

Industrial Solid Waste Landfills – Specific Regulatory Requirements



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Description: This guidance lists and summarizes the citations in NR 500 to 520 and associated statutes which are specific to industrial solid waste landfills. There is no listing in code or statute of regulatory requirements specific to industrial solid waste landfills. This guidance was written to respond to a request for such a list by a papermill representative. This guidance is also an aid to staff who lack experience with industrial solid waste landfills or are not fully aware of code requirements specific to them.

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Narrative: The regulatory review and siting process defined in ch. 289, Stats., and NR 500 to 520, Wis. Adm. Code, is applicable to all licensed solid waste landfills. Historically, the Waste & Materials Management Program has maintained requirements for municipal and industrial solid waste landfills in a single set of codes, noting specific requirements for industrial solid waste landfills as subjects were addressed in the codes.

Industrial solid waste landfills are regulated under ch. 289, Stats., and NR 500 to 520, Wis. Adm. Code. There is no distinction between regulatory plan review and licensing procedures for municipal solid waste landfills, industrial solid waste landfills, landfills for high volume industrial wastes, and large construction and demolition waste landfills. Certain differences in detailed technical requirements for these categories have accumulated due to history, experience with environmental impacts, and legislative requirements. These differences can be confusing and easy to overlook. This guidance addresses code and statutory citations specific to industrial solid waste landfills and certain other requirements specific to industrial solid wastes.

Industrial waste is defined in s. NR 500.03(109), Wis. Adm. Code. It includes high volume industrial wastes, which are defined in s. 289.01(17), Stats., and extends to other manufacturing solid wastes. In practice, code requirements specific to industrial solid wastes are not usually defined as being applicable to industrial solid wastes but, rather, as being applicable to landfills which do not accept municipal solid wastes. This means that the requirements listed below also apply to large C&D landfills (which are not regulated under NR 503 and which have to go through the licensed solid waste landfill siting process) and to landfills for remediation wastes such as dredged material, as long as the waste mass does not include municipal solid wastes.

This guidance does not attempt to describe or modify the siting process, the environmental assessment review, locational or performance restrictions, the negotiation/arbitration process, or any other aspects of the siting process. This guidance is not a substitute for compliance with the requirements of ch. 289, Stats., and NR 500 to 520, Wis. Adm. Code. It constitutes clarification of requirements for industrial solid waste landfills, which we know from experience are sometimes not immediately apparent.

Design and Operation - NR 504, NR 506, and NR 507

NR504.06(1) - Liner design: This explicitly requires that MSW landfills use a composite liner (4 feet of compacted clay overlain by a 60 mil HDPE geomembrane). Liner requirements for industrial solid waste landfills are addressed in a less straightforward fashion.

“All other landfills shall be designed to contain and collect leachate to the maximum practical extent. This shall be accomplished by designing the landfill to meet the standards contained in the applicable portions of subs. (2), (3) and (4), unless the Department approves the applicant’s alternative design as per s. NR 504.10, which provides for an equivalent or better level of performance than the standards contained in this chapter.”

NR 504.06(2)(e) requires that the minimum thickness of a compacted clay liner be 5 feet. Industrial solid waste landfills are allowed to be designed with a clay liner rather than a composite liner, as long as there is no disposal of MSW in the industrial solid waste landfill.

NR 504.10 contains no specific technical design standards, but places the burden on the applicant to demonstrate that the alternative design adequately protects public health, welfare and environment and meets or exceeds location and performance standards. This section applies specifically to landfills for high volume industrial waste, with minor inclusions of other wastes. The alternative designs have to be justified to the satisfaction of the assigned review staff. Since one of the standards is that a design has to meet is the groundwater standards in NR 140, review staff could, if necessary, require that groundwater modeling or other analytical methods be used to demonstrate that an alternative design meets or exceeds the performance standards.

The standard liners prescribed by code are presumed to meet the performance standards of NR 504.04(4) if they are designed and constructed as required by the code.

The design standard for liners for industrial solid waste landfills is 5 foot thick compacted clay.

NR 504.06(5)(a) - Separation of leachate collection pipes is addressed by limiting the leachate flow length to 130 feet. In practice, for a 2% liner slope, this results in a 100 foot perpendicular distance from the collection trench to the ridgeline between collection lines. Greater flow lengths can be proposed only for composite liner designs. Thus, industrial solid waste landfills with clay liners are limited to a 130 foot leachate flow length.

