less than the standard concentrations specified for parameters listed in Appendix Table 1, Column B	ss. NR 538.10(1)-(3), Wis. Adm. Code
Contains less than the standard concentrations specified for parameters in Appendix Tables 1, Column B and Table 2	ss. NR 538.10(1)-(4), Wis. Adm. Code
For FGD material that is intended for use as a soil amendment and contains less than the standard concentrations specified for parameters in Table 3	ss. NR 538.10(5), Wis. Adm. Code
For byproducts from the production of lime that are intended for use as agricultural liming agents and contains less than the standard concentrations specified for parameters under s. 204.07(5)(c), Wis. Adm. Code	s. NR 538.10(5), Wis. Adm. Code
Contains greater than the standard concentrations specified for parameters listed in Appendix Table 1B or Table 2 and is not a hazardous waste	s. NR 538.10(1), Wis. Adm. Code

<sup>1</sup> The byproduct must meet all the specifications for the eligible use including, in some cases, certain physical characteristics. Some eligible uses are also specific to certain byproducts (i.e. coal fly ash).

**Step 5:** Submit the results to the DNR for review and concurrence.

Once the required information and test analyses have been collected, they must be submitted to the DNR along with a signed, completed Form 4400-197. The DNR will reply with a written concurrence within 10 business days, provided the application is complete and meets all the applicable criteria. The DNR response may:

- concur with the characterization,
- request additional information or analysis,
- determine that a case specific approval under s. NR 538.09, Wis. Adm. Code, is required, or
- issue a non-concurrence decision.

**Ferrous and Aluminum Foundry System Sand Industrial Byproduct Characterization**

**Facility:** \_\_\_\_\_ **Date:** \_\_\_\_\_

<b>Water Leach Test (ASTM D3987)</b>	<b>Table 1 Column A</b>	<b>Table 1 Column B</b>	<b>Sand Sample</b>
<b>Parameter</b>	<b>mg/L</b>	<b>mg/L</b>	<b>mg/L</b>
Antimony	0.006	0.03	
Arsenic	0.01	0.05	
Beryllium	0.004	0.02	
Cadmium	0.005	0.025	
Chromium, Tot.	0.1	0.5	
Cobalt	0.04	0.2	
Copper	1.3	6.5	
Lead	0.015	0.075	
Nickel	0.1	0.5	
Phenol	2	10	

**Notes:** Column A - Industrial byproducts that have concentrations below these standards may be used as geotechnical fill no less than 3 feet from the water table at the time of placement in accordance with s. NR 538.12 (2) (b), Wis. Adm. Code, or no less than 5 feet from the water table when used for nonmetallic mine reclamation under s. NR 538.10 (2) (f), Wis. Adm. Code. Standards are based on the enforcement exceedance values in s. NR 140.10, Wis. Adm. Code, or recommended standard updates from the Wisconsin Department of Health Services.

Column B - Industrial byproducts that have concentrations above Column A but below Column B may be used as geotechnical fill no less than 5 feet from the water table at the time of placement in accordance with s. NR 538.12(2)(c), Wis. Adm. Code. Standards are based on 5 times the enforcement exceedance values in s. NR 140.10, Wis. Adm. Code.

## Ferrous and Aluminum Foundry System Sand Industrial Byproduct Characterization

Facility: \_\_\_\_\_ Date: \_\_\_\_\_

Bulk Analysis	Table 2	Sand Sample
Parameter	mg/kg	mg/kg
Antimony	97.3	
Arsenic	8	
Beryllium	122	
Cadmium	104	
Chromium, Hexavalent	1.9	
Cobalt	35.2	
Lead	52	
Nickel	264	
Benz(a)anthracene	19.9	
Benzo(a)pyrene	2.0	
Benzo(b)fluoranthene	20	
Benzo(k)fluoranthene	200	
Chrysene	2000	
Dibenz(ah)anthracene	2	
Indeno(123-cd) pyrene	20	
1-methyl naphthalene	75.8	
2-methyl naphthalene	628	
Naphthalene	25.1	
Pyrene	4710	

**Note:** In accordance with s. NR 538.06(1), Wis. Adm. Code, the DNR may request additional water leach testing if any polyaromatic hydrocarbon (PAH) compound is detected above the bulk analyses standards and compare the results to the groundwater standards in ch. NR 140, Wis. Adm. Code, to ensure groundwater quality protection.

