

Chapter NR 512

FEASIBILITY REPORTS FOR LANDFILLS

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NR 512.01 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 feasibility reports for new solid waste disposal, transportation and processing facilities. The purpose of the feasibility report is to determine whether a facility has potential for use in disposal of solid waste and to identify any conditions which the applicant must address in the plan of operation. 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 512.02 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 512.03 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 512.04 Initial inspection. Any person intending to establish a new solid waste disposal facility or expand an existing solid waste disposal facility shall contact the department's district or area office as appropriate to arrange for an initial inspection for the purpose of evaluating com-

pliance with the location and performance standards of s. NR 504.04. This inspection shall be completed prior to submittal of the report.

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

NR 512.05 General submittal requirements. An applicant proposing to construct a new solid waste disposal facility or expand an existing solid waste disposal facility shall submit a feasibility report and related materials in accordance with s. NR 500.05 and this chapter, except as otherwise provided. The applicant shall include all pertinent information from the initial site report in the feasibility report. The feasibility report shall address all department review comments on the initial site report. If the applicant requests any exemptions to the location and performance standards listed in s. NR 504.04, justification for the request shall be provided in the narrative section of the feasibility report. Applicants proposing an alternative design to the requirements contained in s. NR 504.05 shall include an analysis that predicts whether the facility will meet or exceed the performance standards of s. NR 504.04 (4) (d) regarding groundwater quality.

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

NR 512.06 Procedural requirements. An applicant shall comply with all applicable procedural requirements of s. 144.44, Stats.

(1) **LOCAL APPROVALS.** An applicant shall submit a written request including the standard notice developed under s. 144.44 (1m) (bn), Stats., to each affected municipality for the specification of all applicable local approval requirements under s. 144.44 (1m) (b), Stats. An applicant subject to s. 144.445, Stats., shall apply for all applicable local approvals specified by a municipality under s. 144.44 (1m) (b), Stats., at least 120 days prior to submitting the feasibility report to the department. If the municipality either fails to respond within 15 days after the receipt of the written request from the applicant or indicates that there are no applicable local approval requirements, the applicant may submit the feasibility report 135 days after receipt by the municipality of the written request from the applicant or 120 days after receipt of the response from the municipality indicating that there are no local approval requirements, whichever occurs first. The feasibility report shall contain documentation that this requirement has been met.

(2) **SUBMISSION OF REPORTS.** An applicant shall submit a feasibility report to the department in accordance with s. 144.44 (2), Stats. At the same time, the applicant shall submit a copy of the feasibility report to each participating municipality under s. 144.445 (6) (b), Stats. The applicant shall notify the department of when and to whom the copies of the feasibility report were submitted.

(3) **COMPLETENESS.** Within 60 days after a feasibility report is submitted, the department shall determine whether or not the feasibility report is complete. If the report is complete, the department shall publish a class I public notice in accordance with s. 144.44 (2) (k), Stats., and issue a preliminary determination stating whether or not an environmental impact statement is required. If the report is incomplete, the department shall notify the applicant in writing and specify the information which shall be submitted before the feasibility report is complete. The department shall determine the completeness of the feasibility report by determining whether or not the minimum requirements of this chapter have been met. The department may require the applicant to submit addi-

tional information after determining that the feasibility report is complete if the department establishes that the feasibility of the facility cannot be determined without the additional information.

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

NR 512.07 Alternative requirements. (1) WASTE TYPES AND VOLUMES. An applicant for a facility for the disposal of municipal solid waste having a proposed design capacity of 50,000 cubic yards or less may submit a feasibility report which contains all the information described in ch. NR 510. For an industrial or commercial solid waste disposal facility having a proposed design capacity of 50,000 cubic yards or less, the department may allow the applicant to submit a feasibility report which contains all the information described in ch. NR 510, depending on the waste types and the facility location.

(2) REQUIRED INFORMATION. When an applicant submits a feasibility report containing all the information described in ch. NR 510, the information described in ss. NR 512.14, 512.15, 512.18, 512.20 and 512.21 regarding water budget and liner efficiency, waste characterization, borrow source investigation, needs and recycling shall also be included.