NR 504.06(5)(d) - Leachate collection trenches for clay liners are required to be designed as rectangular trenches. Vee trenches are required for composite liner designs. Rectangular trenches provide greater pipe support and are easier to construct. Vee trenches are necessary to minimize strains in geomembranes that cross the trenches, reduce bridging, and reduce the difficulty of placement and seaming of geomembrane panels that cross the trenches.

NR 504.06(5)(h) - The number of perforations of a clay liner are required to be minimized, and perforations are allowed only in a horizontal direction. This, in conjunction with subs. (5)(i), (5)(k), and (5)(L), is intended to aid the design of gravity flow drain systems, where leachate is intended to flow unimpeded to the low point of the landfill and out through a solid wall header pipe into exterior piping, manholes, and liftstations which convey leachate to a collection tank or sanitary sewer connection.

Note: Sumps and sideslope risers are required for composite-lined landfills under s. NR 504.06(5)(h) and (j). The code does not explicitly disallow sumps and sideslope risers for clay-lined landfills. However, sumps inherently require a liquid-filled level above pump intakes, which results in a permanent standing liquid head in the sumps. The Waste Program has historically not allowed clay-lined landfills to deliberately maintain liquid heads on the liner, even at the low point in the liner system. We are not aware of any clay-lined landfills which have been approved to use other than a gravity flow system to drain leachate through the sidewall to a tank or lift station.

NR 504.06(5)(i) - Antiseep collars are required for pipe penetrations of a clay liner, to create a longer flow path and dissipate the gradients that allow leachate loss through poorly compacted clay around a collection pipe header.

NR 504.06(5)(u) - A minimum of one collection basin lysimeter is required under each major horizontal clay-lined phase above the saturated zone.

NR 504.07(1)(b) - Composite capping layers are not required for sites that do not contain MSW, with one exception. Any landfill with a composite liner, regardless of waste type disposed of in it, is required to have a composite capping layer. Clay capping layer dimensions and specifications in NR 504.07(4) require a minimum of 2 foot thickness of compacted clay, which is required to meet clay liner requirements for soil properties and compaction.

NR 504.07(1)(d) - Landfills for papermill sludges and other industrial solid wastes with high water contents and low strength can propose an alternative cover design, if the strength of the waste mass does not allow construction of the cover system specified in code. This subsection and sub. (3) are intended to allow designs that can be implemented in reasonable time, while providing relief from slopes or other design elements that might be impossible to attain. They also assure that final cover can be placed after filling to waste final grades without waiting an open-ended or inordinate amount of time for a waste mass to gain strength.

NR 504.07(3) - A support layer is required for stabilization, reinforcement, and removal of gas and leachate, for industrial solid wastes with high water contents and low strength. The specifications for a support layer are not defined. This is deliberate, as the specifications will depend on the properties of both waste and the support layer components, which vary widely. A set of design elements commonly applied to papermill sludge landfills is also likely suitable for all high water content and low strength wastes. These include a separation and reinforcing geosynthetic laid on top of the waste (usually a geotextile with sewn seams, but could be a geonet), covered by a granular layer of 1 to several feet of bark, sand, ash, or other material. Shredded bark or other permeable and lightweight material is usually preferable. Leachate and gas can be forced out of the waste mass by the weight and construction activities associated with the cover. Leachate should be drained and gas vented by a network of flexible, perforated piping placed in the support layer.

NR 504.08(4) - This requires a passive gas venting system at any site that accepted industrial or other non-MSW waste with the potential to generate decomposition gas.

Note: Any site that took any amount of MSW is required to install an active gas extraction system as specified in sub. (2). All landfills are required to install a minimum of one gas monitoring probe on each side of the landfill, regardless of waste type.

NR 504.09(2)(h) - Final cover slope limits are specified for all landfills. Landfills which are primarily designed for disposal of papermill or sewage sludges are required to use a maximum slope of 6:1, as opposed to the 4:1 maximum slope specified for other landfills.

NR 504.11 - This includes specifications for landfills for disposal of ash from MSW incinerators. The liner design is required to be a single composite or double composite liner, depending on whether the ash passes or fails the TCLP leach test procedure.

NR 506.05(2) - Daily cover is not required for high volume industrial waste landfills, unless specified by Department approval. Other industrial and commercial solid wastes are required to use daily cover, unless the Department grants a written exemption.

