

Chapter NR 204

MUNICIPAL SLUDGE MANAGEMENT

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NR 204.01 Purpose. The purpose of this chapter is to establish discharge standards and monitoring requirements for the use and disposal of municipal and domestic wastewater sludge and grit and screenings. Section 147.02, Stats., requires a permit for the lawful discharge of any pollutant into the waters of the state. Section 147.015(13), Stats., defines "waters of the state" to include groundwater. It is the intent of the department through this chapter to restore, protect and maintain the physical, chemical and biological integrity of the surface water and groundwater of the state and to allow no detrimental effects to these resources.

History: Cr. Register, March, 1985, No. 351, eff. 4-1-85.

NR 204.02 Applicability. These rules govern the use and disposal of wastewater sludge and grit and screenings generated by any publicly owned wastewater treatment work or any privately owned domestic wastewater treatment work. These rules do not govern the use or disposal of sludge which is a hazardous waste as defined by s. NR 181.12, septage disposal or the practice of high rate disposal of sludge which is regulated under s. NR 180.14.

History: Cr. Register, March, 1985, No. 351, eff. 4-1-85.

NR 204.03 Definitions. The following definitions are applicable to terms used in this chapter. Definitions of other terms and the meaning of abbreviations are set forth in ch. NR 205.

- (1) "Application rate" means the annual loading limits placed on a landspreading operation normally expressed as dry tons/acre or gallons/acre.
- (2) "Available nitrogen" means the nitrogen which is present in the sludge in inorganic forms or is converted from organic forms and which can be absorbed and assimilated by growing plants.
- (3) "Available water capacity" means the amount of water which is readily held by the soil and available for plant uptake.
- (4) "Bedrock" means the rocks that underlie soil material. Bedrock may be present at the earth's surface when the weathered in-place consolidated material, larger than 2mm in size, is greater than 50% by volume.
- (5) "Cation exchange capacity" means the sum total of exchangeable cations absorbed by a soil, expressed in milliequivalents per 100 grams of oven dry soil.

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(6) "Crops for direct human consumption" means crops that are consumed directly by humans without prior processing to minimize pathogens.

(7) "Disposal" means the discharge, deposit, or dumping of any sludge so that the sludge or any of its constituents may enter the environment or any waters of the state or be emitted into the air.

(8) "Dry run" means a drainage pathway, either natural or artificial, with definable banks, which contains confined flow during periods of natural runoff.

(9) "Finished sludge product" means a sludge based product distributed or marketed to the public that is treated by a disinfection process or Process To Further Reduce Pathogens as identified in 40 CFR Part 257 and for which the permittee maintains records including the pathogens reduction process utilized and relevant operational data, chemical contaminant data, total nitrogen and moisture content data, and finished products labels.

(10) "Floodplain" means floodplain as defined in s. NR 116.03(14).

(11) "Food chain crops" means tobacco and crops grown for human consumption, pasture, forage and feed grain for animals whose products are consumed by humans.

(12) "Grit" means heavy solid materials such as sand, gravel and cinders as well as nonputrescible organic materials such as eggshells and fruit rinds.

(13) "Groundwater" means any of the waters of the state occurring in a saturated subsurface geological formation of permeable rock or soil.

(14) "High groundwater level" means the higher of either the elevation to which the soil is saturated as observed as a free water surface in an unlined hole, or the elevation to which the soil has been seasonally or periodically saturated as indicated by soil color patterns throughout the soil profile.

(15) "High rate disposal" means sludge disposal which exceeds the annual or lifetime application rates as required for specific crops and sites.

(16) "Incorporation" means the mixing of sewage sludge with topsoil, by injecting, disking, mold-board plowing, chisel plowing or rototilling to a minimum depth of 4 inches.

(17) "Injection" means the subsurface placement of liquid sludge to a depth of 4 to 12 inches.

(18) "Landspreading" means the injection of sludge into the soil or the application of sludge to the soil surface.

(19) "Lifetime loading limit" means the maximum amount of a specific substance that can be applied to a particular site based upon the physical and chemical characteristics of specific sites.

(20) "Pasture crop" means a crop such as legumes, grasses, grain stubble or stover which is consumed by animals while grazing.

(21) "Pathogens" means organisms, including microorganisms, viruses, and all forms of animal parasites, which are capable of producing an infection or disease in a susceptible host.

(22) "PCBs" means polychlorinated biphenyls.

(23) "Permit" means Wisconsin pollutant discharge elimination system (WPDES) permit.