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

NR 512.08 General facility information. The feasibility report shall identify the project title; name, address and phone number of the primary contacts including the facility owner and any consultants; present property owner; proposed facility owner and operator; facility location by quarter-quarter section; total acreage of the property and proposed limits of fill; proposed facility life, design capacity and an estimated date of initial operation; municipalities and industries to be served; estimated waste types and characteristics; estimated weekly quantities of each major waste stream; anticipated cover frequency; mode of operation; anticipated base and sub-base grades; and preliminary design concepts.

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

NR 512.09 Land use information. The feasibility report shall discuss the present and former land uses at the facility and the surrounding area. A thorough discussion of land uses which may have an impact on the suitability of the property for waste disposal or affected groundwater quality shall be included. The report shall address all areas that may affect or be affected by the proposed facility. At a minimum, this will be the area within one-half mile of the limits of filling for facilities with a design capacity of 50,000 cubic yards or less and areas within one mile for facilities with a design capacity greater than 50,000 cubic yards. The discussions shall be supplemented with land use maps. At a minimum specifically address the following items:

(1) ADJACENT LAND OWNERS. Identify and locate the adjacent land owners. This information may be presented on a plat map. However, check current ownership conditions and note any changes.

(2) LAND USE ZONING. Include a discussion of land use zoning in the area. Give particular attention to areas where zoning variances will be required, where agricultural impact statements may be required, or where floodplain, shoreland or wetland zoning is designated.

(3) DOCUMENTATION OF PRESENT LAND USES. Include a description of the present land uses in the area. Put particular emphasis on the discus-

sion of known recreational, historical, archaeological or environmentally unique areas including natural or scientific areas, county forest lands and critical habitat. Include a letter from the department's bureau of endangered resources addressing the known presence of any endangered or threatened species, critical habitat and natural or scientific areas and a letter from the state historical society addressing the presence of any known historical, scientific or archaeological areas in the vicinity of the proposed facility. Address the need for an archaeological survey of the proposed limits of waste fill prior to development.

(4) **TRANSPORTATION AND ACCESS.** Delineate the present or proposed transportation routes and access roads including any weight restrictions.

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

NR 512.10 Regional geotechnical information. The feasibility report shall discuss the regional setting of the facility to provide a basis for comparison and interpretation of information obtained through field investigations. This discussion may be limited to information available from publications such as a hydrologic investigations atlas, water supply papers, informational circulars and technical bulletins published by the Wisconsin state geologic and natural history survey, the United States geological survey and the soil conservation service. The regional setting to be described is the area which may affect or be affected by the proposed facility. At a minimum, this will be the area within 5 miles of the proposed limits of filling. Supplement the discussions with available regional bedrock and glacial geology maps, USGS topographic maps, SCS soil maps and regional water table maps. Specifically discuss the following items:

(1) **TOPOGRAPHY.** Describe the existing topography including predominant topographic features.

(2) **HYDROLOGY.** Describe the surface water drainage patterns and significant hydrologic features such as surface waters, springs, surface water drainage basins, divides and wetlands.

(3) **GEOLOGY.** Describe the origin, texture, nature and distribution of bedrock; the origin, texture, thickness and distribution of the unconsolidated units; and the texture and classification of the surficial soils.

(4) **HYDROGEOLOGY.** Indicate the depth to groundwater, groundwater flow directions and hydraulic gradients, recharge and discharge areas, groundwater divides, aquifers and identification of the aquifers used by public and private wells in the region.

(5) **WATER QUALITY.** Submit information on groundwater and surface water quality which is available from the USGS, WSGNHS, DNR, UW-Extension and regional planning commissions.

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

NR 512.11 Specific geotechnical information. The applicant shall perform laboratory and field investigations to define the physical characteristics of the facility including soils, bedrock and groundwater. At a minimum these investigations shall include the requirements specified below unless an alternative geotechnical investigation program is approved by the department in writing. The applicant shall provide supporting justification for any reductions to the requirements in this section.

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(1) **BORINGS.** Borings sufficient to define sub-surface conditions shall be drilled both inside and outside the proposed limits of waste filling.

(a) At a minimum, borings shall be drilled in 10 separate locations for the first 5 or less acres of the proposed fill area. Three borings shall be drilled for each additional 5 or less acres of proposed fill area. The borings shall be located on a grid pattern and such that there is a minimum of one boring in each major geomorphic feature such as ridges, lowlands and drainage swales. All borings shall be within 300 feet of the proposed limits of waste filling. The department may require more borings in complex hydrogeologic environments.