## Coal Ash Industrial Byproduct Characterization

Facility: \_\_\_\_\_ Date: \_\_\_\_\_

Water Leach Test (ASTM D3987)	Table 1 Column A	Table 1 Column B	Coal Ash Sample
Parameter	mg/L	mg/L	mg/L
Antimony	0.006	0.03	
Arsenic	0.01	0.05	
Barium	2	10	
Beryllium	0.004	0.02	
Boron	2	10	
Cadmium	0.005	0.025	
Chloride	250	1250	
Chromium, Tot.	0.1	0.5	
Cobalt	0.04	0.2	
Fluoride	4	20	
Lead	0.015	0.075	
Mercury	0.002	0.01	
Molybdenum	0.04	0.2	
Selenium	0.05	0.25	
Sulfate	250	1250	
Thallium	0.002	0.01	

Bulk Analysis	Table 2	Ash Sample
Parameter	mg/kg	mg/kg
Antimony	97.3	
Arsenic	8	
Barium	8600	
Beryllium	122	
Boron	43600	
Cadmium	104	
Chromium, Hex.	1.9	
Lead	52	
Mercury	13.7	
Molybdenum	1220	
Selenium	1210	
Thallium	2.4	
Vanadium	773	

## Flue Gas Desulfurization Gypsum Characterization

Facility: \_\_\_\_\_ Date: \_\_\_\_\_

<b>Water Leach Test (ASTM D3987)</b>	<b>Table 1 Column A</b>	<b>Table 1 Column B</b>	<b>FGD Sample</b>
<b>Parameter</b>	<b>mg/L</b>	<b>mg/L</b>	<b>mg/L</b>
Antimony	0.006	0.03	
Arsenic	0.01	0.05	
Boron	2	10	
Fluoride	4	20	
Manganese	0.3	1.5	
Mercury	0.002	0.01	
Selenium	0.05	0.25	
Thallium	0.002	0.01	

<b>Bulk Analysis</b>	<b>Table 2</b>	<b>FGD Sample</b>
<b>Parameter</b>	<b>mg/kg</b>	<b>mg/kg</b>
Antimony	97.3	
Arsenic	8	
Beryllium	122	
Chromium, Hex.	1.9	
Mercury	13.7	
Selenium	1210	
Thallium	2.4	



## FGD Byproduct for Soil or Plant Additive Characterization

Facility: \_\_\_\_\_ Date: \_\_\_\_\_

Bulk Analysis	Table 3	FGD Sample
Parameter	mg/kg	mg/kg
Antimony	1.5	
Arsenic	13.1	
Barium	1000	
Beryllium	2.5	
Boron	200	
Cadmium	1.0	
Chromium, Total	100	
Copper	95	
Lead	52	
Manganese	2937	
Mercury	3.13	
Molybdenum	10	
Nickel	100	
Selenium	50	
Thallium	1.0	
Vanadium	136	
Zinc	150	

**Notes:** Values are derived from the NRCS Conservation Practice Standard Code 333, "Amending Soil Properties With Gypsum Products," June, 2015, screening values or ch. NR 720, Wis. Adm. Code, background threshold values for lead, manganese and zinc which have background values exceeding the NRCS screening values. Mercury values are based on the ch. NR 720, Wis. Adm. Code, direct contact remedial concentration limits (RCLs).

