Beneficial uses. The beneficial uses of industrial byproducts under this chapter which may be exempt from regulation as provided under s. NR 538.12 are:

1. **Raw materials for manufacturing of a product** Encapsulated uses in which the measurable leaching, emissions or decomposition characteristics of the industrial byproduct are substantially eliminated by binding them into a solid matrix. Products that would meet these criteria include cement, lightweight aggregate, structural or ornamental concrete or ceramic materials, portland cement concrete pavement, asphalctic concrete pavement, roofing materials, plastics, paint, fiberglass, mineral wool, wallboard, plaster and other products as approved by the department.

2. **Agents for physical or chemical stabilization, solidification or other treatment of solid waste that is to be disposed of at a lined landfill having a leachate collection system, or utilized in some other final use approved by the department.**

3. **Supplemental fuels that provide energy through controlled burning.**

4. **Daily cover or internal structures at lined landfills having a leachate collection system.** The industrial byproducts used for this purpose may not contain free liquids. The industrial byproducts used as landfill daily cover may contain not more than 15% of silt and clay sized materials (P200 content), and may not be placed in layers greater than 6 inches thick. In addition the industrial byproducts used as landfill daily cover shall be able to control disease vectors, fires, odors, blowing litter and scavenging without presenting a threat to human health or the environment.

NR 538.10(5) Confined geotechnical fill material in accordance with the project criteria and uses specified in this subsection. If more than 5,000 cubic yards are to be used in an individual project, prior written notification in accordance with s. NR 538.14(4) and concurrence by the department are needed. If the department does not respond to the notification within 10 business days, concurrence is considered to be granted. **The use of a clay capping layer or geomembrane as an impervious surface in accordance with the design criteria of s. NR 504.07 for confined geotechnical fill must be approved in accordance with s. NR 538.08(7).** Industrial byproducts shall be used in accordance with best management practices. The criteria and uses under this subsection are as follows:

(a) **Base course, subbase or subgrade fill** for the construction of commercial, industrial or non-residential institutional buildings provided the design and use of the building prevents the percolation of liquid through the byproduct layer. The placement of the industrial byproduct may not extend more than 4 feet beyond the outside edge of the concrete slab or the frostwalls of the building. Placement of the concrete floor or frostwalls shall be completed as soon as practical after placement of the fill material in accordance with s. NR 538.12(2)(d). Any area where industrial byproducts are not directly beneath the building shall be sloped to prevent ponding of water and covered with 2 feet of native soil. **The upper six inches shall consist of**, including topsoil and seeded or other cover as approved by the department and placed as soon after placement
as is practical. The use of industrial byproducts as base course, subbase and subgrade fill in the construction of residential buildings is specifically prohibited.

(b) Base course, subbase or subgrade fill for the construction of a portland cement concrete or asphaltic concrete paved lot. The placement of the industrial byproduct may not extend more than 4 feet beyond the paved area. Placement of the pavement shall be completed as soon as practical after placement of the fill material. Any area where industrial byproducts are not directly beneath the pavement structure shall be sloped to prevent ponding of water, covered with 2 feet of native soil including topsoil and seeded as soon after placement as is practical. The fill may not exceed 3000 cubic yards per half acre of the project area. The depth of fill may not exceed 4 feet below the natural ground surface. Prior written notification in accordance with s. NR 538.14 (4) and written concurrence by the department are needed for fills that do not meet the criteria in this subsection. Concurrence by the department will be based on specific site conditions and good engineering practice. If the department does not respond to the notification within 10 business days, concurrence is considered to be granted. The use of industrial byproducts as paved lot fill is prohibited in residential areas.

(c)  Base course, subbase or subgrade fill for the construction of a paved federal, state or municipal roadway. Industrial byproducts placed as part of construction of the paved federal, state or municipal roadway may not extend beyond the subgrade shoulder point and the depth of the fill may not exceed 4 feet except for incidental sections of the fill. Any area where industrial byproducts are not directly beneath the pavement structure shall be sloped to prevent ponding of water, covered with base course or native soil including topsoil and seeded as soon as practical after placement of the industrial byproduct. Placement of the pavement structure shall be completed as soon as practical after placement of the fill material. For fills greater than 4 feet in depth using category 4 industrial byproducts, the design criteria in sub. (6) shall be required. For fills greater than 4 feet in depth using category 3 or less industrial byproducts, the design criteria in sub. (7) shall be required. The use of industrial byproducts as paved roadway subbase or base subgrade fill is prohibited in residential areas, unless used in a roadway designed with a rural type cross-section.