NR 506.06 - Intermediate cover is not required for high volume industrial wastes, unless otherwise required by Department approval.

NR 506.07(1)(i) and NR 525.05 - A trained operator or certified manager does not have to be present at a high volume industrial waste landfill during all hours of operation. All other landfills are required to have a trained operator or certified manager on site during all hours of operation.

NR 506.13(3) and NR 506.14(3) - Landfills that do not accept MSW can accept free-liquid wastes or non-free liquid wastes (i.e., sludges) with Department approval.

NR 506.16 - Random load inspections are required only of MSW landfills.

NR 507.09 - Vertical leachate head wells are required for clay lined landfills.

Note: In practice, vertical headwells can be designed to be built up incrementally as the waste mass fills, or drilled in after the waste mass reaches final waste grades. MSW landfills are required to use a more recent version, horizontal headwells with sideslope access risers, to prevent damage to the geomembrane and to demonstrate compliance with leachate depth limits during active filling life. Horizontal headwells are compatible with clay lined landfill design and can be required if leachate heads need to be monitored during active filling life.

NR 507, Appendix I - Water quality parameters are listed in tables for groundwater, leachate, and lysimeter fluids, which vary depending on waste types which a landfill accepts.

Siting and Plan Review Process - NR 504, NR 512 and NR 514

NR 504.05(3) and NR 512.17 - Need, Design Capacity, and Site Life: This implements s. 289.29(1)(d), Stats., and s. 289.28(2), Stats. S. 289.29(1)(d), Stats., imposes a 10 to 15 year site life on all new licensed solid and hazardous waste disposal facilities. S. 289.28(2), Stats., exempts two types of facilities from determination of needs and the site life limitations, specified to be disposal facilities for waste generated from a pulp or paper mill (includes sludge, ash, off-spec chemicals, wood yard debris, etc.) and disposal facilities that are part of a prospecting or mining operation.

NR 512.12(3)(a) and (b) - Default leachate generation rates during landfill operations and after closure are listed, with different rates for composite versus non-composite liners and caps. Absent other data, these generation rates should be used for financial responsibility analyses, although this section is not directly referenced by NR 514.06(15) or NR 520.07(3).

NR 514.07(1)(k) and NR 516.04(4) & (5) - These sections address requirements for preconstruction submittals for landfills which use geosynthetics in liner or cover construction. These are not normally required for clay-lined landfills which are following previously approved or code-specific quality control and quality assurance measures and are using a previously defined and approved soil borrow site.

NR 514.07(4) - This section specifically allows a two year delay between completing placement of the support layer over waste final grades and the completion of the final cover for papermill sludge landfills. This still requires Department approval, and a longer time period can also be approved. The intent is to allow papermill sludge and other soft contents of a cell to adjust to the placement of an approved support layer. A support layer should be designed with enough reinforcement to withstand the large differential settlements and depressions that might occur in the sludge surface and to distribute compression forces over the sludge surface. The support layer should contain enough piping to drain off leachate and precipitation, prevent surface exposure of leachate ponded on the sludge surface, and withdraw leachate rapidly. The combined effect of materials and drainage features of the support layer and the prevention of surface exposure of leachate has been shown to minimize or suppress detectable odors.

NR 514.07(6)(b) - This section requires leak tests of collection basin lysimeters and sumps for sideslope risers. Sideslope risers are required for composite lined landfill cells. Collection basin lysimeters are required for clay-lined landfill cells.

Fees and Financial Responsibility - NR 520 & Ch 289, Stats.

NR 520.06(6) & s. 289.41(4) & (9), Stats. - These authorize use of the net worth test for demonstration of financial responsibility for closure and long-term care. This method is restricted to companies operating for profit, which also meet certain financial tests. Historically, it has been used by large manufacturing companies, such as papermills.

S. 289.645(3), Stats. - The \$3.00 per ton recycling fee does not apply to high volume industrial waste, regardless of whether disposal is in an MSW or industrial solid waste landfill.

S. 289.67(1)(cm) & (cp) - The environmental repair fee is \$0.20 per ton for high volume industrial waste and \$0.50 per ton for all other wastes, regardless of whether disposal is in an MSW or industrial solid waste landfill.

Contact 608/266-2111 or DNRWasteMaterials@Wisconsin.gov for further information.

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