## Other Industrial Byproduct Characterization

Facility: \_\_\_\_\_ Sample: \_\_\_\_\_ Date: \_\_\_\_\_

Water Leach Test (ASTM D3987)	Table 1 Column A	Table 1 Column B	Your Sample
Parameter	mg/L	mg/L	mg/L
Antimony	0.006	0.03	
Arsenic	0.01	0.05	
Barium	2	10	
Beryllium	0.004	0.02	
Boron	2	10	
Cadmium	0.005	0.025	
Chloride	250	1250	
Chromium, Total	0.1	0.5	
Cobalt	0.04	0.2	
Copper	1.3	6.5	
Fluoride	4	20	
Lead	0.015	0.075	
Manganese	0.3	1.5	
Mercury	0.002	0.01	
Molybdenum	0.04	0.2	
Nickel	0.1	0.5	
Nitrite & Nitrate	10	50	
Phenol	2	10	
Selenium	0.05	0.25	
Sulfate	250	1250	
Thallium	0.002	0.01	
Vanadium	0.375	0.75	
Zinc	25	125	

**Notes:** As provided under s. NR 538.06(1)(b), Wis. Adm. Code, in approving the testing program for industrial byproducts other than ferrous and aluminum foundry system sand, coal ash, and FGD gypsum, the DNR may do any of the following:

1. Exempt the requirement to analyze for certain parameters on a material-specific basis.
2. Require analysis for additional parameters on a material-specific basis in order to demonstrate compliance with performance standards identified at s. NR 538.04, Wis. Adm. Code.
3. Require the applicant submit a testing program plan, which the department must approve in writing prior to commencement of characterization.

### Other Industrial Byproduct Characterization

Facility: \_\_\_\_\_ Sample: \_\_\_\_\_ Date: \_\_\_\_\_

Total Elemental Analysis	Table 2B Category 2 & 3	Your Sample
Parameter	mg/kg	mg/kg
Antimony	97.3	
Arsenic	8	
Barium	8600	
Beryllium	122	
Boron	43600	
Cadmium	104	
Chromium, Hex.	1.9	
Cobalt	35.2	
Lead	52	
Mercury	13.7	
Molybdenum	1220	
Nickel	264	
Selenium	1210	
Thallium	2.4	
Vanadium	773	
Zinc	73000	
Benz(a)anthracene	19.9	
Benzo(a)pyrene	2.0	
Benzo(b)fluoranthene	20	
Benzo(k)fluoranthene	200	
Chrysene	2000	
Dibenz(ah)anthracene	2	
Indeno(123-cd)pyrene	20	
1-methyl naphthalene	75.8	
2-methyl naphthalene	628	
Naphthalene	25.1	
Pyrene	4710	

## Appendix B – Recharacterization Process

To confirm that the initial characterization results are still valid and to confirm that the byproduct materials are still qualified for their eligible uses, industrial byproducts that are beneficially used under the beneficial use program must be recharacterized in accordance with s. NR 538.06(5), Wis. Adm. Code, unless the DNR approves an alternative recharacterization method.

**For further information see:**

Subsections NR 538.06(5) and NR 538.14(2), Wis. Adm. Code, Form 440-197

### Periodic Recharacterization

A representative sample of each industrial byproduct must be recharacterized in accordance with the NR 538 Appendix, Tables 1 and 2, at a minimum of once every 4 years from the date of the initial certification or the last recharacterization. However, recharacterization is not required for any industrial byproduct of which less than 1,000 cubic yards were beneficially used or stored for beneficial use in any calendar year during the previous 4 year period.

### Recharacterization Following a Change in the Byproduct Production Process

In addition to the periodic recharacterization of the byproduct material, a representative sample of each industrial byproduct must be recharacterized whenever there is a change in the process that produces the industrial byproduct that could potentially result in a change in the eligible uses of the industrial byproduct. Generators should apply their knowledge of the industrial byproduct and the byproduct production process in determining the need for a recharacterization. It may only take a small process modification or raw material change to alter the industrial byproduct's use potential.

Please note that even generators that produce byproduct quantities too small to require periodic recharacterization are required to recharacterize their material if a process modification could result in a change in their eligible uses.

### Parameters Required for Recharacterization

For each new industrial byproduct, for periodic recharacterization of an existing byproduct, or when the process generating the byproduct changes, each byproduct must be analyzed for the appropriate parameters as listed in the NR 538 Appendix, Table 1 and Table 2 columns, along with any additional parameters required by the DNR on a material-specific basis.