(24) "Permeability" means the rate of the movement of liquid through the soil.

(25) "Privately owned domestic wastewater treatment work" means a facility which has a permit under ch. 147, Stats., and which treats domestic wastewaters and which is owned and operated by a non-municipal entity or enterprise such as a mobile home park, restaurant, hotel, motel, country club, etc.

(26) "Publicly owned wastewater treatment work" has the meaning specified under s. NR 211.03(8).

(27) "Raw sludge" means sludge that has not received biological, chemical, physical or thermal treatment that would significantly reduce the volatile solids or pathogens in the sludge, and includes sludge from primary and secondary sedimentation tanks and secondary activated sludge which has not been treated with facilities designed and operated in conformance with s. NR 110.26.

(28) "Screenings" means coarse sewage solids collected from devices such as gratings, wire mesh or perforated plates.

(29) "Site" means any property used for disposal or storage of sludge.

(30) "Sludge" means the accumulated solids resulting from the biological or chemical treatment, coagulation, flotation, filtration or sedimentation of wastewater.

(31) "Soil" means the unconsolidated material which overlies bedrock.

(32) "Soil conservation practice" means a measure used to retain surface water and soil on agricultural fields, including but not limited to contour strip cropping, terracing and grassed waterways.

(33) "Soil pH" means the pH of the soil in the plow layer as measured in water by a pH meter with a glass electrode.

(34) "Stabilization of sludge" means any combination of chemical, physical, thermal, or biological treatment processes which result in a significant reduction in the percentage of volatile solids in the sludge.

(35) "Surface application" means spreading sludge on the surface of the land without incorporation.

(36) "Surface water" has the meaning specified under s. NR 101.03(4).

(37) "Wisconsin soil testing program" means the soil analysis and fertilizer recommendation program established by the university of Wisconsin-extension through the soil science department.

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NR 204.05 Permit requirement. No person may dispose of sludge unless the disposal is done in accordance with the conditions in a permit issued by the department. The generator of the regulated wastes shall be responsible for the disposal of wastes. In the event the generator employs an independent hauler, the generator and the independent hauler shall be severally and jointly responsible for the disposal of the wastes.

History: Cr. Register, March, 1985, No. 351, eff. 4-1-85.

NR 204.06 Sludge management reporting requirements. The following reports shall be submitted to the department as required by the permit.

(1) **GENERAL SLUDGE MANAGEMENT INFORMATION REPORT.** The report shall include but not be limited to:

(a) The sources, processes, and treatment systems at the treatment facility from which the sludge originates.

(b) Sludge treatment or processing techniques used prior to disposal or land application.

(c) The mode of sludge transportation, including the name of the transporter of the sludge, the type of vehicle used for sludge transportation, and, when applicable, the methods used to spread the sludge on the site.

(d) The volume of sludge generated on a daily, monthly and annual average basis.

(e) The provisions for storing sludge when the landspreading sites are unavailable or inaccessible.

(2) **SLUDGE CHARACTERISTICS REPORT.** (a) *General.* The permittee shall report the physical, chemical and biological characteristics of the sludge or finished sludge product at intervals specified in the permit. The sludge sample shall be collected at the point the sludge is discharged from the plant for disposal. If a permittee generates more than one type of sludge, each sludge type shall be sampled and analyzed at a frequency specified in the permit.

(b) *Parameters.* The department may require that the sludge or finished sludge product sample be analyzed for any or all of the following parameters, depending on the size and character of industrial flows to the sewerage system:

1. Physical characteristics such as the percentage of total solids.
2. pH.
3. Nitrogen, phosphorus and potassium.
4. Arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc.
5. Chlorides, fluorides and sulfates.
6. Total coliforms and fecal coliforms.
7. Oils and greases, phenolics, pesticides, toxic substances and persistent organics.

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8. Any other pollutants which the department determines may be present in the sludge.

(c) *Sampling and analytical methods.* Unless otherwise specified in the permits:

1. The procedures for taking samples of sludge shall be those set forth in ch. NR 218, and

2. The methods of analysis for substances contained in sludge shall be those set forth in ch. NR 219.

(3) **LANDFILLING AND PUBLIC DISTRIBUTION REPORT.** The report shall include the following information for all sludge or finished sludge product disposed of at any solid waste disposal facility or by means of public distribution.

(a) The permittee shall report, at a frequency specified in the permit, the volume of sludge disposed of at any solid waste disposal facility. The report shall include the name of the solid waste disposal facility and DNR license number for each such facility used during the report period.