(b) Borings shall extend a minimum of 25 feet below the anticipated sub-base grade or to bedrock, whichever is less. If regional information suggests that bedrock is within 100 feet of the land surface, at least one boring shall be extended into bedrock. Every attempt shall be made to locate this boring outside the proposed limits of waste filling. The boring log shall identify the lithology of the bedrock.

(c) Where conditions permit, samples shall be collected using undisturbed sampling techniques. Samples may not be composited for testing purposes. In fine-grained soil environments, continuous samples shall be collected from each boring beginning at the land surface to at least 25 feet below the anticipated sub-base grade. In uniform, coarse-grained soil environments or following the continuous sampling in fine-grained soil environments, samples shall be collected from each major soil unit encountered and at maximum 5-foot intervals. Each soil sample shall be described including its structure, mottling, voids, layering, lenses and geologic origin and visually classified according to the unified soil classification system and Muncell color chart. Continuous core samples of the bedrock shall be taken and the rock properties including fracture frequency, RQD and percent recovery shall be determined for the borings extended into bedrock.

(d) Borings not converted to wells shall be abandoned in accordance with s. NR 508.07(2).

(e) A boring log shall be submitted for each boring. Each boring log shall include soil and rock descriptions, methods of sampling, sample depths and elevations, date of boring, land surface elevation, bottom of boring elevation, moisture content, and consolidation test results such as blow counts, vane shear or pocket penetrometer. All elevations shall be corrected to USGS datum. If the boring is converted to a well, include the water level at time of drilling, dates of water level measurements and a well construction diagram on the log.

(2) **WELLS.** Groundwater monitoring wells sufficient to define the hydrogeologic and groundwater quality conditions shall be installed. At a minimum, this includes:

(a) Water table observation wells shall be installed to adequately define the water table surface and horizontal gradients. At a minimum, 5 water table observation wells shall be installed for the first 5 or less acres of disposal area and one additional well for each additional 5 or less acres of disposal area. The wells shall be constructed so that the screens intersect the water table at all times during the year and attempt to locate the wells no further than 150 feet from the anticipated limits of filling. At a minimum, for the first 5 or less acres of disposal area, a piezometer shall

be installed adjacent to a water table observation well at 2 separate locations to create well nests. One additional piezometer for each additional 10 or less acres of disposal area shall be installed to create additional well nests. In addition, in fine-grained soil environments, 2 well nests consisting of at least 2 piezometers shall be installed adjacent to a water table observation well for the first 5 or less acres of disposal area and one additional well nest consisting of at least 2 piezometers for each additional 10 or less acres of disposal area.

(b) All wells shall be designed, installed, developed, sampled and documented in accordance with ch. NR 508. Alternative methods of well design and installation must be approved prior to well construction.

(3) **FIELD DIRECTION.** A hydrogeologist or other qualified person shall observe and direct the drilling of all borings, the installation and development of all wells and all in-field hydraulic conductivity tests. The hydrogeologist shall also visually describe and classify all of the geologic samples.

(4) **LABORATORY AND FIELD ANALYSIS.** Laboratory and field analyses shall be conducted to identify the specific geologic, hydrogeologic and groundwater quality conditions at the proposed facility as outlined below:

(a) For each major soil unit encountered, at least 5 representative samples shall be analyzed for grain size distribution by mechanical and hydrometer tests and Atterberg limits as appropriate for the particular type of material. Each representative sample shall be classified according to the unified soil classification system.

(b) Laboratory hydraulic conductivity tests shall be conducted on at least 2 representative samples from each major soil unit. Tests shall be run on undisturbed samples when conditions allow.

(c) The department may require that other tests be conducted as appropriate for the particular type of material.

(d) An in-field test shall be conducted on each well to determine the in-situ hydraulic conductivity. The test shall be of long enough duration and include a sufficient amount of data to provide a representative estimate of the actual hydraulic conductivity.

(e) After each well has been properly developed, successive water level measurements shall be taken until stabilized readings are obtained. Thereafter, water level measurements shall be obtained on a monthly basis for a minimum of 6 months prior to submittal of the feasibility report. After this period, quarterly water level monitoring shall be performed until a feasibility determination is made. In addition, stabilized water level measurements shall be obtained on a quarterly basis from surface water bodies including streams, lakes, ponds, drainage ditches and wetlands located within 1,200 feet of the proposed facility. Where public or private wells are present, stabilized water level readings from these wells may be required if access can be obtained from the owner. The water level monitoring program shall continue until a feasibility determination has been issued by the department.