### Submittal of Recharacterization Data

Each industrial byproduct generator must submit the recharacterization information to the DNR along with a completed Initial Certification and Recertification Form 4400-197 in accordance with s. NR 538.14(2), Wis. Adm. Code. The recertification form must be submitted to the DNR no later than 60 days following the receipt of the analytical testing results which indicate a potential reassignment of the eligible uses for any industrial byproduct. Analytical testing results that confirm the eligible uses assigned during the initial certification or the previous recharacterization may be submitted at the same time as the Annual Certification.

## Appendix C - Project Notification Process

**Project Notification** – While there isn't a DNR form associated with the project notification requirement, each generator, or a person designated by the generator such as a broker, must submit written project notification to the DNR prior to initiating a project when required under ss. NR 538.10(2) and NR 538.12, Wis. Adm. Code. The notification must include the following information:

**For further information see:**  
Section NR  
538.14(5), Wis.  
Adm. Code

- The name, address, email address, and phone number of the contact for the project and the property owner.
- The location of the project and a site description, including a topographic or orthophoto map, township and range to the quarter section, and land use information. In addition, the applicant must submit:
  - geographic information system locational information based on no fewer than six geographically informative points that define the limits of industrial byproduct placement.
  - These points must be collected using the North American Datum, NAD83 (1991) with the longitude and latitude referenced to the 5th decimal degree at each point.
  - The date, method and tools used to collect locational information for each point must also be included in the notification.

Other methods of geolocation that provide similar or better accuracy are also acceptable, subject to approval by the DNR.

- The approximate volume of industrial byproduct anticipated to be used in the project.
- The anticipated start and end dates for the project and the timing of any phasing.
- Identification of the types and generators of the industrial byproducts to be used and the eligible uses of these materials.
- Information demonstrating that the proposed project will meet the performance standards under s. NR 538.04, Wis. Adm. Code and beneficial use specifications under ss. NR 538.10(2) and NR 538.12, Wis. Adm. Code.
- For those beneficial uses listed in s. NR 538.10(2), Wis. Adm. Code, that exceed 5,000 cubic yards, the method and the data used to determine the groundwater separation distance.
- A copy of the property owner notification form required under s. NR 538.22, Wis. Adm. Code.
- For those beneficial uses subject to the public notification requirement under s. NR 538.18, Wis. Adm. Code, proof that a public notice was placed in the local newspaper in accordance with s. NR 538.18 (1)(a), Wis. Adm. Code. Please note that if a previously approved project will be contiguously expanded and the expansion results in the total volume exceeding 30,000 cubic yards, a public notification may be required at the time of the expansion request.

Proof of a public notice may include a copy of the notice clipped from the newspaper along with the date it was published or any other notification verifying that an order for the public notice was placed with the newspaper and the expected date of publication.

## **Timeframe for Gaining Concurrence**

1. If the notification submittal contains all the required information, the DNR will respond within 10 business days.
2. If the notification submittal is missing information or it does not appear that compliance to the specific project requirements will be achieved, the DNR will contact the person making the submittal and inform them that a concurrence will not be granted until additional information is submitted.

The project may not commence until concurrence is received from the DNR and the 10-day review timeframe for a concurrence decision will not restart until the applicant has submitted a complete application to the DNR.

3. For geotechnical fill projects greater than 100,000 cubic yards as described in NR 538.12(6), Wis. Adm. Code, the applicant must submit a request for a case specific approval under s. NR 538.09 Wis. Adm. Code.

## Appendix D – Case Specific Request

Case specific requests to the DNR consist of a cover letter and a report containing the following elements.

**For further information see:**  
Section NR 538.09,  
Wis. Adm. Code

### Cover Letter

The cover letter should provide a brief summary of key information relating to the case specific exemption request, including the following:

- a brief statement requesting a case specific review;
- the desired DNR action;
- the legal basis for the exemption (s. NR 538.09, Wis. Adm. Code);
- the name of the waste generator and contact information;
- the type, volume and rate of byproduct production;
- the location and type of beneficial use being proposed; and
- the expected start and end dates.

Positive environmental or social impacts (replace virgin material, effectively replace a more expensive manufactured product, save a business money, create jobs, reduce the carbon footprint, etc.) may be included the submittal.