(d) Base aggregates for the construction of a paved federal, state or municipal roadway that meet the Wisconsin department of transportation Section 301 standard specifications for base aggregates. The use of industrial byproducts as paved roadway base aggregate is prohibited in residential areas, unless used in a roadway designed with a rural type cross-section.

(d) Utility trench backfill. The industrial byproducts placed as part of backfill of a trench constructed for the placement of sanitary or storm sewer, non-potable water line, gas main, telecommunications, electrical or other utility lines shall be beneath a paved roadway, parking lot or other portland cement concrete or asphaltic concrete paved structure. The industrial byproducts may not extend more than 4 feet beyond the pavement structure. Any area where industrial byproducts are not directly beneath the
pavement structure shall be sloped to prevent ponding of water, topsoiled and seeded as soon as practical after placement of the industrial byproduct.

(e) Bridge abutment backfill. Industrial byproducts placed as part of bridge abutment backfill shall be covered by a roadway structure. Any area where industrial byproducts are not directly beneath the pavement surface shall be sloped to prevent ponding of water, covered with base course or topsoiled and seeded as soon as practical after placement of the industrial byproduct. The use of industrial byproducts as bridge abutment trench backfill is prohibited in residential areas, unless used in a roadway designed with a rural type cross-section.

(f) Abandonment of tanks, vaults or tunnels that will provide total encapsulation of the industrial byproduct. This use does not include the placement of an industrial byproduct in a location where environmental pollution has been identified unless it is specified in a plan approval by the department.

(g) Slabjacking material. Industrial byproducts used as a component in a slabjacking material in combination with portland cement, lime or bentonite shall be placed beneath portland cement concrete paved structures to raise areas that have settled. The slabjacking material shall be placed directly from an enclosed transport vehicle. Projects using more than 2 cubic yard of industrial byproduct as a slabjacking material is prohibited in residential areas.

(h) Soil and pavement stabilization. Industrial byproducts used as soil and pavement base stabilization for structural improvements listed in pars. (a) to (c) shall be used in accordance with ASTM C618-03 or the Wisconsin department of transportation specifications for highway and structure construction, or other good engineering practices acceptable to the department. The use of industrial byproducts as soil and pavement base stabilization is allowed in residential areas for those beneficial uses specified in par. (c) if approved by the local unit of government with jurisdiction over the roadway.

Note: ASTM C618-03 is the American society for testing and materials "Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete." Copies of this test procedure can be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, (610) 832-9585, www.astm.org. Copies of the standard are also available for inspection at the offices of the Department of Natural Resources, the Secretary of State and the Legislative Reference Bureau.

(i) Controlled low strength material (flowable fill). Industrial byproducts incorporated into controlled low strength material for structural improvements listed in pars. (a), (d), (e) and (f) shall be used in accordance with ACI 229R-99 or the Wisconsin department of transportation specifications for highway and structure construction, or other good engineering practices acceptable to the department.
(6) Fill material used for the construction of feed and manure storage structures at livestock operations. The feed and manure storage structures shall be constructed in accordance with applicable Natural Resources Conservation Service Conservation practice standards. Larger operations are also subject to NR 243 requirements. If more than 5,000 cubic yards are to be used in an individual project, prior written notification, including copies of construction plans that detail how the byproduct material will be incorporated into the project, in accordance with s. NR 538.14 (4) and concurrence by the department are needed. If the department does not respond to the notification within 10 business days, concurrence is considered to be granted.