(b) The permittee shall report the name, address, phone number, and volume of sludge removed from the treatment facility by either commercial or domestic users when the sludge is used for non-agricultural purposes.

(c) The permittee shall report the volume of sludge or finished sludge product sold commercially in bulk and bag both instate and out of state.

(4) **AGRICULTURAL SITE CHARACTERISTICS AND OPERATIONS REPORT.** The permittee shall submit sufficient information to allow the department to properly evaluate each site. The report shall include but not be limited to:

(a) The location of the site delineated on either a soils map, plat map, air photo, or a U.S. geological survey topographic map.

(b) The ownership of the site as well as a description of any contracts or agreements covering use of the landspreading site.

(c) The results of analyses of soil samples taken from the land disposal site. The samples shall be analyzed for soil type, soil pH, cation exchange capacity, organic matter, available phosphorus, exchangeable potassium and any other parameters deemed necessary by the department. Soil tests must be conducted after every 3 years of site use.

(d) The name of the person or firm applying the sludge if the sludge spreading is performed by a contract hauler.

(e) The land use of the site and adjacent properties.

(f) The distance to the nearest residence, nearest public and private water supply and nearest surface water.

(g) An estimate of the total acreage to which the sludge will be applied.

(h) The crops to be grown or the dominant vegetation on the landspreading site.

(i) Any groundwater, surface water or plant tissue monitoring programs which are required by the department in the permit. The department

ment may require a site monitoring program if the land application practices of the permittee may result in a threat to the environment or public health.

(5) **SLUDGE DISPOSAL LAND APPLICATION RECORDS REPORT.** Sludge application records shall be submitted to the department on a frequency established in the permit. The records shall include the following information for each site utilized during the report period:

- (a) The number of acres on which sludge was spread.
- (b) The amount of sludge applied per acre reported in gallons or cubic yards per acre.
- (c) The amount of available nitrogen applied in pounds per acre on a dry weight basis.
- (d) The amount of cadmium, copper, lead, nickel and zinc applied in pounds per acre on a dry weight basis.
- (e) The results of groundwater, surface water, and plant tissue monitoring programs established under sub. (4).
- (f) The department may require delineation of the site or portion of the site actually landspread each year on a soils map or aerial photograph.
- (g) The department may alter the record reporting requirements in the permit based on size and complexity of the permittee's landspreading program.

History: Cr. Register, March, 1985, No. 351, eff. 4-1-85.

NR 204.07 Landspreading of sludge. (1) GENERAL. (a) No person may operate a sludge landspreading program which does not conform with the requirements of a permit and this chapter. Written approval from the department for each site on which sludge is landspread shall be obtained prior to landspreading. The department shall review and issue either a written approval or denial within 60 business days following receipt of the site submittal unless weather conditions preclude adequate site evaluation. Each site shall be reviewed and approved based on information contained in the reports required by s. NR 204.06 and the criteria in sub. (2). Failure to comply with the conditions of site approval may result in the revocation of site approval and shall be grounds for referral for a violation of s. 147.02, Stats. Reapproval shall be contingent on submittal of an operations report for the site which must specify how further violations will be avoided.

(b) Sludge may not be surface applied on sites where crops are grown which will be grazed by or fed to dairy cows within 1 month of sludge application, or where cereal grains will be harvested within 2 months of sludge application.

(c) Sludge may not be surface applied on sites where non-dairy animals are grazed or feed is green chopped within 2 weeks of sludge application.

(d) Public access to sludge application sites shall be restricted for a period of 6 months after sludge application. Access may be restricted by remote location, fencing or posting of the application site in order to minimize human contact with the sludge.

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(e) Raw sludge may not be landspread except on an emergency basis after the permittee receives written approval by the department. Incorporation shall be used to landspread the raw sludge and the requirements of par. (a) shall be met. The department may require the permittee to take action to prevent reoccurrence of the emergency.

(f) Sludge may not be applied to land which is to be used within 18 months of the application for the production of crops for direct human consumption if the edible portions of the crop would be in contact with the sludge.

(g) Sludge shall be landspread in a manner to prevent surface runoff and to control objectionable odors.

(h) Sludge spreading vehicles must be moving forward at all times while sludge is being spread.

(i) Sludge which has a PCB concentration greater than 50 mg/kg may not be landspread unless the management plan is approved by the EPA Region V Administrator pursuant to 40 CFR 761.10(a)(5).