In accordance with ch. NR 520, Table 2, Wis. Adm. Code, the DNR will send the applicant an invoice for a review fee of \$550 for each case specific approval requested. The DNR has 90 days to review and respond to the request in accordance with s. 289.43(7), Wis. Stats.

### Report Content

The purpose of the report is to provide the DNR reviewer and, where applicable, the public, with a detailed description of the proposed project and to demonstrate that the material qualifies for a NR 538 case specific approval. The following information should be included in the report:

#### Contact information:

- *Owner and Generator Contact*  
Name, organizational affiliation, address, telephone number and email address of the industrial byproduct generator who is responsible for the material to be beneficially used.
- *Reuse Site Contact*  
Name, organizational affiliation, address, telephone number and email address of the owner and operator of the site where the byproduct will be utilized.
- *Project Contact Person*  
Name, title, organizational affiliation, address, telephone number and email address of the person who will be working with the DNR on the proposed request.

#### Use Description

Provide a detailed description of how the byproduct material will be managed, including plans for reuse and storage. Include:

- Information demonstrating that the proposed project or use will meet the performance standards under s. NR 538.04, Wis. Adm. Code.
- The approximate volume of industrial byproduct anticipated to be used annually or at one time in the proposed project.

If the byproduct material will be used as geotechnical fill the following information is required:

- The anticipated start and end dates for the project and the timing of any phasing.
- The location of the project and a site description, including a topographic or orthophoto map, township and range to the quarter section, and land use information. In addition, the applicant must:
  - submit geographic information system locational information based on no fewer than six geographically informative points that define the limits of industrial byproduct placement.
  - These points must be collected using the North American Datum, NAD83 (1991) with the longitude and latitude referenced to the 5th decimal degree at each point.
  - The date, method, and tools used to collect locational information for each point must also be included in the notification.

Other methods of geolocation that provide similar or better accuracy are also acceptable, subject to approval by the DNR.

### Byproduct Description

Provide a narrative description of the byproduct's characteristics and the process from which the byproduct was generated. Include any chemical reagents involved in the generation of the byproduct or other chemicals used at the generating facility that may contact the byproduct material.

Provide a narrative description of any other treatments which have been or will be performed on the byproduct such as hydration (conditioning), oxidation or mixing with other materials.

The material description section should contain the following:

- Tables summarizing the results of all chemical, physical or geotechnical analyses of the byproduct conducted to verify contaminants and hazardous characteristics. For byproduct materials that are not specifically listed in the table columns, analysis should include, at a minimum, all the parameters included in the NR 538 Appendix, Tables 1 and 2 for the "Other" category. Include a scaled site map depicting all sample locations.
- A determination that the byproduct is not a hazardous waste as defined under s. NR 660.12(52), Wis. Adm. Code, using a method specified under ch. NR 661, Wis. Adm. Code.
- Technical data and information about the properties of the byproduct relevant to the proposed reuse.
- The potential for the byproduct characteristics to change due to ingredient or process changes.
- If warranted (such as for continuous waste generation), include an ongoing sampling plan for the byproduct, including sample parameters and sampling frequency.

If available, also include the following:

- Any studies or analytical characterization, safety data sheets or contaminant risk assessments.



- Documentation of contaminant profiles including test results and analyses of exposure or migration pathways.
- The results of any trials, experiments, field tests, technical literature findings, staff observations and inspections related to the proposed action.

### Additional Attachments

The report should include attachments containing copies of the following:

- The analytical package for all sampling results submitted to the DNR.
- The chain of custody, sampling methods and QA/QC data along with the results. The package should also include documentation that the laboratory used for the testing is a Wisconsin certified laboratory.

If more than one sample was analyzed, analytical results should be displayed in a table to help the DNR review your request in a timely manner.

**Number of Paper and Electronic Copies:** Unless otherwise specified, send the DNR a paper copy and an electronic copy of the report, plan sheets or drawings.

## Resources

The table below identifies regulatory elements and their associated code citation. Regulations can be found online at ch. NR 538, Wis. Adm. Code.