Note: Natural Resources Conservation Service (NRCS) conservation practice standard Code 313 applies to the construction of waste storage facilities and NRCS conservation practice Code 629 applies to construction of feed storage pads. Copies of these and other conservation practice codes can be obtained online from the NRCS Field Office Technical Guide, [www.nrcs.usda.gov/wps/portal/nrcs/site/wi/home](http://www.nrcs.usda.gov/wps/portal/nrcs/site/wi/home). Copies are also available at the Wisconsin NRCS State Office or the Wisconsin Land and Water Conservation Association Office.

(6) Fully encapsulated transportation facility embankments constructed under the authority of the Wisconsin department of transportation, or a municipality, that meet the criteria in this subsection. Examples include linear roadway sound and sight barrier berm embankments, airport embankments and roadway bridge or overpass embankments. For projects using more than 100,000 cubic yards of industrial byproducts, or with a maximum thickness of industrial byproduct greater than 20 feet, department concurrence shall be obtained prior to initiating the project. These embankments shall be constructed, documented and monitored as follows:

(a) The embankment shall be monitored in accordance with s. NR 538.20 (2).

(b) The embankment shall be covered on the top and sidewalls by 2 feet of recompacted clay, and underlain by a 3-foot thick recompacted clay liner. The recompacted clay base, sidewalls and top cover shall meet the following specifications:

1. A minimum thickness of 3 feet under the entire base and 2 feet on the sidewalls and top compacted to a minimum of 95% standard dry proctor density at a moisture content wet of optimum, based on the characteristics of the appropriate proctor curve for the clay being placed.
2. A classification of CL or CH under the unified soil classification system.

3. A permeability of $1 \times 10^{-7}$ cm/sec or less, when compacted to 95% standard maximum dry proctor density or greater.

4. An average liquid limit of 25% or greater with no values less than 20%, when tested in accordance with ASTM D4318-95.

5. An average plasticity index of 12% or greater with no values less than 10%, when tested in accordance with ASTM D4318-95.

6. A minimum of 50% by weight that passes the 200 sieve.

Note: ASTM D4318-95 is the American Society for Testing and Materials "Test Method for Liquid Limit, Plastic Limit and Plasticity Index for Soils." Copies of this test procedure can be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, (610) 832-9585, www.astm.org. Copies of the standard are also available for inspection at the offices of the Department of Natural Resources, the Secretary of State and the Legislative Reference Bureau.

(c) Any portion of the clay top cover or sidewalls of the embankment not covered by the pavement structure, which includes base course and pavement, shall be covered by one foot of cover soil that includes a minimum of 4 inches of topsoil.

(d) Documentation testing for the recompacted clay base, sidewalls and top cover shall be as follows:

1. Field density and moisture content testing shall be performed on a uniform grid pattern for each lift of clay placed with the grid pattern offset on each subsequent lift. A lift may not exceed 8 inches in thickness following compaction. One density test shall be performed for each 40,000 ft$^2$ of surface area for every 8 inch lift of clay placed on the base and top cover. One density test shall be performed for each 60,000 ft$^2$ of surface area for every 8 inch lift of clay placed on the sideslopes offset on each subsequent lift.

2. A disturbed soil sample shall be obtained for one of every 3 field test locations in subd. 1. and analyzed in a laboratory for atterberg limits and grain size to the 2 micron particle size. An undisturbed soil sample shall be obtained for one of every 9 field test locations in subd. 1. and analyzed for laboratory permeability.

3. A standard proctor curve, ASTM D698-91, shall be developed for each distinct soil source and type in order that density testing can be correlated to the appropriate soil type.

4. Monitoring devices including headwells, and associated borehole construction shall be documented using the appropriate department forms: monitoring well construction form
#4400-113A (rev. 4-90), soil boring log information form #4400-122 (rev. 7-91) and well information form #4400-89 (rev. 1-90).

Note: ASTM-D698-91 is the American society for testing and materials "Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort." Copies of this test procedure can be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, (610) 832-9585, www.astm.org. Copies of the standard are also available for inspection at the offices of the Department of Natural Resources, the Secretary of State and the Legislative Reference Bureau.

Note: Copies of these forms may be obtained from the Department of Natural Resources, Bureau of Waste Management, 101 South Webster Street, Natural Resources Building, P.O. Box 7921, Madison, Wisconsin 53707-7921.