(2) SITE CRITERIA. Landspreading sites shall be reviewed and approved by the department based on the following criteria.

(a) Sludge may not be landspread on slopes greater than 12%.

(b) Liquid sludge shall be injected on sites with slopes between 6% and 12% in order to prevent runoff.

(c) Cake sludge may be surface applied on sites with slopes greater than 6% but less than 12% with department approval. The department may require incorporation. If required, sludge should be incorporated within 24 hours but in no case greater than 72 hours. The department approval shall be based on the crop grown, the sludge loading rate and topography of the site.

(d) Sludge may not be landspread on sites with slopes greater than 2% from December 1 through March 31 unless the site is approved by the department for wintertime spreading. The approval shall be based on the ground cover, sludge loading rate, sludge characteristics and topography of the site.

(e) Sludge may not be landspread from December 1 through March 31 on sites with slopes greater than 6%.

(f) Sludge may not be applied to soils with a high groundwater level at a depth of less than 3 feet unless it is demonstrated that the soil has an available water capacity greater than 5 inches above high groundwater.

(g) Sludge may not be applied to soils with a depth to bedrock less than 3 feet unless it is demonstrated that the soil has an available water capacity greater than 5 inches above bedrock.

(h) Sludge may not be landspread on sites with soils which have rapid permeability of greater than 6 inches per hour unless the department through consideration of sludge characteristics, loading rate and cropping practices determines the impact on groundwater quality will be minimal.

(i) Sludge may not be landspread in wetlands or in areas subject to flooding or ponding.

(j) Sludge may not be spread within 200 feet of a private water supply well.

(k) Sludge may not be spread within 1000 feet of a public water supply well.

(l) Sludge which is incorporated with the soil may not be spread less than 200 feet from any residence unless written acceptance from the occupants and owner is obtained; less than 50 feet from streams, ponds and other channelized waterways; or less than 25 feet from a dry run.

(m) Sludge which is surface applied may not be spread less than 500 feet from any residence unless the occupants agree in writing to a lesser distance; less than 100 feet from streams, ponds and other channelized waterways; or less than 25 feet from a dry run or wetland.

(n) Sludge may not be landspread on any site which the department determines that the spreading of sludge will have a detrimental effect on air, surface water or on groundwater quality.

(o) The pH of the soil and sludge mixture shall be 6.5 or greater at the time sludge is landspread unless it can be shown that the sludge will modify the soil pH to 6.5 or greater. Where the concentration of cadmium in the sludge is 2 mg/kg (dry weight) or less, the soil pH may be less than 6.5.

(3) APPLICATION RATES. Sludge may not be applied at loading rates in excess of those listed in this subsection.

(a) The volume of sludge applied annually on a site may not exceed that which is necessary to supply the nitrogen need of the crop to be grown as determined by the analysis of soil samples. The nitrogen recommendations shall be based on the university of Wisconsin soil test recommendations program except as allowed in par. (b).

(b) Sludge may be applied to leguminous crops at a volume sufficient to supply 200 lbs/ac available nitrogen.

(c) No more than 0.5 kg/ha (0.45 lbs/ac) of cadmium may be spread annually on land used for production of tobacco, leafy vegetables or root crops grown for direct human consumption. The amount of cadmium spread annually on land on which other food-chain crops are grown may not exceed the levels listed in Table 1.

TABLE 1

Time Period	Annual Cd Application Rate	
	kg/ha	lbs/ac
July 1, 1984 to December 31, 1986	1.25	1.11
Beginning January 1, 1987	0.50	0.45

(d) The cumulative amount of cadmium spread on any site may not exceed the levels listed in Table 2.

TABLE 2

Soil Cation Exchange Capacity (meq/100g)	Maximum cumulative application			
	Soil pH less than 6.5		Soil pH 6.5 or greater	
	kg/ha	lbs/ac	kg/ha	lbs/ac
Less than 5	5	4.5	5	4.5
5-15	5	4.5	10	9
Greater than 15	5	4.5	20	18

(e) The cumulative amount of copper, lead, nickel and zinc spread on any site may not exceed the levels listed in Table 3.