(f) At least 4 rounds of baseline groundwater quality sampling shall be performed on all wells outside the proposed limits of waste filling in ac-
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cordance with s. NR 508.14 and submitted along with the feasibility report.

(g) The department may require other work such as pump tests, geophysical investigations, isopach maps or a fence diagram to assess the hydrogeologic conditions at the proposed facility.

(5) **SAMPLE RETENTION.** All soil and bedrock samples shall be retained until the department issues a feasibility determination. Representative samples of all major soil units and bedrock formations shall be retained until the department issues an operating license for the facility.

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

NR 512.12 Subsurface data analysis. Data on subsurface investigations shall be presented in the narrative section of the report as follows:

(1) **SOIL AND BEDROCK DESCRIPTIONS.** Each major soil unit and bedrock formation shall be described using data from both subsurface investigations and regional information. The descriptions shall include:

(a) Grain size distribution, geologic origin and classification of materials using the USCS system and Muncell color chart.

(b) The lateral and vertical extent of each major soil unit including description of lenses or other heterogeneities and the strike and dip of rock formations.

(c) The presence and frequency of joints, fractures, voids, solution openings, faults or other structural features.

(d) Testing data shall be summarized by major soil unit in a table in the report. The table shall contain the following information: geologic origin, sample ID number, percentages of gravel, sand, silt and clay-sized materials, P200 content, liquid limit, plasticity index, and lab and field hydraulic conductivity. If average values are calculated for any of these test results, a range and standard deviation shall also be presented.

(2) **HYDROGEOLOGIC PROPERTIES.** The properties of each saturated soil unit or rock formation and its function in the groundwater flow system shall be described including the following:

(a) Hydraulic conductivity.

(b) Role as a confining unit.

(c) Hydraulic connection to other units.

(d) Actual or potential use as a water supply.

(e) Depth to groundwater and seasonal variations in groundwater elevation.

(f) Location and extent of perched groundwater.

(g) Local and regional flow directions including the location of groundwater divides.

(h) Horizontal and vertical gradients, particularly between soil units of differing hydraulic conductivity and between unconsolidated deposits and bedrock.

(i) The saturated thickness of the uppermost aquifer at the facility boundary which can be expected to attenuate contaminants which may enter the flow system and estimates of the quantity of flow passing under the proposed waste fill area.

(3) APPENDIX. All raw data including boring logs, well construction diagrams, soil tests and water level measurements shall be included in the appendices of the report.

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

NR 512.13 Data presentation. The results from the subsurface investigations shall be presented on 24 inch x 36 inch plan sheets, unless an alternative size is approved by the department in writing, as follows:

(1) **EXISTING CONDITIONS.** A detailed topographic survey of the proposed facility and all areas within a distance of 1,500 feet from the proposed limits of filling. The minimum scale shall be one inch = 200 feet with a maximum 2 foot contour interval. The contour interval selected shall be sufficiently small to clearly show surface water flow patterns within and around the facility. This plan sheet shall show the following features:

(a) 100-year floodplain area.

(b) Surface waters, including intermittent and ephemeral streams and wetlands.

(c) Homes, buildings, human-made features and utility lines.

(d) Surrounding land uses, such as residential, commercial, agricultural and recreational.

(e) Property and waste boundaries, including any previous fill areas.

(f) Access control, such as fences and gates.

(g) Water supply wells including irrigation and stock wells, as well as public and private water supply wells.

(h) Boring, test pit and well locations.

(i) Other structures including runoff control systems, agricultural drain tile systems, access and internal roads, and storm and sanitary sewerage systems.

(2) **GEOLOGIC CROSS-SECTIONS.** Cross-sections shall be constructed through all borings, both perpendicular and parallel to the facility base-line, as well as along and across transects which include major geologic and geomorphic features such as ridges, valleys and buried bedrock valleys. At least one cross-section shall be constructed parallel to ground-water flow. Where more than one interpretation can be reasonably made, conservative assumptions shall be used when evaluating heterogeneities within the unconsolidated deposits. The following information shall be presented on the geologic cross-sections:

(a) Inferred or questionable lithostatigraphic boundaries shall be shown with a dashed line or question mark.

