

## Chapter NR 516

## LANDFILL CONSTRUCTION DOCUMENTATION

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**NR 516.01 Purpose.** The purpose of this chapter is to help ensure that efficient, nuisance-free and environmentally acceptable solid waste management procedures are practiced in Wisconsin and to outline the requirements regarding testing and construction documentation for solid waste landfills and surface impoundments. This chapter is adopted under ss. 144.43 to 144.47, and 227.11, Stats.

**History:** Cr. Register, January, 1988, No. 385, eff. 2-6-88.

**NR 516.02 Applicability. (1)** Except as otherwise provided, this chapter governs all solid waste disposal facilities as defined in s. 144.43 (5), Stats., except hazardous waste facilities as defined in s. 144.61 (5m), Stats., and regulated under chs. NR 600 to 685 and metallic mining operations as defined in s. 144.81 (5), Stats., and regulated under ch. NR 182.

**(2)** This chapter does not apply to the design, construction or operation of industrial wastewater facilities, sewerage systems and waterworks treating liquid wastes approved under s. 144.04, Stats., or permitted under ch. 147, Stats., nor to facilities used solely for the disposal of liquid municipal or industrial wastes which have been approved under s. 144.04, Stats., or permitted under ch. 147, Stats., except for facilities used for the disposal of solid waste.

**History:** Cr. Register, January, 1988, No. 385, eff. 2-6-88; correction in (1) made under s. 13.93 (2m) (b) 7, Stats., Register, May, 1994, No. 461.

**NR 516.03 Definitions.** The terms used in this chapter are defined in s. NR 500.03.

**History:** Cr. Register, January, 1988, No. 385, eff. 2-6-88.

**NR 516.04 General requirements. (1) CONSTRUCTION DOCUMENTATION.** The construction associated with the establishment and closure of all landfills and surface impoundments shall be documented by a professional engineer registered in the state of Wisconsin. A registered professional engineer or qualified technician under the direct supervision of a registered professional engineer shall be present at all times during critical construction periods such as liner and final cover placement, leachate collection system construction, leachate storage and transfer device construction, granular drainage material placement, gas collection and control device installation and clay borrow source excavation. The department may require that a registered professional engineer be present during major construction activities. The engineer shall render an opinion in writing, based on testing results and actual inspections, as to whether the facility has been constructed or closed in substantial conformance with the plan of operation or other approved plans.

**(2) REPORT PREPARATION.** A report documenting all aspects of construction shall be prepared for the initial construction of the facility; the construction of all subsequent phases or portions thereof; the construction of any surface water, groundwater, leachate or gas control structures; the implementation of remedial actions; and the closure of each major disposal area. Approval of the report which documents the construction of the landfill base shall be obtained from the department prior to initiating disposal operations in the newly established area. The department shall review and respond to each construction documentation report within 65 business days after receiving a complete submittal and the appropriate review fee specified in ch. NR 520.

**History:** Cr. Register, January, 1988, No. 385, eff. 2-6-88.

**NR 516.05 Soil testing requirements.** Soil testing shall be performed during the construction and closure of any landfill areas. At a minimum, this testing shall include:

**(1) LINER AND CAP CONSTRUCTION.** For all recompacted clay soil and for all clay liner and cap construction the following tests shall be performed:

**(a)** Dry density and as-placed moisture content shall be determined on an approximate 100-foot grid pattern for each one-foot thickness of clay placed. The grid pattern shall be offset on each subsequent layer of tests. At least 5 sets of tests shall be performed for each acre for every one-foot thickness of clay placed. A minimum of 2 density and moisture content tests for each one-foot thickness of clay placed shall be performed to fully define the degree of soil compaction obtained in confined areas where equipment movement is hindered or hand compaction is necessary.

**(b)** One moisture-density curve shall be developed for every 5,000 cubic yards or less of clay placed and for each major soil type utilized. At least 5 points shall be established on each curve. A representative sample for every 5,000 cubic yards or less of clay placed shall be analyzed for grain size distribution through the .002 millimeter particle size and for Atterberg limits. If apparent changes in soil quality are observed during clay placement, a one-point Proctor analysis shall be utilized to verify the applicability of previously analyzed moisture-density curves.

**(c)** A minimum of one undisturbed sample for each acre or less for every one-foot thickness of clay placement shall be retrieved and analyzed for Atterberg limits, grain size distribution through the .002 millimeter particle size, moisture content and dry density. Laboratory hydraulic conductivity tests using the falling head method shall be performed on every third undisturbed sample. The depart-

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ment may require that a portion of the hydraulic conductivity testing for liner documentation be performed using leachate.