TABLE 3

	Soil Cation Exchange Capacity (meq/100g)							
	Less than 5		5-10		10-15		Greater than 15	
	kg/ha	lbs/ac	kg/ha	lbs/ac	kg/ha	lbs/ac	kg/ha	lbs/ac
Lead	500	445	1,000	890	1,500	1,335	2,000	1,750
Zinc	250	225	500	445	750	670	1,000	890
Copper	125	110	250	220	375	335	500	445
Nickel	50	45	100	90	150	135	200	180

(f) Sludge containing concentrations of PCBs equal to or greater than 10 mg/kg (dry weight) shall be incorporated into the soil when applied to land used for producing animal feed, including pasture crops for animals raised for the purpose of producing milk. The department on a case-by-case basis may allow incorporation of the sludge into the soil if it is assured that the PCB content is less than 0.2 mg/kg (actual weight) in animal feed or less than 1.5 mg/kg (fat basis) in milk from animals consuming the feed.

(g) The department may on a case-by-case basis limit or prohibit the land disposal of sludges containing additional pollutants such as, but not limited to, phenolics, pesticides, and persistent organics. Any such limit or prohibition shall be based on waste characteristics, soil cation exchange capacity, type of crop grown, and other factors the department determines relevant.

History: Cr. Register, March, 1985, No. 351, eff. 4-1-85.

NR 204.08 Public distribution. The department may approve distribution of sludge to the general public for unrestricted use. Distribution of finished sludge products as defined in s. NR 204.03(9) are exempt from these requirements. The permittee shall provide written instructions on the use of sludge. The instructions shall include a listing of crops which should not be grown on sludge amended soils. These instructions shall be reviewed and approved by the department prior to use. The following criteria shall also be considered by the department prior to approval of the sludge distribution program:

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(1) The contaminant concentration of the sludge shall not exceed those specified in the following table.

	Concentration (Dry Weight)
Cadmium	10 mg/kg
Lead	250 mg/kg
PCB's	2 mg/kg

(2) Distribution records shall be maintained in order to comply with s. NR 204.06(3).

History: Cr. Register, March, 1985, No. 351, eff. 4-1-85.

NR 204.09 Landfill disposal. (1) **GENERAL.** Disposal of sludge at a sanitary landfill shall comply with the requirements of ch. NR 180.

(2) **APPROVAL.** The permittee shall obtain approval from the department prior to the disposal of sludge at a licensed sanitary landfill.

History: Cr. Register, March, 1985, No. 351, eff. 4-1-85.

NR 204.10 Storage facilities. (1) **GENERAL.** No person may construct any sludge storage facility without first obtaining department approval. All such facilities shall be designed in accordance with the appropriate requirements of ch. NR 110.

(2) **OTHER STORAGE FACILITIES.** Sludge may be stored at sites such as, but not limited to, manure storage facilities and septage storage lagoons following review and acceptance by the department of an operations report. This report must include at a minimum:

- (a) The facility location of the storage facility.
- (b) The type and volume of the storage facility, including construction details.
- (c) Sufficient site characteristics information to evaluate the environmental impact and suitability of such sludge storage.
- (d) The name and address of the owner of the storage facility.
- (e) Any contractual arrangements involved.
- (f) The type and composition of any wastes other than sludge to be stored at the facility.
- (g) Annual sampling and analysis of the combined wastes in accordance with requirements in the permit and s. NR 204.06(2).
- (h) The methods to be used for landspreading the sludge or sludge mixture.

History: Cr. Register, March, 1985, No. 351, eff. 4-1-85.

NR 204.11 Sludge management plan. The department may require the development of a sludge management plan in addition to the reports specified in the permit if the permittee exhibits an inability to comply with the requirements of the permit or of this chapter. The plan shall include a description of the facility's sludge management program and

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how the facility plans to operate in compliance with the requirements of this chapter.

History: Cr. Register, March, 1985, No. 351, eff. 4-1-85.

NR 204.12 Grit and screening disposal. All grit and screenings generated from facilities designed in accordance with s. NR 110.16 or 110.17 shall be disposed of at a solid waste disposal facility licensed under ch. NR 180.

History: Cr. Register, March, 1985, No. 351, eff. 4-1-85.

NR 204.13 Sludge management program standards and requirements based upon federally promulgated regulations. (1) In the event that federal regulations establishing sludge management program standards or requirements are promulgated for any permittee to which the provisions of this chapter apply, the department may implement and enforce those federal standards and requirements after publishing a notice of its intent to do so in the Wisconsin administrative register.

(2) The department shall, as soon as possible after the promulgation of any federal regulation establishing sludge management program standards or requirements as described in sub. (1), adopt appropriate standards or requirements for permittees subject to this chapter.

History: Cr. Register, March, 1985, No. 351, eff. 4-1-85.