(b) For clarity, a number or symbol shall be used to label major soil units instead of extensive shading. A key shall be provided which con-

tains a description of each major soil unit including geologic description and origin, USCS classification and color.

(c) Boring logs showing the USCS classification of each major soil unit, the results of grain size analyses, Atterberg limits, and lab and field hydraulic conductivity tests. The data shall be correlated to the sample location.

(d) Well construction details shown to scale including the well screen and filter pack length, the location of the upper and lower seals and stabilized water level elevations measured on the same day. Where 2 or more water table observation wells are presented on a cross-section, a line representing the water table shall be drawn. The date the measurements were taken shall be specified in the key.

(3) **WATER TABLE MAPS.** At least 2 water table contour maps shall be presented. The maps shall be based on monthly water table elevations documenting the seasonal high and low water table. For each sampling round, all water level elevations shall be measured on the same day. The water table maps shall show all wells and the measured water level elevation at each well. If 3 or more bedrock wells are installed, a bedrock piezometric map shall be prepared.

(4) **BEDROCK MAP.** Where at least 3 borings to bedrock are required, a bedrock contour map shall be prepared from specific and regional data.

(5) **FLOW NET.** A flow net shall be constructed parallel to the direction of groundwater flow to show the distribution of recharge and discharge.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; correction in (1) (c) made under s. 13.93 (2m) (b) 5, Stats., Register, May, 1994, No. 461.

NR 512.14 Water budget and liner efficiency. (1) **WATER BUDGET.** A water budget shall be prepared for the periods of time during active operations when the maximum amount of area has been filled but not capped and following facility closure. At a minimum, the following factors shall be considered in the preparation of the water budget:

- (a) Average monthly temperature,
- (b) Average monthly precipitation,
- (c) Evaporation,
- (d) Evapotranspiration,
- (e) Surface slope and topsoil texture,
- (f) Soil moisture holding capacity and root zone depth,
- (g) Runoff coefficients,
- (h) Moisture contribution from the waste, and
- (i) Any groundwater contribution.

(2) **LEACHATE COLLECTION SYSTEM EFFICIENCY.** The collection efficiency of the leachate collection system shall be calculated using an approved analytical or numerical method. The factors to be considered in the calculation of collection efficiency shall include:

- (a) The saturated hydraulic conductivity of the liner,

- (b) Liner thickness,
- (c) The saturated hydraulic conductivity of the drainage blanket,
- (d) Drainage blanket porosity,
- (e) The base slope of the liner,
- (f) The maximum flow distance across the liner,
- (g) Annual infiltration, and
- (h) Any groundwater inflow.

(3) **LEACHATE GENERATION.** Information gained from the collection efficiency calculations shall be used to predict the daily volume of leachate collected and the volume of liquid that may permeate through the liner.

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

NR 512.15 Waste and leachate characterization. (1) **INDUSTRIAL WASTES.** Unless otherwise approved, the physical and chemical characteristics of all wastes and leachates shall be analyzed and described. When more than one waste is generated, testing shall be performed on each waste stream. All leaching tests shall be done in accordance with published test procedures. Physical tests shall be done in accordance with ASTM standards or published test procedures. All testing procedures shall be documented. The proposed testing program including the leaching test method, the leaching media, the parameters to be analyzed for and the detection limits for each parameter specified should be discussed with the department prior to initiation of the work. Actual field leachate data may be substituted for chemical characterization data of the waste at facilities for the disposal of industrial wastes only, if approved in writing by the department.

(2) **MUNICIPAL WASTES.** Actual field leachate data from existing facilities of similar size, design and waste type or an estimate of the anticipated leachate quality available from the department shall be included for all facilities for the disposal of municipal solid waste.

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

NR 512.16 Constraints on facility development. The feasibility report shall contain a discussion of constraints for the development of the proposed facility. This shall include:

(1) **LOCATION AND PERFORMANCE STANDARDS.** A demonstration that the facility will meet location and performance standards in s. NR 504.04.

(2) **GEOTECHNICAL INFORMATION.** An analysis of the geologic, hydrogeologic, topographic and hydrologic features of the facility that may be favorable or unfavorable for landfill development.