(e) Within 90 business days of completion of the construction project, a site construction report shall be prepared and 3 copies sent to the department. Two of these reports shall be submitted to the bureau of waste management and one shall be submitted to the department's field office responsible for the area in which the embankment is located. The report shall include all of the following:

1. A plot plan showing final grades actually achieved in the field, and the location of all soil tests, drainage ditches, surface water drainage control structures, monitoring wells, control points and any other pertinent features.

2. Documentation of the depth of the final cover material utilizing a 200 foot grid pattern. All borings shall be replaced with acceptable material and compacted to proper density. Hand auger or survey data may be used for this documentation.

3. Documentation of the type and quantity of fertilizer, mulch and seed used on the side slopes.

4. Documentation of the quantity and source of the industrial byproduct used in the embankment fill.

5. The final perpendicular cross-sections of the completed embankment. These cross-sections shall indicate the extent of the industrial byproduct placement.

6. Typical detailed drawings of any special design features.

7. An appendix containing all the raw data from the soil testing program.

8. A description of the institutional controls that will be in place to ensure that the structural integrity of the embankment will be maintained, and that any future disturbances of the embankment design features will be repaired.
(f) The final cover and topsoil shall be smoothly graded to enhance positive surface runoff and seeded, fertilized and mulched to establish a thick vegetative growth. Routine maintenance of the embankment slopes shall be performed to insure the integrity of the final soil cover.

(g) A perimeter berm shall be constructed within the limits of the prepared clay base to contain any surface water runoff from the industrial byproduct. The berm shall be maintained throughout the period of industrial byproduct placement.

(h) Measures shall be taken to limit blowing and tracking of the industrial byproduct during transportation to the construction site and placement in the embankment. Measures include keeping the industrial byproduct moist, and compacting it as soon as it is deposited in the fill area.

(i) The department's field office responsible for the area in which the embankment is located shall be contacted at least one week prior to initiating construction of the clay liner so that arrangements can be made for inspecting the site.

(7) **Clay-capped and sidewalled** transportation facility embankments constructed under the authority of the Wisconsin department of transportation, or a municipality, that meet the criteria in this subsection. Examples include linear roadway sound and sight barrier berm embankments, airport embankments and roadway bridge or overpass embankments. Any area where industrial byproducts are beneficially used as an embankment shall be sloped to prevent ponding of water, covered with 2 feet of native soils including a minimum of 6 inches of topsoil, or other cover approved by the department, and seeded with an approved Wisconsin department of transportation seed mix as soon as practical after placement of the industrial byproducts. For projects using more than 100,000 cubic yards of industrial byproducts, or with a maximum thickness of industrial byproduct greater than 20 feet, department concurrence shall be obtained prior to initiating the project. The construction, documentation and monitoring of these embankments shall be as described under sub. (6) (b) 2. to (i). and as follows:

(a) The embankment shall be monitored in accordance with s. NR 538.20 (3).

(b) The embankment shall be covered on the top and sidewalls by 2 feet of recompacted clay compacted to a minimum of 95% standard dry Proctor density at a moisture content wet of optimum, based on the characteristics of the appropriate Proctor curve for the clay being placed. The sidewalls and top cover shall be a minimum of 2 feet thick. No liner is required.

(8) Unconfined geotechnical fill material used as fill material for sight, sound, safety and structural berms, reclamation of nonmetallic mines, public recreational trails, construction of sporting venues, limited use parking areas, access lanes, utility trenches or other beneficial uses demonstrated to be acceptable by the department. Any area where industrial byproducts are beneficially used as unconfined geotechnical fill shall be sloped to prevent ponding of water, covered with 2 feet of native soils including a minimum of 6
inches of topsoil, or other cover approved by the department, and seeded as soon as practical after placement of the industrial byproducts. Gravel or other granular material may be substituted for topsoil if necessary for the final use as long as the total fill cover is at least 2 feet. If more than 5,000 cubic yards are to be used in an individual project, prior written notification in accordance with s. NR 538.14 (4) and concurrence by the department are needed for all unconfined geotechnical fills. Concurrence by the department will be based on specific site conditions and good engineering practice. If the department does not respond to the notification within 10 business days, concurrence is considered to be granted. The beneficial use of industrial byproducts as an unconfined geotechnical fill is prohibited in residential areas.