(2) **DRAINAGE BLANKET** During placement of the granular drainage blanket material the following testing shall be performed:

(a) One grain size distribution to the #200 sieve for each 1,000 cubic yards of material placed. For lesser volumes, a minimum of 4 samples shall be tested. The department may allow a reduction in the testing frequency if a uniform gravel material is used.

(b) One remolded laboratory hydraulic conductivity test for each 2,500 cubic yards of material placed. The samples shall be tested at the anticipated field density. The moisture content and density of each sample shall be recorded. The department may require that a portion of the hydraulic conductivity tests be performed using leachate. For lesser volumes, a minimum of 2 samples shall be tested. The department may allow a reduction in testing frequency if a uniform gravel material is used.

(c) The department may require that chemical durability testing of the material when exposed to leachate be performed.

(3) **BEDDING MATERIAL** During placement of all leachate or groundwater collection pipe bedding material, the following tests shall be performed:

(a) One grain size distribution to the #200 sieve for each 1000 linear feet of trench. For trench lengths less than 3000 feet, a minimum of 3 grain size analyses shall be conducted.

(b) The department may require that chemical durability testing of the material when exposed to leachate and laboratory hydraulic conductivity testing be performed.

(4) **FINAL COVER** If placement of a gas venting layer is required under s. NR 504.07 (3), the following tests shall be performed.

(a) One grain size distribution to the #200 sieve for each 1000 cubic yards of material placed. For lesser volumes, a minimum of 4 samples shall be tested.

(b) One remolded laboratory hydraulic conductivity test for each 2,500 cubic yards of material placed. The samples shall be tested at the anticipated field density. The moisture content and density of each sample shall be recorded. For lesser volumes, a minimum of 2 samples shall be tested.

(5) **TOPSOIL** At least 2 representative topsoil samples for each acre shall be analyzed for soil pH, nitrogen, phosphorus and potassium and classified under the USDA soil classification system. For areas less than 2 acres, a minimum of 3 samples shall be tested.

**History:** Cr. Register, January, 1988, No. 385, eff. 2-6-88.

**NR 516.06 Construction of landfill areas.** Reports documenting the construction of all new landfill areas shall contain the following minimum information:

(1) **ENGINEERING PLANS** A set of 24 inch by 36 inch engineering plan sheets, or alternative size if approved by

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the department in writing, shall be prepared in accordance with s. NR 500.05 and contain:

(a) A plan view documenting the constructed grades for the sub-base, sidewalls and leachate collection trench undercuts prior to liner placement. Documentation of the grades shall consist of spot elevations taken on a maximum 50-foot grid pattern, with leachate collection trench undercut elevations at least every 25 linear feet. The approved sub-base grades shall also be shown for the same area in a clear and legible manner.

(b) A plan view showing the locations of the various soil testing performed. Each test location shall be clearly labeled. Each plan view shall also clearly show any areas where removal and recompaction of clay was necessary in order to attain the minimum required specifications. Multiple plan views may be shown on a single plan sheet if legibility is not compromised.

(c) A plan sheet documenting the constructed elevations for the liner. This plan sheet shall contain spot elevations of the base, sidewalls and leachate collection trenches. Documentation of grades shall include spot elevations taken on a maximum 50-foot grid pattern, with leachate collection trench elevations taken every 25 linear feet. The approved base grades shall be shown for the same area in a clear and legible manner. A plan sheet shall also be included which shows the granular blanket depth throughout the prepared area.

(d) A plan view drawing showing the constructed base grades as well as the locations and elevations of all leachate collection and transfer piping, manholes, lift stations, culverts, berms and the location of all unsaturated zone, groundwater, gas, leachate monitoring and cleanout devices, surface drainage features and other pertinent structures. This information may be shown on the plan sheet required in par. (c) if legibility is not compromised.

(e) Cross-sections through the constructed area parallel and perpendicular to the base line of the facility at 200-foot intervals. A minimum of 4 cross-sections shall be prepared, 2 of which shall be in each direction. Each of these cross-sections shall show actual and design sub-base and base grade contours, the top of the granular drainage blanket, leachate and groundwater pipe elevations and the actual base and sub-base contours of adjacent filled areas.

(f) Detailed drawings, both plan view and cross-sections, of all manholes, lift stations, storage tanks, all locations where leachate transfer piping exits the lined area and other pertinent construction details. At a minimum, these drawings shall show base and top elevations, the invert elevations of all associated piping, pump details, float level elevations and the extent of recompacted clay placed around and below the structures.

(g) Additional plan sheets, patterned after those specified in pars. (a) to (f), shall be included for those facilities designed with multiple liners, groundwater gradient control systems or other nonstandard design features.