(3) **CONSTRUCTION AND OPERATION.** A discussion of materials and support services required for landfill construction and operation. These shall include leachate treatment alternatives, limitations of any proposed wastewater treatment plants to treat leachate, quality and quantity of acceptable materials available for landfill liner and cap, and any specialized engineering structures to support landfilling activities.

(4) **EXISTING CONDITIONS.** For an expansion of an existing facility, the effectiveness of the existing design and operation shall be discussed. This shall include an evaluation of relevant monitoring data and a discussion of all plan modifications and remedial actions. Attainment or exceedances of any of the groundwater standards contained in ch. NR 140 shall also be noted and discussed.

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

NR 512.17 Proposed design. The feasibility report shall contain a proposed design based on conclusions outlined in the design constraints section of the feasibility report. This portion of the submittal shall consist of a report and preliminary engineering plans prepared in accordance with ch. NR 504. A general discussion of the proposed operating procedures shall also be included.

(1) **REPORT PREPARATION.** At a minimum, this portion of the narrative section of the feasibility report shall include the following information:

(a) Preliminary materials balance calculations, including sources for berms, liner, final cover system, drainage blanket, topsoil, daily and intermediate cover, and any other fill needed to construct the facility.

(b) Proposed methods for leachate and gas control including collection, containment and treatment. The capability of the wastewater treatment plants to accept leachate shall be discussed. An identification of the wastewater treatment plants the applicant is negotiating with to accept the leachate, if the plant is not directly controlled by the applicant.

(c) Proposed operating procedures including the method of facility development, filling sequence, access control for each phase, surface water control, screening, covering frequency as applicable and other special design features.

(d) A description of the proposed groundwater, leachate, surface water, gas, air, unsaturated zone and other monitoring programs to be implemented to meet the requirements of chs. NR 508 and 140.

(e) Proposed final use.

(f) Proposed method of demonstrating financial responsibility for closure and long-term care requirements. This shall include preliminary itemized cost estimates for land acquisition, facility preparation, construction of each major phase, daily operation, closure and long-term care. An estimated cost per ton for disposal shall also be included.

(2) **PRELIMINARY ENGINEERING PLANS.** The preliminary engineering design shall be presented on 24 inch x 36 inch plan sheets, unless an alternative size is approved by the department in writing, as follows:

(a) Proposed access, lateral extent of filling, phases of facility development, sub-base and base grades, slopes and the leachate collection system. The existing conditions map shall be used as a base map for this plan sheet.

(b) A plan sheet showing present topography, proposed base and sub-base grades, final grades, liner and final cover system configuration displayed on all geologic cross-sections intersecting the landfill.

(c) A monitoring plan sheet showing the proposed groundwater, leachate, surface water, gas, air, unsaturated zone and any other monitoring programs.

(d) A detailed plan sheet showing proposed closure sequence and final grades.

(e) A plan sheet showing the details of proposed design features for the major engineering structures at the facility.

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

NR 512.18 Identification and characterization of potential borrow sources.

(1) **GENERAL.** The feasibility report shall contain a discussion of each proposed borrow source for liner and capping purposes including the volume of acceptable material, total acreage, ownership, location by quarter - quarter section, present land use, transportation routes and any access restrictions, travel distance from the proposed waste disposal facility, surface water drainage patterns and significant hydrologic features such as surface waters, springs, drainage divides and wetlands. Clay borrow sources containing less than 5 feet of uniform thickness are approvable provided the applicant demonstrates a construction methodology and a documentation procedure to ensure the liner meets the requirements of s. NR 504.05(5) or 504.07(4). A clay enriched subsoil horizon less than 5 feet thick developed by soil forming processes over course grained parent material may not be an acceptable source of material for liner or cap construction. Specifications for acceptable material are contained in ss. NR 504.05(5) and 504.07 (4).

(2) **FIELD AND LABORATORY INVESTIGATIONS.** At a minimum, preliminary field and laboratory investigations to define the physical characteristics of the proposed clay borrow material shall include the information specified below unless an alternative geotechnical investigation program is approved by the department in writing. Applicants may submit an alternative program in cases where previous information exists regarding the proposed source.

(a) Ten test pits or borings for the first 5 or less acres and one test pit or boring for each additional one or less acre shall be excavated or drilled on a uniform grid pattern across each proposed borrow source to document the depth, lateral extent and uniformity of acceptable material. The department recommends using test pits as the method of borrow source investigation. Logs identifying the geologic origin, testing results, USCS classification and a visual description of each major soil unit encountered shall be included.