(9) Geotechnical fill material used in the reclamation of nonmetallic mining sites. Any area where industrial byproducts are beneficially used in the reclamation of a nonmetallic mine site shall be sloped to prevent ponding of water, covered with 2 feet of native soils including a minimum of 6 inches of topsoil, or other cover approved by the department, and seeded in accordance with the reclamation plan as soon as practical after placement of the industrial byproducts. Prior written notification in accordance with s. NR 538.14 (4) and concurrence by the department are needed for all nonmetallic mine reclamation projects. Concurrence by the department will be based on specific site conditions and good engineering practice. If the department does not respond to the notification within 10 business days, concurrence is considered to be granted. The beneficial use of industrial byproducts in the reclamation of nonmetallic mines is prohibited in residential areas or areas where residential construction is planned as a post-reclamation land use.

(a) The use of fill materials at nonmetallic mining sites with a permit issued under ch. NR 135 shall be in accordance with the approved reclamation plan required under s. NR 135.19. If the reclamation plan does not specify the use of industrial byproducts as fill material, the plan shall be modified in accordance with s. 135.24 to reflect the use of these byproducts. The reclamation plan modification must be approved by the regulatory authority before applying for concurrence by the department.

(b) Nonmetallic mining sites where mining ceased prior to August 1, 2001 and are not subject to ch. NR 135 proposing the use of industrial byproducts as part of reclamation of the mine site shall submit a reclamation plan prepared in accordance with s. NR 135.19(1)-(4) for the portion of the mine site that will accept fill material. Mine reclamation projects at mine sites that do not have an approved reclamation plan issued under ch. NR 135 using more than 10,000 cubic yards of industrial byproduct fill material shall be approved in accordance with s. NR 538.08(7).

(c) For all nonmetallic mine sites, geotechnical fill shall not be placed within 5 feet of the post-reclamation water table level or the pre-mining water table level if a post-reclamation water table level is not determined in the reclamation plan.
(d) Coal combustion residuals such as coal fly ash, bottom ash, slag and flue gas desulfurization byproducts shall not be used for nonmetallic mine reclamation.

(910) Unbonded surface course material used in accordance with the criteria of this subsection. This includes the use of industrial byproducts as a surface course material in unpaved driveways, parking areas and recreation or exercise trails. Industrial byproducts used as surface course shall conform to the requirements of Wisconsin department of transportation standard specifications for highway and structure construction applicable to base materials, and may be placed at a cumulative thickness of 6 inches or less and in areas separated by at least a 25 foot vegetated buffer to a navigable surface water. The use of industrial byproducts as unbonded surface course is prohibited in residential areas. If more than 1000 cubic yards of industrial byproducts or more than 6 inches are to be used in an individual surface course application, prior written notification in accordance with s. NR 538.14 (4) and concurrence by the department are needed. If the department does not respond to the notification within 10 business days, concurrence is considered to be granted.

(10) Bonded surface course material used in accordance with the criteria of this subsection. This use includes placement of industrial byproducts as a bonded surface course material such as seal coats in roads, driveways, parking areas and recreational or exercise trails. Industrial byproducts used as a bonded surface course shall conform to the Wisconsin department of transportation standard specifications for highway and structure construction applicable to asphaltic pavements. Within 48 hours of application of the industrial byproduct, the surface shall be rolled to thoroughly embed these materials into the asphaltic mastic. If more than 10,000 cubic yards of industrial byproducts are to be used in an individual bonded surface course application, prior written notification in accordance with s. NR 538.14 (4) and concurrence by the department are needed. If the department does not respond to the notification within 10 business days, concurrence is considered to be granted.