(2) **REPORT PREPARATION** A comprehensive report containing a detailed narrative describing the construction of the area in chronological fashion. Particular emphasis shall be given to any deviations from the approved plan of operation and to all locations where leachate transfer pip-

ing exits the lined waste fill area. This report shall include the following information at a minimum:

(a) An analysis and discussion of all soil testing work performed. All density and moisture content testing results shall clearly indicate which Proctor curve is applicable to the soil being compacted. Any changes in the referenced Proctor curve shall be identified as to when they occurred and why the change was made. All raw data from the soil testing performed shall be included in an appendix to the construction documentation report.

(b) Documentation of the initial leachate collection pipe cleanout, and pressure testing of force mains and leachate storage tanks. All provisions used to seal pipe connections, manhole sections and leachate storage tanks including protective coatings and corrosion protection shall be described. The manufacturer's recommendations for the installation of all equipment shall be included. Any deviations from the recommendations shall be discussed.

(c) A series of properly labeled 35 millimeter color prints documenting all major aspects of facility construction. This shall include close-up photographs of the construction process including liner placement, leachate pipe placement including all places where transfer piping exits the lined waste fill area, and the installation of all manholes, lift stations and storage tanks. Panoramic views shall be included showing the prepared sub-base and the completed liner before and after granular blanket placement.

(d) A cover letter under the seal of a registered professional engineer rendering an opinion as to whether the facility has been constructed in substantial conformance with the approved plans. Any deviations from the approved plan shall be noted and explained.

**History:** Cr. Register, January, 1988, No. 385, eff. 2-6-88.

**NR 516.07 Closure of landfill areas.** All construction documentation reports for the closure of landfill areas shall contain the following minimum information:

(1) **ENGINEERING PLANS.** A set of 24 inch by 36 inch engineering plan sheets, unless an alternative size is approved by the department in writing, prepared in accordance with s. NR 500.05 and including:

(a) A plan sheet documenting the final refuse grades, including daily or intermediate cover. Documentation of grades shall include spot elevations taken on a maximum 100-foot grid after grading has been performed to establish uniform slopes. Approved final refuse grades shall also be shown for the same area in a clear and legible manner. For areas less than 4 acres, a 50-foot grid shall be used.

(b) A plan view drawing for each one-foot thickness of clay placed showing the locations of the various soil testing performed at each test location. Multiple plan views may be presented on a single engineering plan sheet if legibility is not compromised. The plan view of the upper-

most lift of clay shall also document the final clay grades on a maximum 100-foot grid. For areas less than 4 acres, a 50-foot grid shall be used.

(c) A plan sheet documenting the constructed final cap grades prior to topsoil placement on a maximum 100-foot grid. Approved final cap grades shall be shown for the same area in a clear and legible manner. For areas less than 4 acres, a 50-foot grid shall be used.

(d) A plan sheet documenting the final landfill surface following topsoil placement. Documentation of grades shall include spot elevations taken on a maximum 100-foot grid. The approved final grades shall also be shown in a clear and legible manner. This plan sheet shall also show the locations of all manholes, lift stations, risers, head wells, gas venting systems, surface water drainage control structures and other appurtenances. For areas less than 4 acres, a 50-foot grid shall be used.

(e) Cross-sections through the closed area which are constructed parallel and perpendicular to the base line of the facility at maximum 200-foot intervals. A minimum of 4 cross sections shall be submitted, 2 of which shall be in each direction. Each of these cross-sections shall show all surficial and subsurface features encountered including gas vents, leachate lines, and other landfill structures and shall be tied into the grades of adjacent previously filled areas. At a minimum, each cross section shall show sub-base grades, base grades, final refuse grades, final cap system configuration and grades, and final topsoil grades.

(2) **REPORT PREPARATION.** A comprehensive report containing a detailed narrative chronologically describing the closure of the area. Particular emphasis shall be placed on any deviations from the approved plans. This report shall also include the following information at a minimum:

(a) An analysis and discussion of all soil testing work performed. All raw data from the soil testing performed shall be included in an appendix to the closure documentation report.

(b) The results of all required topsoil testing along with the rates and types of fertilizer and seed applied. Liming requirements shall also be included along with the actual rate of application.

(c) A series of properly labeled 35 millimeter color prints which document all major aspects of facility closure. This shall include panoramic views of the closed area as well as close-up photos of the construction process and completed engineering structures such as gas vents, cleanout ports, manholes, leachate storage tank access, leachate loadout areas and other pertinent structures.

(e) A cover letter under the seal of a registered professional engineer rendering an opinion as to whether the area has been closed in substantial conformance with the approved plans. Any deviations from the approved plan shall be noted and explained.

**History:** Cr. Register, January, 1988, No. 385, eff. 2-6-88.