(b) A minimum of 2 representative samples from each test pit or boring shall be collected and tested in the laboratory for grain size distribution to the 0.002 millimeter particle size and Atterberg limits.

(c) A minimum of 5 representative samples for the first 10 or less acres and one additional sample for each additional 5 or less acres shall be tested for the relationship of water content to dry density using either the modified or standard Proctor method. Each Proctor curve shall be developed with a minimum of 5 points.

(d) A minimum of 20% of the samples used to develop the Proctor curves shall be used to evaluate the relationship between compaction and hydraulic conductivity. This shall be accomplished by testing the

sample corresponding to each point established on the chosen Proctor curves for hydraulic conductivity.

(e) All samples shall be classified according to the unified soil classification system.

(3) **DATA PRESENTATION.** The following information shall be submitted with the feasibility report:

(a) The calculated volume of acceptable material based on the information obtained from the test pits or borings.

(b) Property boundaries and test pit/boring locations shall be shown on a topographic map with a scale of one inch = 500 feet. The mapped area shall extend a minimum of 500 feet beyond the proposed borrow source.

(c) An isopach map showing the thickness of acceptable material.

(d) A description of the methods to be used for separating the acceptable material from any unacceptable material.

(e) A proposal for maintaining drainage, sedimentation control and proper abandonment of the property.

(f) All data obtained from the testing program.

Note: It may be necessary to obtain federal or state permits prior to excavating materials from a borrow source near surface waters or wetlands. It is the responsibility of the applicant or property owner to obtain any such permits.

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

NR 512.19 Environmental review. To aid the department in determining the need for an environmental impact report or environmental impact statement, the feasibility report shall include an environmental assessment section. This assessment shall address the following items:

(1) **PROJECT SUMMARY.** A brief summary of the project shall be included. Particular attention shall be given the following areas:

(a) The purpose and need for the proposed project including the history and background on the project.

(b) A listing of the statutory authority and other relevant local, state and federal permits or approvals required as well as a discussion of the need for exemptions, zoning changes and any other special permits.

(c) The estimated cost and funding source for the project.

(2) **PROPOSED PHYSICAL CHANGES.** A brief description of the proposed physical changes including:

(a) The changes in terrestrial resources. This discussion shall cover the quantity of material to be excavated and the lateral extent of soil removal; the quantity and source of materials to be imported for construction of the liner, final cover system, drainage blanket and perimeter berms. Any other significant terrestrial modifications such as soil placement necessary to reach the proposed sub-base grades, construction of access roads, surface water drainage features and sedimentation controls shall also be outlined.

(b) The changes in aquatic resources including the potential impacts to streams, wetlands, lakes and flowages. This discussion shall include discharge rates and volumes for groundwater control structures, leachate collection systems and surface water runoff under existing conditions as well as that anticipated during active operations and following closure.

(c) Buildings, treatment units, roads and other structures to be constructed in conjunction with the facility. This discussion shall include the size of the facilities and the number of miles of road to be constructed.

(d) Emissions and discharges such as dust, diesel exhaust, odors, gases, leachate, surface water runoff and collected groundwater associated with facility preparation, construction, operation, closure and following closure of the facility.

(e) Other changes anticipated with facility development.

(f) Maps, plans and other descriptive material to clarify the discussion such as a county map showing the general area of the project, a USGS topographic map, a plat map, zoning map, county wetlands map and a facility development plan.

(3) **EXISTING ENVIRONMENT.** A brief description of the existing environment that may be affected shall be included. At a minimum this shall contain:

(a) A description of the physical environment including the regional and local topography, geology, surface water drainage features, hydrogeologic conditions, air, wetlands and earth borrow sources as well as an evaluation of the groundwater quality data and overall performance of any existing solid waste facility.

(b) The dominant aquatic and terrestrial plant and animal species and habitats found in the area including threatened or endangered species and amount, type and hydraulic value of wetlands.

(c) Land use including dominant features and zoning in the area.

(d) Social and economic conditions including any ethnic or cultural groups.

(e) Other special resources such as archaeological, historical, state natural areas, and prime agricultural lands.

(4) **ENVIRONMENTAL CONSEQUENCES.** A brief discussion of the probable adverse and beneficial impacts including primary, indirect and secondary impacts shall include:

(a) The physical impacts which would be associated with facility design, construction and operation, including visual impacts, if applicable.