Requirements	Ch. NR 538, Wis. Adm. Code subsection
Determination of the generation of an industrial byproduct at a facility.	NR 538.03(8)
Characterization of the industrial byproduct.	NR 538.06
Determination of potential eligible uses for the industrial byproduct.	NR 538.08
Completion and submittal of the Initial Certification form and characterization test data to the DNR for review and concurrence.	NR 538.14
Notification of proposed projects utilizing industrial byproducts and requesting a concurrence if required.	NR 538.14
Listing of eligible beneficial uses and specifications for their use in projects or products.	NR 538.10
Performance standards for the storage, handling and use of industrial byproducts.	NR 538.04
Additional requirements for the use of industrial byproducts as geotechnical fill.	NR 538.12
Construction and operation of industrial byproduct storage facilities.	NR 538.16
Transportation of industrial byproducts.	NR 538.16
Public participation requirements for large volume projects.	NR 538.18
Environmental monitoring for case specific projects.	NR 538.20
Property owner notification requirements for geotechnical fill projects.	NR 538.22
Completion and submittal of Annual Certification forms by April 1 each year with information for the prior calendar year.	NR 538.14
Maintenance of records.	NR 538.14
Recharacterization of industrial byproducts every 4 years and submittal of results to the DNR.	NR 538.06
Excavating existing geotechnical fills.	NR 538.24
Standards tables (Tables 1-4) to determine eligible uses based on characterization data.	Appendix

The NR 538 chapter was established as a result of 1996 Wisconsin Act 27, and more specifically Section 289.05(4), Wis. Stats., which directed the Department of Natural Resources (DNR) to develop rules with standards for the beneficial reuse of specific high-volume industrial wastes.

## ERRATA

Please be aware that two subsections of the revised ch. NR 538, Wis. Adm. Code, were retained in error. Neither of the uses were retained as eligible uses under s. NR 538.10(2), Wis. Adm. Code, so the requirements are not relevant and should be disregarded. The subsections in question are under s. NR 538.20 Wis. Adm. Code and read as follows:

- (2) FULLY ENCAPSULATED TRANSPORTATION FACILITY EMBANKMENTS.** Environmental monitoring for embankments that are fully encapsulated under s. [NR 538.10 \(6\)](#) shall be conducted as follows:
- (a)** One headwell shall be installed if less than 50,000 cubic yards of industrial byproducts are used in the embankment. A second headwell shall be installed if 50,000 cubic yards or more of industrial byproducts are used in the embankment.
  - (b)** The head elevation in each headwell shall be monitored twice each year at least 4 months apart. If the head level on the liner exceeds 2 feet, the DNR shall be notified. This notification shall include an evaluation of the reason for the head level build up and a proposed response to reduce the head level on the liner.
- (3) CAPPED TRANSPORTATION FACILITY EMBANKMENT.** The environmental monitoring for embankments that are capped and not lined under s. [NR 538.10 \(7\)](#), shall be conducted as follows:
- (a)** One basin lysimeter shall be installed with a collection area of 100 square feet. The lysimeter shall be placed directly below the industrial byproduct, and shall be located so that it will be beneath the thickest placement of the industrial byproduct.
  - (b)** The volume of fluid collected in a basin lysimeter shall be monitored and recorded twice each year at least 4 months apart. If the volume of liquid collected in a basin lysimeter exceeds 375 gallons in one year the DNR shall be notified. This notification shall include an evaluation as to the reason for the volume of liquid being collected, an analysis of the liquid collected for all the parameters listed ch. [NR 538 Appendix I](#), Table 2A and a proposed response to reduce the volume of liquid exfiltrating through the industrial byproduct.

## DNR Contact Information

For more information on this subject, including publications, staff contacts, and administrative codes and statutes, go to [dnr.wi.gov](http://dnr.wi.gov) and search “waste.” Staff contact information can also be found by searching “beneficial use requirements” in the [DNR staff directory](#).

**Mailing address:** DNR Waste & Materials Management Program, PO Box 7921 Madison, WI 53707

**Email:** [DNRWasteMaterials@Wisconsin.gov](mailto:DNRWasteMaterials@Wisconsin.gov)

***Disclaimer:** This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.*

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