(11) Bonded surface course material used in accordance with the criteria of this subsection. This use includes placement of industrial byproducts as a bonded surface course material such as seal coats and chip seals in paved federal, state or municipal roadways, driveways, parking areas and trails specified in sub. (5) (c). Industrial byproducts used as a bonded surface course shall conform to the Wisconsin department of transportation standard specifications for highway and structure construction applicable to asphaltic pavements. Bonded surface course material must contain less than 2 percent passing the P200 sieve and applied at a rate no greater than 18 pounds per square yard. Within 48 hours of application of the industrial byproduct, the surface shall be rolled to thoroughly embed these materials into the asphaltic mastic. If more than 10,000 cubic yards of industrial byproducts are to be used in an individual bonded surface course application, prior written notification in accordance with s. NR 538.14 (4) and concurrence by the department are needed. If the department does not respond to the notification within 10 business days, concurrence is considered to be granted. The use of industrial byproducts as seal coats is prohibited in residential areas, unless used in a roadway designed with a rural type cross-section.
(12) Decorative stone applications using industrial byproducts shall conform to Wisconsin department of transportation specifications for highway and structure construction applicable to base aggregates. The use of industrial byproducts as decorative stone is prohibited in residential areas.

(13) Winter weather road abrasive on roadways with a rural cross-section, including areas with incidental sections of curb and gutter. The winter road abrasives using industrial byproducts, wholly or as part of a mixture of abrasives and de-icing compounds, shall meet Wisconsin department of transportation gradation and application rate recommendations for winter highway maintenance contained in the state highway maintenance manual. The abrasive or abrasive mixture shall be applied at rates not to exceed 1000 pounds/ lane mile per application.

(14) Blasting grit or abrasives produced through the crushing, washing and sieving of granular industrial byproducts such as coal bottom ash and foundry slag.

(15) Soil or plant additives to be managed, applied and licensed in accordance with the Wisconsin department of agriculture, trade and consumer protection ch. ATCP 40, Subchapter II or ATCP 41 requirements. Prior written notification in accordance with s. NR 538.14 (4) and concurrence by the department are needed for all soil or plant additives used in accordance with this section. If the department does not respond to the notification within 10 business days, concurrence is considered to be granted. The applicant shall demonstrate, as part of the required written notification, the following:

(a) The byproduct, as demonstrated through research projects approved under s. NR 518.04(2) or previously published research, has value as a soil or plant additive and will not result in detrimental effects to the soil or vegetation at the rates and mixtures proposed. If the additive is part of a mixture, the physical and chemical nature of the other materials in the mixture must be described in the submittal as well as the relative percentages of each material.

(b) The byproduct or byproduct mixture will not be applied at rates such that excessive accumulation of hazardous substances occur in soil or vegetation, or cause a detrimental effect on surface water quality, or cause a detrimental effect on groundwater quality that would result in an exceedance of the groundwater quality standards in s. NR 140.

(c) The byproduct or byproduct mixture will be applied in accordance with accepted agricultural practices.

(d) Byproducts that are intended for use as agricultural liming materials to be managed, applied and licensed in accordance with ATCP 41 will meet the requirements of this section and do not contain contaminant concentrations in excess of the values listed in Table 3 of s. NR 204.07(c).
(e) Flue gas desulfurization gypsum does not contain contaminant concentrations in excess of the values listed in Table 5 of ch. NR 538, Appendix I and will be applied in accordance with USDA Code 333 or other references as approved by the department.


Note: Copies of Wisconsin department of transportation specifications for highway and structure construction, and state highway maintenance manual can be obtained from the Department of Natural Resources, Bureau of Waste Management, 101 South Webster Street, Natural Resources Building, P.O. Box 7921, Madison, Wisconsin 53707-7921. Copies are also available for inspection at the offices of the Legislative Reference Bureau and the Secretary of State.

Note: Under s. 30.2022, Stats., highway and bridge projects affecting the waters of the state that are carried out under the direction and supervision of the department of transportation are exempt from department permit or approval requirements if accomplished in accordance with interdepartmental liaison procedures established by the Department of Natural Resources and the department of transportation.

History: Cr. Register, December, 1997, No. 504, eff. 1-1-98; CR 05-020: am. (5) (a) to (d), (f), (7) (b), (8) to (10), renum. (11) and (12) to be (12) and (13) and am., cr. (5) (h), (i) and (11) Register January 2006 No. 601, eff. 2-1-06.