(b) The biological impacts including destruction and creation of habitat, alteration of the physical environment and any impacts to endangered or threatened species.

(c) The impacts on land use.

(d) The social and economic impacts to local residents and cultural groups and the communities and industries served by the facility.

(e) Other special resources such as archaeological, historical, state natural areas and prime agricultural lands.

(f) Probable adverse impacts that cannot be avoided including groundwater and surface water impacts, modifications of topography and any borrow source limitations on development around the facility, any loss of agricultural or forest land, displacement of wildlife and adverse aesthetic impacts for people in and around the facility.

(5) **ALTERNATIVES.** Identify, describe and discuss feasible alternatives including taking no action; enlargement, reduction or modification of the project; other facilities, locations or methods to the proposed action and their impacts. Particular attention shall be given to alternatives which might avoid some or all adverse environmental impacts, including proposed and existing solid waste disposal, recycling, incineration, transfer and reduction facilities that may serve to handle the waste expected to be disposed of at the proposed facility, taking into account the economics of waste collection, transportation and disposal.

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

NR 512.20 Needs. The feasibility report shall contain an evaluation to justify the need for the proposed facility in accordance with s. 144.44 (2) (nm), Stats., unless the facility is exempt under s. 144.44 (2) (nr), Stats.

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

NR 512.21 Waste reduction and recovery. The feasibility study shall include a detailed discussion of the alternatives to land disposal, as well as a description of any waste reduction incentives and recycling services to be instituted or provided with the proposed facility. At a minimum, this shall include:

(1) **WASTE TYPES AND QUANTITIES.** A description of the quantity and types of household, commercial, industrial, demolition and other wastes, plus a calculation of waste quantities by composition based on state estimated figures or other data if readily available. This includes newspaper, corrugated containers, glass, metal, plastic, yard waste, tires and other waste categories anticipated at the land disposal facility.

(2) **EXISTING REQUIREMENTS.** A summary of state laws and programs encouraging or mandating waste reduction and recovery and their application to the proposed facility for waste anticipated at the facility.

(3) **DESCRIPTION OF TECHNOLOGIES.** A brief description of the technologies and methodologies of waste reduction, reuse, recycling, composting and energy recovery as applicable to the anticipated wastes to be accepted at the proposed facility.

(4) **ON-GOING PROGRAMS.** A description of any known waste reduction or recovery programs in the area to be served by the proposed facility handling the type of waste anticipated at the proposed facility, including a description of their potential for expansion.

(5) **RECOMMENDATIONS.** A description of any recommendations for waste reduction and recovery in approved areawide solid waste management plans for all counties in the area to be served by the proposed facility.

(6) **CURRENT STUDIES.** A description of any known waste reduction or recovery studies being conducted for waste anticipated to be disposed of at the land disposal facility.

(7) **AVAILABLE RECOVERY MARKETS.** A description of the nearest available known markets for recoverable material from the waste anticipated to be disposed of at the proposed facility including:

(a) Market name and address,

(b) Market requirements for minimum quantities and preparation for deliverable material, and

(c) Prices paid for materials, including both current prices and ranges for the past 3 years, if available to the public.

(8) **POTENTIAL ENERGY MARKETS.** A description of energy users within the service area capable of using at least 25% of the energy available in the waste stream anticipated at the land disposal facility, or for the energy available from a minimum of 25 tons of waste per day, whichever is greater. At a minimum, consideration shall be given to both electrical generation and to steam production.

(9) **COSTS.** An estimate of the tonnage recovered, the capital costs, annual expenses, annual income and the net income or loss, based on current prices and for both the high ranges and low ranges of prices as determined in sub. (7) (c), for implementing each of the following as appropriate:

(a) Source separation drop off center,

(b) Curbside collection of recyclables from households,

(c) Collection of source separated recyclables from commercial and industrial generators,

(d) A mechanical processing facility for the recovery of materials,

(e) A yard waste composting program, including both home composting and a community composting drop-off program,

(f) A composting facility for mixed solid waste,

(g) Energy recovery, and

(h) Other recovery systems as appropriate.

(10) **FUTURE EFFORTS.** A description of any efforts to be implemented to either assist in the expansion of existing waste reduction and recovery programs or to develop new programs for waste reduction and recovery.

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